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Notice of Meeting UNIVERSITY OF HAWAI'I BOARD OF REGENTS

Board business not completed on this day will be taken up on another day and time announced at the conclusion of the meeting.

Date: Thursday, May 19, 2022

Time: 9:30 a.m.

Place: Honolulu Community College Norman W.H. Loui Conference Center Building 2, Room 201 874 Dillingham Blvd. Honolulu, Hawai'i 96817

See the Board of Regents website to access the live broadcast of the meeting and related updates: <u>www.hawaii.edu/bor</u>

<u>AGENDA</u>

I. Call Meeting to Order

II. Approval of the Minutes of the April 21, 2022 Meeting

III. Public Comment Period for Agenda Items:

All written testimony on agenda items received after posting of this agenda and up to 24 hours in advance of the meeting will be distributed to the board. Late testimony on agenda items will be distributed to the board within 24 hours of receipt. Written testimony may be submitted via the board's website through the testimony link provided on the <u>Meeting Agendas</u>, <u>Minutes and Materials</u> page. Testimony may also be submitted via email at <u>bor.testimony@hawaii.edu</u>, U.S. mail at 2444 Dole Street, Bachman 209, Honolulu, HI 96822, or facsimile at (808) 956-5156.

Those wishing to provide oral testimony virtually may register <u>here.</u> Given the constraints with the format of hybrid meetings, individuals wishing to orally testify virtually must register no later than 7:30 a.m. on the day of the meeting in order to be accommodated. Registration for in-person oral testimony on agenda items will also be provided at the meeting location 15 minutes prior to the meeting and closed at the posted meeting time. It is highly recommended that written testimony be submitted in addition to registering to provide oral testimony. Oral testimony will be limited to three (3) minutes per testifier.

All written testimony submitted are public documents. Therefore, any testimony that is submitted orally or in writing, electronically or in person, for use in the public meeting process is public information and will be posted on the board's website.

IV. Report of the President

A. COVID-19 Update

For disability accommodations, contact the Board Office at (808) 956-8213 or <u>bor@hawaii.edu</u>. Advance notice requested five (5) days prior to the meeting.

- B. SCR201 Task Force Next Steps Progress Report
- C. Strategic Plan Progress Report
- D. Update on Collective Bargaining Agreements and Student Employment
- E. Other
- F. Honolulu Community College Campus Presentation

V. Report of the University of Hawai'i Foundation

VI. Committee and Affiliate Reports

- A. Report from the Committee on Academic and Student Affairs
- B. Report from the Committee on Personnel Affairs and Board Governance
- C. Report from the Committee on Research and Innovation
- D. Affiliate Reports
 - 1. University Health Partners of Hawaii

VII. Agenda Items

- A. Consent Agenda
 - 1. Approval of Established Status for the PhD Program in Nutritional Sciences at the University of Hawai'i at Mānoa (UHM)
 - 2. Approval of Established Status for the Bachelor of Arts in Astronomy and the Bachelor of Science in Astrophysics at UHM
 - 3. Approval of Provisional Status for the Master of Architecture Degree at UHM
 - 4. Approval of Established Status for the Bachelor of Arts in Biochemistry and Bachelor of Science in Biochemistry Degrees at UHM
 - 5. Approval of Established Status for the Bachelor of Arts in Pacific Island Studies at UHM
 - 6. Approval of Established Status for the Master of Arts in Heritage Management at the University of Hawai'i at Hilo
 - 7. Approval of a New Provisional Certificate in Labor Studies at the University of Hawai'i West O'ahu
 - 8. Request Approval of Indemnification Provision to Allow the University of Hawai'i to Accept NASA Subawards from the Space Telescope Science Institute
 - 9. Request Approval of Indemnification Provision in an Agreement Between Curtin University, East Metropolitan Health Service, Purdue University and the University of Hawai'i
 - 10. Request Approval of Indemnification Provision in a Non-Exclusive Research and Materials License Agreement with Pioneer Hi-Bred International, Inc.

For disability accommodations, contact the Board Office at (808) 956-8213 or <u>bor@hawaii.edu</u>. Advance notice requested five (5) days prior to the meeting.

- B. Approval of Revisions to Regents Policy 5.201, Instructional Programs
- C. Request for Exception to Regents Policy 5.219, Emeritus/Emerita Title, for Christopher P. Lee, Director, Academy for Creative Media, University of Hawai'i
- D. Legislative Update
- E. Adoption of Final Report and Dissolution of the Maunakea Plan Review Permitted Interaction Group Recommending that the Board of Regents Review and Approve, and that the Board of Land and Natural Resources Approve, the 2022 Comprehensive Management Plan (CMP) Supplement Amending the 2009 CMP
- F. Approval of the 2022 CMP Supplement Amending the 2009 CMP, for Submission to the Board of Land and Natural Resources for Approval

VIII. Announcements

A. Next Scheduled Meeting: July 7, 2022, at University of Hawai'i at Manoa

IX. Adjournment

ATTACHMENTS

Attachment A – Personnel actions posted for information only, pursuant to Section 89C-4, Hawai'i Revised Statutes. These actions are not subject to approval by the Board of Regents.

Attachment A: Pursuant to §89C-4, Hawai'i Revised Statutes, the following proposed compensation actions for excluded Executive/Managerial are disclosed for purposes of public comment.

1 of 1

BOARD OF REGENTS

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DTS 22467

Executive/Managerial							DTS 22467
Campus	Last Name	First Name & Middle Initial	Proposed Title	Unit	Nature of Action	Monthly Salary	Effective Date
UH Manoa	Fallejo Uganiza	Sabrina	Interim Director of Student Affairs	Office of the Vice Provost for Student Success	Appointment	\$6,500	June 1, 2022 - May 31, 2023
Hawaii CC	Haleamau-Kam	Raynette	Director of the University of Hawaii Center	Palamanui	Appointment	\$9,134	May 20, 2022

DISCLAIMER – THE FOLLOWING ARE DRAFT MINUTES AND ARE SUBJECT TO FURTHER REVIEW AND CHANGE UPON APPROVAL BY THE BOARD

MINUTES

BOARD OF REGENTS MEETING

APRIL 21, 2022

I. CALL TO ORDER

Chair Moore called the meeting to order at 9:05 a.m. on Thursday, April 21, 2022, The meeting was conducted virtually with regents participating from various locations.

<u>Quorum (11)</u>: Chair Randy Moore; Vice-Chair Alapaki Nahale-a; Vice-Chair Benjamin Kudo; Regent Simeon Acoba; Regent Kelli Acopan; Regent Eugene Bal; Regent William Haning; Regent Wayne Higaki; Regent Diane Paloma; Regent Robert Westerman; and Regent Ernest Wilson.

<u>Others in attendance</u>: President David Lassner; Vice President (VP) for Administration Jan Gouveia; VP for Community Colleges (UHCC) Erika Lacro; VP for Legal Affairs/University General Counsel Carrie Okinaga; VP for Research and Innovation Vassilis Syrmos; Vice President for Information Technology/Chief Information Officer Garret Yoshimi; Vice President for Budget and Finance/Chief Financial Officer Kalbert Young; UH Mānoa (UHM) Provost Michael Bruno; UH West Oʻahu Chancellor Maenette Benham; Kapiʻolani Community College (KapCC) Chancellor Louise Pagotto; Executive Administrator and Secretary of the Board of Regents (Board Secretary) Kendra Oishi; and others as noted.

II. APPROVAL OF THE MINUTES

Chair Moore inquired if there were any comments or amendments to the minutes of the March 17, 2022, and March 18, 2022, meetings which had been circulated to board members for review. Hearing none, the minutes for both meetings were approved.

III. PUBLIC COMMENT PERIOD

Board Secretary Oishi announced that late written comments were received from the Mānoa Faculty Senate in the form of resolutions endorsing the proposed merger of classics into a new department of religions and ancient civilizations and opposing the 2021 reorganization of the John A. Burns School of Medicine (JABSOM). She also stated that no one had signed up to provide oral testimony.

Written comments may be viewed at the Board of Regents website as follows:

Late Written Testimony Comment Received

IV. <u>REPORT OF THE PRESIDENT</u>

A. <u>COVID-19</u>

President Lassner provided an update on the university's current state of affairs with regard to the COVID-19 pandemic, noting that statewide COVID-19 restrictions ended in March amid a subsidence of hospitalizations and fatalities. The university followed suit and lifted most on-campus restrictions, although the wearing of masks will still be required in classrooms, shared laboratory spaces, and other confined instructional spaces for the remainder of the spring semester. As such, campuses across the university system continue to progress toward a return to normalcy with increased campus presence and student activity, including the highly anticipated return of traditional, in-person commencement activities for the spring semester. It was also noted that campuses will afford graduates from 2020 and 2021 whose graduations were impacted by COVID-19 with the opportunity to take part in these ceremonies.

B. SCR 201 Task Force (Task Force) Next Steps Progress Report

The steering committee formed to address the recommendations and next steps contained within the report of the Task Force has developed several tasks that are correlated to each of the recommendations noted in the Task Force report, has met twice, and plans to hold weekly meetings to address this matter. While most of the Task Force report's recommendations appear to be straightforward, challenges are expected to be faced in addressing recommendations relating to specialist faculty, as well as the non-instructional faculty at the community colleges. Given the diverse roles and responsibilities of these positions across the university's campuses, the steering committee decided to form a working group that will meet over the summer to develop specific ideas that are responsive to the broad Task Force recommendations. The working group will be comprised of faculty senate for the provision of recommended individuals to be included in the working group will be forthcoming. President Lassner reiterated that any recommendations developed will be prospective and proceed through appropriate consultation.

C. Strategic Plan Progress Report

President Lassner stated that a strategic plan steering committee (SPSC) has been established based upon recommendations received from the university's campus and shared governance groups. The SPSC has met twice since its establishment discussing issues such as general strategic planning, strategic plans at other institutions, and the university's strategic directions, and will continue to meet bi-weekly throughout the summer. A website about the strategic plan has also been created and a systemwide survey requesting comments on possible critical themes and emerging issues to be considered within the strategic plan has been distributed to all members of the university community. The SPSC is expecting to review survey results at its next meeting and begin discussions on, among other things, the university's key aspirational goals. Town hall meetings to further engage university campus communities are also being planned for the last week in April and first week in May and a series of outreach communications and events are being developed to engage with, and solicit input from, the broader community over the summer.

D. Other

The university continues to do well in securing extramural research funding with just over \$422 million being received to date, an increase of approximately 10 percent as compared to the same period last year.

Registration for the fall semester has started and the administration will begin tracking this data to achieve a better understanding of fall enrollment trends. While it is still too early to predict fall enrollment numbers, the trend thus far appears to be positive, particularly at UHM.

Despite difficulties early in 2022, UHM Athletics has experienced numerous successes over the last few months including the reinvigoration of the UHM football program under the direction of new Head Football Coach Timmy Chang, as well as various achievements and championships in men's and women's basketball, women's golf, softball, baseball, women's sailing, men's volleyball, and women's water polo.

E. KapCC Campus Presentation

Chancellor Pagotto provided enrollment trend data for historically underrepresented student populations including Filipino, Native Hawaiian, Pacific Islander, and Pell Grant recipients, stating that enrollment among these demographics has remained relatively consistent despite declining overall student enrollment. KapCC is taking steps to address declining enrollment through initiatives such as increasing engagement with Department of Education (DOE) schools and conducting in-person campus tours to provide insights into the benefits of a post-secondary education as well as the collegiate experience. Virtual campus tours are also being conducted to attract both international students and students from the continental United States.

Chancellor Pagotto highlighted improvements in several benchmark categories such as certificates and degrees awarded to Native Hawaiian students, students enrolled in science technology engineering and math (STEM) disciplines, and Pell Grant recipients; transfers to baccalaureate degree institutions, including those within the university system; and first year college-level English and math completion rates, as well as areas of decline such as the overall amount of degrees and certificates awarded, the number of STEM graduates that continue to pursue their education at a four-year institution, and both fall-to-fall and fall-to-spring retention rates. Several programs have been developed to address some of these declining performance statistics including the classes in carts program which is aimed at increasing retention rates. Faculty are also analyzing data to identify factors leading to the decline in KapCC STEM graduates pursuing a degree at a four-year institution. While overall performance is improving, gaps between actual performance and established goals remain and is especially significant when comparing Native Hawaiian students to other student populations. KapCC is closely monitoring this issue and has begun to address some of the known causal factors for the gaps experienced by Native Hawaiian students including through increasing professional development opportunities for faculty.

Student surveys conducted in fall 2020 to better assess barriers that may be impacting academic success found that students faced a number of academic and personal challenges due to the COVID-19 pandemic including financial, food, and

housing insecurity; health and safety concerns; issues with school workload and academic support; and worries about basic needs. In response to these discoveries, KapCC has increased peer mentoring and tutoring; provided \$5.6 million in Higher Education Emergency Relief Fund monies as direct aid to students; and promoted the availability of scholarship funding. Chancellor Pagotto highlighted one such scholarship, the Kaneta Leadership Scholarship, which was established to honor the legacy of Lester and Marian Kaneta, the founders of KapCC's Lunalilo Program, and has been completely funded through the philanthropic efforts of Program graduates. KapCC's Basic Need and Food Security Committee has also prioritized the provision of direct services and emergency aid to assist students in meeting their basic needs and continues to work on communication campaigns as well as student outreach to better inform students of the types of support that are available on campus.

Faculty Report

Dr. Richard Halverson, KapCC Faculty Senate Chair, spoke about activities undertaken by the Faculty Senate throughout the academic year specifically mentioning work performed by its Curriculum Committee whose workload has more than doubled over the last two years due to the development of new online programs and the challenges of adapting to the new course instruction methodologies during the COVID-19 pandemic and reviewed data on some of the work undertaken by the committee. He also highlighted two professional development programs undertaken to address issues with distance education and prepare faculty members to better engage students in an online modality of instruction while ensuring that the educational needs of KapCC's students were met: the Teaching Online Preparation Program (TOPP) and a newly created distance education coaching program. The Faculty Senate also undertook activities related to assessing student learning outcomes including the holding of A'o Day, an all-day event consisting of campus-wide intra-departmental meetings to discuss methods, techniques, difficulties, and obstacles to teaching and assessment within each particular discipline. Ideas and best practices were then shared among all faculty members with the goal of improving overall instruction and learning outcome assessment at KapCC.

Student Report

Jenny Brown, President of the KapCC Student Congress (Student Congress), presented information on the work and achievements of the Student Congress highlighting several events aimed at addressing the basic needs of students. She reviewed initiatives undertaken to tackle financial and food insecurity concerns and spoke about projects established to attend to academic challenges faced by students including a safe places program that provided secure and quiet places on campus for students to study and meet other educational needs and a "classes-in-carts" event that was designed to use the registration process to promote student re-enrollment and engagement. She also noted increased efforts to better communicate and connect with constituents through online newsletters and emails that provide valuable, quality information about campus events, as well as resources that are available to students. Ms. Brown stated that the Student Congress looks forward to continuing to serve as the voice for KapCC students and advocating on their behalf.

Staff Report

Brandon Marc Higa, Co-Vice Chair of Communications for the KapCC Staff Council (Staff Council), and Stan Fichtman, ex-officio member of the Staff Council, provided background information on the establishment, membership, and work of the Staff Council which was recently formalized as an authorized governance organization. Mr. Higa stated that the Staff Council serves as the voice for all staff professionals at KapCC and is responsible for collaborating with campus administration on policies and operations that impact staff.

Mr. Fichtman reported on some of the projects and activities carried out by the Staff Council over the past year, including projects to advance professional growth opportunities, and highlighted several local and national awards received by staff members in recognition of their outstanding work. He also spoke about some of the challenges faced by staff during the COVID-19 pandemic explaining that staff requested that greater emphasis be placed on employee well-being and work-life balance through activities that promoted more social interaction during these difficult times. In response to these requests, the Staff Council collaborated with other campus groups to hold events that were designed to develop resilience through collegial support among all staff members at KapCC.

Mr. Higa reviewed the top priorities and future plans of the Staff Council stating that it is currently in the process of identifying staff members to serve as delegates to participate in ongoing governance and strategic planning activities that are occurring at the campus and university system levels. He also noted that the Staff Council supports the development of an All Campus Council of Staff Chairs that was first brought to the fore in discussions held among the seven staff governance organizations in 2017 and is excited about the prospect of collaborating further with the administration and the board on issues of importance to the university staff.

<u>'Aha Kalāualani Native Hawaiian Council ('Aha Kalāualani)</u>

Kapulani Landgraf, Kīpū of 'Aha Kalāualani, provided an overview of the purpose of 'Aha Kalāualani stating that one of its primary missions is to progress in all areas of education by creating programs and sharing resources that support Native Hawaiian programs at KapCC. She reviewed the membership and composition of the 'Aha Mole, or Executive Council, of 'Aha Kalāualani stating that each position on the Executive Council was based upon positions within a wa'a, or outrigger canoe, with each member being charged with a responsibility that works toward moving the entire council forward. She also reported on the activities and accomplishments of 'Aha Kalāualani over the past year including the publication of *Ka Wehena Kaiao*, a bilingual Hawaiian and English cultural and protocol guide, and the holding of events such as author presentations and cultural workshops to address and advance its kuleana.

Similar to other campuses within the university system, KapCC has begun its strategic planning process for the future. Chancellor Pagotto reported that a convocation held this spring to review KapCC's mission, suggest mission updates and possible amendments, and discuss concepts of importance that would allow KapCC to

effectively carry-out of this mission, as well as achieve its established goals, was attended by over 100 faculty members and staff. She also stated that conversations on this issue are continuing via online platforms; summits are being held among faculty, staff, and students to generate mission statements and discuss visions for the KapCC campus; and data gathering is ongoing.

Throughout the strategic planning process, KapCC has been committed to including student voices and has collaborated with the Campus Undergraduate Research Experiences Program, the Kapo'oloku Program for Native Hawaiian Student Success, and the National Science Foundation funded Bridge to Baccalaureate Program to create the Pāoa Student Researchers. Under the guidance of faculty and staff mentors, a cohort of 17 Pāoa Student Researchers has begun the process of researching and assisting KapCC in creating a strategic plan that will address student concerns and needs by initially reflecting upon their personal campus experiences, extrapolating these experiences into a broader picture, and expanding these efforts to include additional student perspectives through focus groups.

Pauwilo Look, a KapCC student and member of the Pāoa Student Researchers cohort, provided an overview of, and offered personal insights into, the work being conducted by the Pāoa Student Researchers. She noted the important role KapCC must play in developing diverse, critical thinking, problem solving individuals who are deeply rooted in the community. She also espoused the value of this program and the opportunities it provides to students, particularly those from underrepresented populations.

Regent Acoba requested clarification on the methods being used by KapCC to increase enrollment and asked about efforts to recruit international students and students from the continental United States. He also questioned whether efforts to increase enrollment were done in collaboration with other community colleges. Chancellor Pagotto replied that KapCC uses a number of approaches that are intended to boost interactions with high school students and include regular high school campus visits by specific programs and outreach counselors. Additionally, KapCC holds workshops with high school counselors each semester. KapCC believes that these actions lead to a greater awareness of the educational opportunities offered by the community colleges and elevate interest among high school students in pursuing a post-secondary education which in turn will result in increased enrollment. Recruiting international students, as well as students from the continental United States, has been made more difficult by the COVID-19 pandemic but engagement with these individuals still occurs through various online platforms, online videos promoting pathways available to attaining baccalaureate degrees, and the provision of virtual campus tours.

Stating that it was his understanding that the university had employed a consulting firm to assist with boosting enrollment, Regent Acoba inquired as to whether KapCC has utilized the services of this consultant to address its enrollment challenges. Chancellor Pagotto replied that KapCC is not a party to any enrollment consultation agreement but does track the results of these types of consultations provided to the university system to glean information that can be used to improve best practices with respect to enrollment management.

Regent Acoba questioned whether KapCC has established future enrollment goals. Chancellor Pagotto responded that KapCC formerly established enrollment goals based upon campus capacity. Given that the increased use of online and hybrid modalities of instruction has increased the educational capacity of KapCC, Chancellor Pagotto stated that establishing an enrollment goal has been difficult and that she was not prepared to make such a determination at this time. However, the ultimate goal of KapCC is to graduate as many students as possible to meet the State's needs.

Referencing data provided regarding the discontinuation of approximately 27 courses at KapCC, Regent Acoba asked about the process used to make this determination and whether consideration was given to the impact on students. Dr. Halverson replied that the course discontinuation process is rigorous including a process whereby the decision to terminate the course is reevaluated after five years. He explained that alternatives are established to address any impacts these actions may have on students. Additionally, KapCC counselors track the academic progress and needs of each KapCC student and are an integral part of the course discontinuation process.

Regent Acoba remarked that the concept of a staff council began at UHM and has since been adopted by other campuses throughout the university system. He praised the work of the staff councils noting that they have become a vital, contributory component of each campus. He also acknowledged Mr. Higa as a former student regent.

Citing faculty professional development efforts occurring at KapCC, Regent Wilson asked about the costs of these programs and whether these costs were reflected in the budget that is submitted by UHCC. Chancellor Pagotto replied that, while philanthropic donations, grants, and federal funding have allowed KapCC to provide some professional development opportunities, a large percentage of these activities are made possible by the volunteer efforts of faculty members. KapCC also promotes professional development as a volunteer program and works to adjust faculty assignments to allow individual faculty members to create, develop, and present a professional development program. Dr. Halverson concurred with Chancellor Pagotto's assessment stating that faculty members who volunteered to serve as coaches in the distance education coaching program were provided with a one course reduction in their faculty workload to allow time for them to evaluate the work of their peers.

Regent Wilson inquired as to whether the professional development programs pioneered by KapCC to improve online instruction was prevalent throughout the UHCC system. Chancellor Pagotto responded in the affirmative stating that KapCC is the primary provider of professional development with respect to the provision of online course instruction.

Mentioning the decline noted in STEM enrollment, especially among Native Hawaiian students, Regent Haning asked about the reasons for this decline. Chancellor Pagotto clarified that the enrollment in STEM courses has increased but that there has been a concomitant decrease in degree completion in STEM disciplines. She stated that the reasons for this decline are not fully understood, and data is being analyzed to better understand any causal factors.

Regent Haning questioned whether there was data on the numbers of KapCC STEM graduates who continued to pursue a STEM degree at a baccalaureate institution. Chancellor Pagotto replied that KapCC tracks students to degree completion and is aware of the number of students that continue their educational journey at a baccalaureate institution. However, a KapCC graduate's choice of major at a non-UH four-year institution is not a monitored data point but suggested that this is something that can be done in the future.

Regent Westerman questioned whether there was a correlation between a decline in the number of Pell Grant recipients and the decline in the number of students transferring to a four-year institution. Chancellor Pagotto stated that she has not yet had the opportunity to analyze whether there was a connection between these data points. However, she stated that KapCC has increased its efforts to connect student with financial resources and scholarship opportunities to assist them in continuing their post-secondary education. She also clarified that there has been an increase in the number of Pell Grant recipients enrolling at KapCC.

Vice-Chair Nahale-a inquired as to whether the Pāoa Student Researchers initiatives was administratively driven and questioned how student researchers were chosen to be a part of this program. Chancellor Pagotto replied that design of the Pāoa Student Researchers program was faculty and staff driven and was initiated as part of the administration's efforts to involve and engage students in the strategic planning process. Ms. Look provided an account of how she became involved in the Pāoa Student Researchers initiative, her ongoing educational and research activities at KapCC, and the impacts this program has had on her educational experience.

Regent Paloma lauded KapCC's provision of a quality education in a breadth of programs, particular those in the health sciences, stating that the community impacts of these programs are phenomenal and priceless. She applauded efforts to provide more educational opportunities for Native Hawaiian students and include Native Hawaiian culture in campus activities. She also praised the students of the Lunalilo Program for their philanthropic work in establishing the Kaneta Leadership Scholarship.

Regents commended the work of Chancellor Pagotto, Dr. Halverson, Ms. Brown, Mr. Higa, Mr. Fichtman, and the faculty, staff, and students of KapCC remarking that the collaboration on, involvement in, and genuine concern for improving the campus and its educational efforts was stellar.

V. REPORT OF THE UNIVERSITY OF HAWAI'I STUDENT CAUCUS (UHSC)

Maya Ward, Chair of the UHSC, stated that the UHSC is the official representative body that advocates for and supports approximately 51,000 undergraduate and graduate students across the 10-campus university system, and serves as the liaison between constituents and the university administration. She presented information on the organizational structure of the UHSC, as well as membership demographics, and spoke about its work and activities, highlighting several of UHSC's student driven priorities and initiatives. It was noted that one of the major initiatives undertaken this year was to improve continuity within the UHSC by establishing standing committees and an ad hoc committee to address current issues. In doing so, UHSC could address matters that are important to students in a more timely and effective manner. Ms. Ward also reviewed several impacts of the COVID-19 pandemic on the student body, as well as the UHSC's future plans, which include the activation of a UHSC website to increase student engagement and communication.

Regent Wilson inquired as to why the use of the Sustainability Tracking Assessment and Rating System (STARS) tool by each of the university's institutions was a priority for UHSC. Ms. Ward replied that sustainability was an issue of importance to students across the system and that the STARS assessment tool allows an institution to gain a baseline for sustainability practices. UHSC believes that improved and increased use of the STARS assessment tool will allow institutions to implement sustainability practices to the greatest extent possible. To avoid any unintended confusion, Chair Moore clarified that the STARS tool was different from the STAR GPS registration system.

Regent Acopan commended the work of the UHSC and expressed her belief that the creation of standing committees will go a long way in improving transitions when new delegates are appointed.

In an effort to more inclusive and engaging with the university community, President Lassner remarked that, going forward, campus presentations will include reports from all of the authorized governance organizations and Hawaiian councils for the respective campus, and that official, systemwide governance organizations will be invited to present at board meetings on a quarterly basis.

VI. COMMITTEE AND AFFILIATE REPORTS

A. Report from the Committee on Independent Audit

Committee Vice-Chair Acoba summarized the committee report.

B. Report from the Committee on Intercollegiate Athletics

Committee Chair Acoba summarized the committee report.

C. Affiliate Reports

<u>Career and Technical Education Coordinating Advisory Council (CTECAC)</u>: Regent Acoba reported that CTECAC met on March 24, 2022, at which time the annual report on the management of federal Career and Technical Education (CTE) funds provided to the State under the Perkins V Act for 2021 was reviewed and discussed. He stated that a recommendation was made to further disaggregate data contained within the report with respect to the categorization of Asian students and noted that CTECAC is recommending adoption of the report by the board when it next convenes as the State Board for Career and Technical Education. CTECAC also discussed the concept of using industry-recognized credentials in the area of workforce development and the educational pathways and curriculums being considered by UHCC and DOE to attain these credentials.

The meeting recessed at 10:52 a.m.

The meeting reconvened at 11:00 a.m.

VII. AGENDA ITEMS

A. Consent Agenda

- 1. Approval of an Indemnification Provision in Subawards between the Smithsonian Astrophysical Observatory and the University of Hawai'i for the 2022, 2023, and 2024 Calendar Years
- 2. Approval of an Indemnification Provision in a Contract Issued by the U.S. Fish and Wildlife Service to the University of Hawai'i
- 3. Approval of an Indemnification Provision to Allow the University of Hawai'i to Accept a National Aeronautics and Space Administration Research Subaward from the University of California, San Diego, Scripps Institution of Oceanography

Prior to acting on the consent agenda, Regent Acoba requested clarification as to why the university was purchasing additional liability insurance with respect to the aforementioned indemnification provisions. VP Young replied that the university was not purchasing additional liability insurance explaining that the university's chief financial officer was statutorily authorized to make the determination as to whether the purchase of additional insurance was necessary. In these instances, the university's existing insurance policy is sufficient to cover its liability. President Lassner added that the administration can include language in future indemnification requests to make clear as to whether or not the university is purchasing additional liability insurance.

Regent Westerman questioned the necessity of indemnification provisions in instances where the amount of an award being received is minimal. Chair Moore replied that individuals, corporations, or entities providing a grant, benefit, service, or interest in or right to use property often require indemnification as a condition for providing the benefit to the university.

Regent Wilson moved to approve the consent agenda, seconded by Regent Haning, and noting the excused absence of Vice-Chair Kudo, the motion carried with all members present voting in the affirmative.

B. Annual Sustainability Report

VP Gouveia introduced Mr. Miles Topping, Director of Energy Management and Mr. Matt Lynch, Director of Sustainability Initiatives in the Office of Sustainability (Sustainability Office), as well as Michael Unebasami, Associate Vice President (AVP) for Administrative Affairs for Community Colleges, who would provide updates on the university's net-zero energy use and sustainability efforts. She noted that the administration has had conversations about where the broad topic of sustainability fits within the realm of board oversight and suggested that a discussion on this matter at the end of the presentations would be helpful.

Mr. Topping provided a progress report on systemwide net-zero initiatives for fiscal year (FY) 2020-2021. While the university has only achieved seven percent of its net-zero goals to date, he stated that the rate of increase in the percentage of net-zero goals achieved was encouraging and that these figures were expected to grow exponentially over the next several years. The university also experienced a decrease in energy consumption for FY 2020-2021 which, when coupled with an 18 percent increase in energy efficiency and 43 percent increase in renewable energy production, has resulted in an 11 percent decrease in the amount of energy purchased from a utility. He noted that much of these successes can be attributed to the community colleges and introduced AVP Unebasami to provide insight into activities on those campuses.

AVP Unebasami spoke about energy efficiency and renewable energy production initiatives occurring at the community colleges and provided background on the twophased approach that is being used to achieve energy resiliency and self-sufficiency. Through the procurement of energy-saving performance contracts and data analysis, the community colleges have been able to determine their energy requirements when considering energy efficiency capabilities and the impacts these actions would have on energy consumption. The information gained through this analysis has allowed the community colleges to update their performance contracts and move ahead with the establishment of power purchase agreements and the installation of photovoltaic energy production systems. As such, the community colleges have been extremely successful in its renewable energy initiatives with the University of Hawai'i Maui College and Leeward Community College attaining the capability of producing as much energy as they consume over the course of a year and three of the remaining five campuses achieving upwards of 70 percent renewable energy production. AVP Unebasami provided specific information on the amount of renewable energy generation, energy storage capacity, and status of PV systems at each of the community college campuses and reviewed the next steps for the community colleges with respect to renewable energy initiatives, including the optimization of energy assets to create additional revenue for the university.

Mr. Topping presented a focused update on energy consumption and production for the UHM campus noting that, as a R1 research university with an average campus population of 23,000 on any given day, UHM's energy needs and consumption are immense, with many of its research facilities, laboratories, dorms, and information technology centers requiring 24-hour energy use. He reviewed energy efficiency and renewable energy production activities at UHM, including an energy-savings performance contract pilot project and max PV potential study; presented peak demand statistics; and provided a snapshot of the latest PV installations. He also summarized UHM's pursuit of the development of a strategic energy management plan, noting the progress achieved to date.

Mr. Topping spoke about endeavors to utilize the skills and knowledge of various campus partners to achieve energy resiliency and self-sufficiency highlighting a vehicle

to grid project developed in conjunction with the Hawai'i Natural Energy Institute at UHM. He also talked about the past efforts of student collaborators within the Sustainability Office and introduced Socheatha Chea Tork the current student energy manager who would be providing insights into his work.

Mr. Tork, a senior currently working on attaining his degree in biological engineering from the College of Tropical Agriculture and Human Resources, showcased several projects he executed over the last year, including an analysis of PV opportunities for JABSOM that modeled energy consumption, energy demand, and associated cost savings; and offered his observations on the benefits and challenges associated with being a student collaborator.

Mr. Lynch stated that global warming and climate change are already affecting and impacting the world, as well as the university, and that these transformative times will require integration of the concepts of sustainability across the operations, curriculum, research, and cultural engagement and connection functions of the university. He explained that an improved understanding of the concept of sustainability and its guiding principles coupled with a greater knowledge of Hawai'i's past indigenous practices and values places the university in a unique position to become a global leader in sustainability and ecological restoration efforts. He also discussed the university's use of the STARS tool, which was developed by the Association for the Advancement of Sustainability in Higher Education (AASHE) to be a mechanism by which a college or university could gauge its sustainability performance; reviewed selected highlights from the university's first AASHE STARS reports; and outlined the next steps that the university must take to be a global leader in sustainability and to better equip students with the knowledge, skills, and experiences to face uncertain climate futures.

Vice-Chair Kudo arrived at 11:44 a.m.

Referencing the amount of renewable energy generated by the Kaua'i Island Utility Cooperative (KIUC), Kaua'i's electric utility, Regent Westerman questioned whether Kaua'i Community College (KauCC) is made aware of the amount of energy it receives from KIUC that is renewable in its utility bill. AVP Unebasami replied that KIUC does not provide this detail of information on its electricity billing statement for KauCC.

Regent Westerman questioned whether KauCC will become a 100 percent net-zero energy campus in the future. He also espoused the benefits of simple energy efficiency measures such as the tinting of campus windows. AVP Unebasami replied that KauCC does not have the PV panel nor battery storage capacity to become a 100 percent net-zero campus and be taken off the electric grid. He also stated that it was not the intent of UHCC to remove any campus from the electric grid as PV energy production can be subject to meteorological conditions that would necessitate use of energy produced by standard means.

Citing the fragility of Hawai'i's water resources, which was brought to the forefront by the Red Hill aquifer crisis; the exacerbation of water resource shortages on a global scale resulting from rising temperatures due to climate change; and the impacts of

climate change on Hawai'i's shorelines, Regent Wilson stated that the issues of water resource management and climate change must be underscored when addressing the issue of sustainability.

Chair Moore requested that VP Gouveia elaborate on her suggestion regarding discussions on the structure for future sustainability reports. VP Gouveia stated that the administration attempts to formulate its annual sustainability report presentation with the mindset of providing information on topics and issues which it believes would be of interest to regents. However, it is not always clear as to whether this is the best approach to use and the administration was seeking feedback from regents on ways to make these presentations more beneficial and relevant.

Chair Moore suggested the possibility of developing a matrix displaying the economic, environmental, cultural, and social elements of sustainability and their relationship to the practices of the university with respect to operations, curriculum, research, and engagement and outreach with students and the broader community.

Regent Westerman concurred with the proposal to develop a matrix stating that perhaps a separate matrix could be developed for each of the elements of sustainability that included qualifying statements. He opined that this would allow the board to better monitor the sustainability efforts of the university and amend any policies as necessary to achieve sustainability goals.

Vice-Chair Nahale-a stated that the university needs to be more aspirational in its sustainability goals. He expressed his belief that this should be a core value and that philosophical principles of sustainability should be embedded throughout the university system. He also acknowledged the work of the Sustainability Office stating that it has continued to move forward towards attaining the university's sustainability goals despite a lack of clear guidance.

Regent Acopan lauded the work of Mr. Tork and asked whether the administration could develop more opportunities for students like Mr. Tork to actively engage in sustainability efforts given the level of interest in this matter across the university system. VP Gouveia replied that the Sustainability Office essentially consists of two individuals and stated that expansion and development of more opportunities to actively engage students on this issue may be possible should the university choose to further invest in campus sustainability efforts and advance the formalization of the Sustainability Office.

C. Legislative Update

VP Young reviewed the status of the supplemental operating and capital improvement projects (CIP) budgets passed by the Senate and House of Representatives (House) which are currently awaiting conference committee discussions. He provided comparative details on several provisions contained within the different versions of the supplemental operating and CIP budgets noting that the House and Senate versions of both budgets were favorable to the university. However, the Senate version also contained a large number of budget provisos which placed conditions and/or requirements upon several individual appropriations. He also reported on additional measures and priority issues that the university has been tracking, highlighting that none of the university's legislative package measures will pass the Legislature; presented the legislative calendar and timetable for the remainder of the session, which is expected to conclude in approximately two weeks; and noted that the Senate Committee on Higher Education has recommended confirmation for two Regent nominees and that a decision is expected to be rendered by the full Senate shortly.

Citing the differences in funding provided for athletics in each version of the budget, Regent Acoba asked whether these differences would be addressed in conference committee and whether the funds were for operating or capital costs. VP Young replied that the differences in the budgets would be dealt with in conference committee discussions and that the funds were for athletic department operating costs such as travel. He noted that, of the funds appropriated, \$4 million was for the restoration of the decrease in athletic funding experienced last year and reiterated that the Senate version of the operating budget contained stipulations on the use of some of the appropriations.

Regent Acoba asked if the funding provided for in the operating budget was separate and apart for the approximately \$18 million provided for expansion of the Clarence T.C. Ching Field. VP Young responded in the affirmative.

D. <u>Final Report of the Maunakea Plan Review Permitted Interaction Group</u> (Permitted Interaction Group) Recommending that the Board of Regents <u>Review and Approve, and that the Board of Land and Natural Resources</u> (BLNR) Approve, the 2022 Comprehensive Management Plan (CMP) <u>Supplement amending the 2009 CMP</u> (For Information Only – Pursuant to Section 92-2.5(b), Hawai'i Revised Statutes, regarding permitted interaction groups, no Board deliberation or action can or will occur at this meeting on the 2022 CMP Supplement amending the 2009 CMP or the report of the Maunakea Plan Review Permitted Interaction Group. Deliberation and decision making will occur at the next Board meeting.)

Chair Moore explained the processes, procedures, and statutory parameters that govern permitted interaction groups reiterating that discussions on this matter were prohibited at this meeting. He noted that the final report of the Permitted Interaction Group containing its findings and recommendations with respect to the 2022 CMP Supplement has been provided in the board materials packet, with discussion and potential action scheduled to occur at the next board meeting.

Vice-Chair Nahale-a, who served as the Chair of the Permitted Interaction Group, thanked the members of the group for their work and meaningful engagement on this issue, and acknowledged the efforts of staff. He stated that, despite being aware of the complexity of, and emotion involved in, matters regarding Maunakea, the Permitted Interaction Group remained focused on its task of reviewing the 2022 CMP Supplement. He also stated that several of the recommendations in the report were based upon transparency and accountability and that he was looking forward to having discussions on this matter at the next board meeting.

Dr. Greg Chun, Executive Director of Maunakea Stewardship, provided context to and background information on the 2022 CMP Supplement, as well as the processes used to develop this document. He stated that, concurrent with the development of the Maunakea Master Plan which was approved by the board in January of this year, the administration has been working on updating the CMP for Maunakea in anticipation of pursuing an application for a new master lease. It was noted that the CMP is the university's comprehensive plan to manage multiple uses and activities on Maunakea in order to protect and conserve natural and cultural resources and that the 2022 CMP Supplement is supplemental to, and not a replacement for, the 2009 CMP. He also provided an overview of an Outcome Analysis Report (OAR) which was commissioned to comprehensively assess 103 management actions relative to Maunakea to determine the status of each action and ascertain whether amendments are necessary; reviewed the procedures used to complete the OAR; highlighted the status of management actions contained within the OAR; and noted outreach efforts with respect to the development of the 2022 CMP Supplement.

VIII. EXECUTIVE SESSION (closed to the public)

Regent Wilson moved to convene in executive session, seconded by Regent Higaki, and with all members present voting in the affirmative, the board approved convening in executive session to deliberate concerning the authority of persons designated by the board to conduct labor negotiations or to negotiate the acquisition of public property, or during the conduct of such negotiations, pursuant to Section 92-5(a)(3), Hawai'i Revised Statutes (HRS); and to consult with the board's attorneys on questions and issues pertaining to the board's powers, duties, privileges, immunities, and liabilities, pursuant to Section 92-5(a)(4), HRS.

The meeting recessed at 1:04 p.m.

Regent Higaki left at 1:42 p.m.

Vice-Chair Kudo left at 1:58 p.m.

Regent Acoba left at 2:06 p.m.

Chair Moore called the meeting back to order at 2:16 p.m. and announced that the board met in executive session to discuss matters as stated on the agenda.

IX. ANNOUNCEMENTS

Chair Moore announced that the next board meeting was scheduled for May 19, 2022, at Honolulu Community College.

X. ADJOURNMENT

There being no further business, Chair Moore adjourned the meeting at 2:17 p.m.

Respectfully Submitted,

Kendra Oishi Executive Administrator and Secretary of the Board of Regents

Item VI. Report of the President A-E

NO MATERIALS ORAL REPORT

Item IV.F Report of the President HonCC Campus Report

MATERIALS



Board of Regents

PRESENTATION

Honolulu Community College May 19, 2022 Karen Lee, Ed.D.

Faculty Senate Executive Council Staff Senate Executive Council Kupu Ka Wai Council Student Government



Honolulu Community College Student Profile

Fall 2021

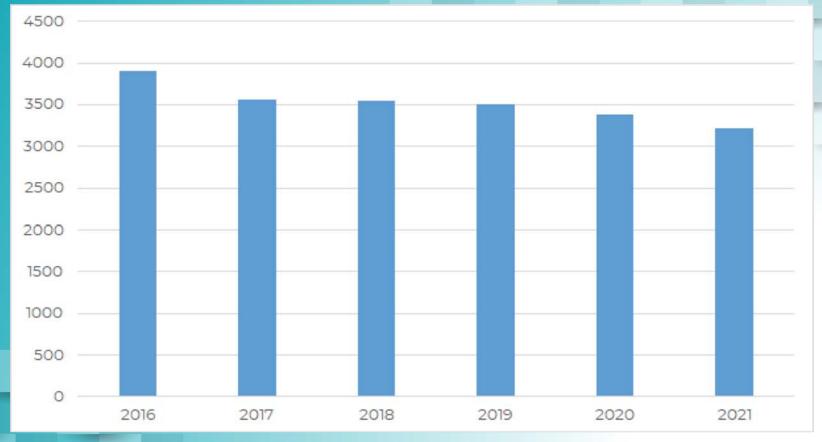
Credit student enrollment =3,210 Apprenticeship/non-credit enrollment =2,619

Credit student characteristics:

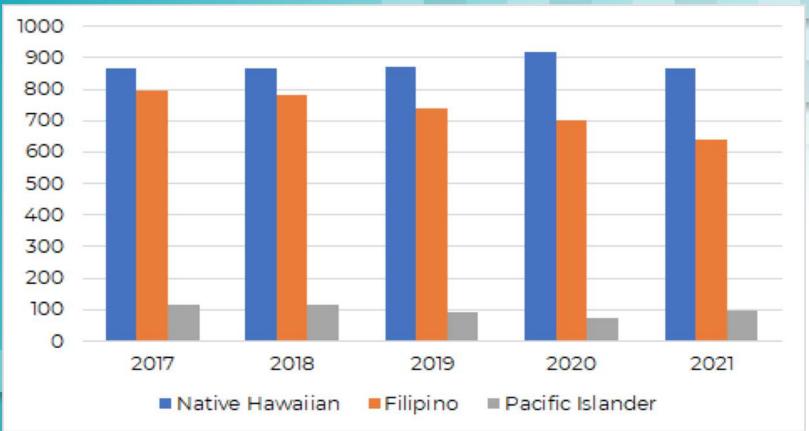
- 54% Male, 43% Female, 3% No Data
- 70% Career/Tech Ed, 20% Liberal Arts, 10% Unclassified
- 62% of students < 25 years old
- 72% of students are part-time, 28% full-time
- 73% of students are HonCC home-based, 27% are at other UH home-based institutions



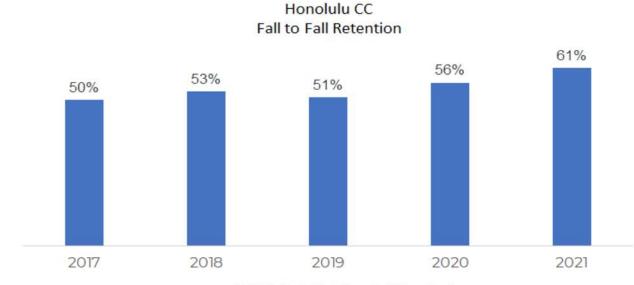
Fall Enrollment



Fall Enrollment - Ethnicity



IPEDS Retention Rate

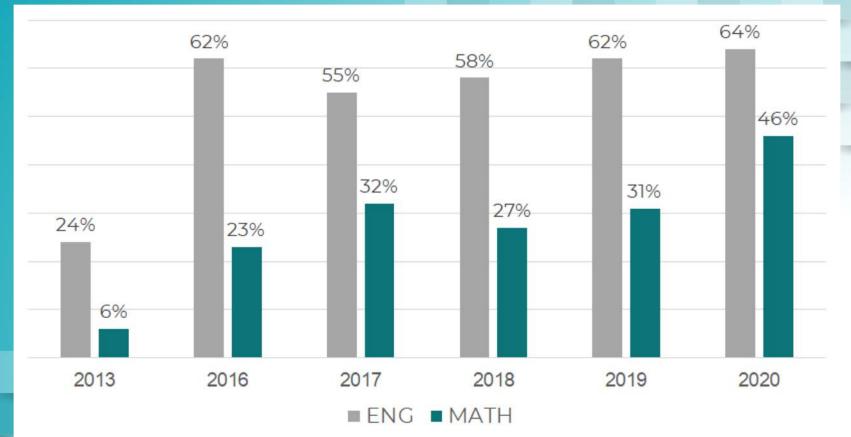


IPEDS Cohort: First time, Full-time Freshmen

Fall 2020 IPEDS Full-time Cohort Cohort size: HON, 253

Goal: 65%

First Year Success

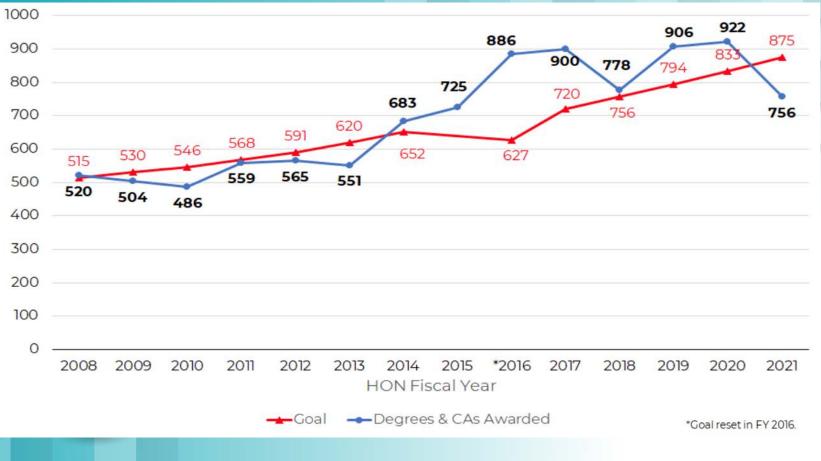


Performance

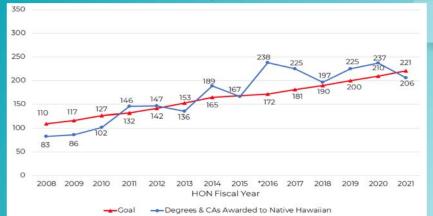
Measures



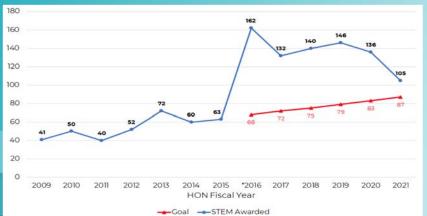
Graduation Outcomes - Degrees and Certificates

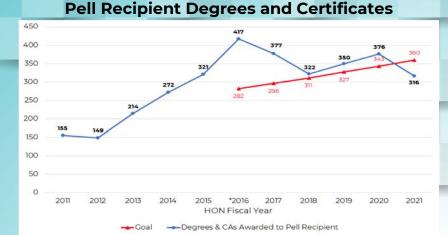


Native Hawaiian Degrees and Certificates



STEM Degrees and Certificates Earned at CC





CC Transfers to UH 4 Year



*Goal reset in FY 2016

Honolulu CC: The Path Forward



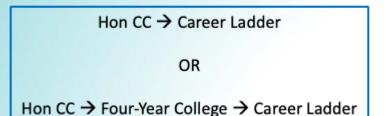
Where is Hon CC going?

We want to be:

- Relevant
- Career, not just job, focused
- Transfer-responsive
- Industry-responsive
- High-tech, cutting edge
- Professional ("soft") skills inclusive

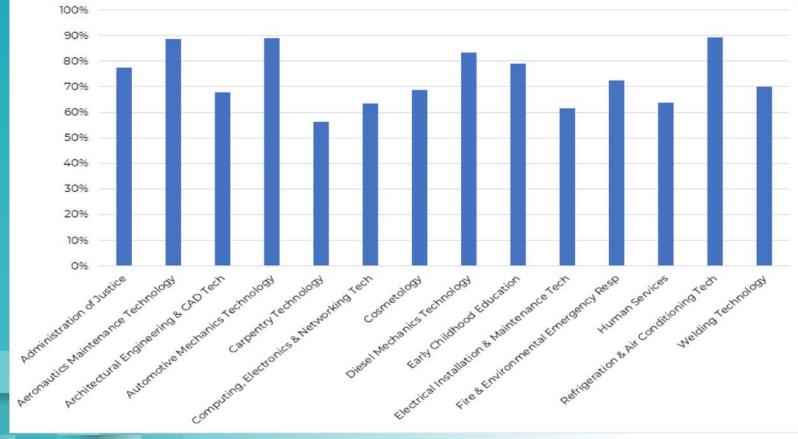






"While 96% of chief academic officers believe their institutions are very or somewhat effective at preparing students for the workforce, only 11% of business leaders strongly agree." (Gallup)

Job Placement Rate (FY19-FY21 average)



Where is Hon CC going?

- Stronger Connection to Industry
- Easier Paths from Non-Credit/Short-Term to Credit Programs
- Creation of 8-Week Online Classes
- Intentional Use of Industry Advisory Boards
- Increased Work-Based Learning Opportunities
- Easier Paths to Transfer to Four-Year Institutions



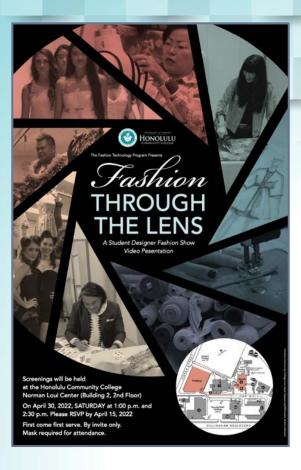


Faculty Senate Executive Council (FSEC)

Ross Egloria & Drake Zintgraff (Co-Chairs)

Fashion Tech Program - Student Fashion Show

- Student designers' showcase from the Fashion Technology program
- Returning from a 3-year hiatus
- Exclusive screening of prerecorded video showcasing student designs from the past 3years



College Achievement and Retention Experience (CARE)

- Increase student success through proactive intervention and increased interaction with students, faculty, and staff.
- Offer guidance, personalized assistance and support as well as access to programs and services that develop attitudes and behaviors necessary for success.
- Developed virtual campus tour on <u>Google Earth</u>
- AY 2021-2022 Statistics
 - Fall 2021 contacted 1,439 students (726 continuing + 713 first year/returning/transfer students)
 - Spring 2022 contacted 1,205 students (1,035 continuing + 170 firstyear/returning/transfer students)



Sustainability Committee and S-Focus Designation

- First established in AY 2013-2014.
- Charged with promoting, coordinating, and facilitating sustainability activities, awareness and campus functioning to ensure the College meets various strategic goals of the campus, UHCC System, UH System, and the State of Hawaii
- Incorporated the sustainability focus designation for courses indicating that significant portion of assignments & content focus on issues of sustainability.
- Faculty sustainability coordinator produces a weekly newsletter highlighting community activities and sharing ways to promote sustainability, reduce our carbon footprint, and battle climate change.



Climate Change and Combating Urban Heat

- Project funded by U.S. EPA Environmental Justice Grant
- Community partners include:
 - Trees for Honolulu's Future
 - HIDOE
 - Parents and Children Together (PACT)
 - Honolulu CC (via Dr. DeLay's involvement)
- Students apply classroom knowledge to realworld problems



International Education Learning Opportunity

- Virtual exchange with University of Niigata Prefecture
- Students exchanged introductions, thoughts, and ideas
- Early Childhood Education comparison of preschool environments and procedures
- Shared via Padlet (collaborative bulletin board)



RockSat-X (NASA-Funded Colorado Space Grant)

- National program funded by NASA and in partnership with the Colorado Space Grant Consortium
- Provide students hands-on experience developing experiments for space flight
- Students apply classroom knowledge to real-world problems



Project Imua 10

- 1. HonCC
 - a. Data Controller
 - b. Onboard Camera
- 2. WinCC
 - a. ScubeR

(super simple sublimation rocket S³R)



RockSat-X Team 2022

*pre-pandemic photos







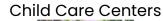
Academic Counseling





Faculty-coordinated services have remained open for in-person assistance throughout the pandemic.







Testing & Tutoring







Practicing Good Assessment to Improve Outcomes

- Alignment of programs and services outcomes with institutional goals and values
- FIRE program using assessment to align timing of courses to help students earn industry certifications
- Student affairs programs using assessment data to dynamically adapt services



FIRE Program

Collaboration with Community & Industry Partners

- Administration of Justice partnership with DLNR for Division of Conservation and Resources Enforcement (DOCARE) Academy
- Architectural, Engineering, &
 Construction Technologies program using input from advisory board to help update curriculum to meet industry need and create transfer
 opportunities for students



DOCARE Graduates

Supporting Students Basic Needs

- Organized Basic Needs Drive with donations going to support students' basic needs
 - Over 500 students served
 - Over 3,500 items donated and distributed
- Campus also awarded Urgent
 Student Relief funds supporting
 students basic needs



Basic Needs Drive



Kupu Ka Wai Native Hawaiian Council (KKW)

Greg Kashigi, Alapaki Luke

Po'i Nā Nalu Native Hawaiian Career & Technical Education Program

This project is supported by the Native Hawaiian Education (NHE) program of the U.S. Department of Education, as part of a three year award totaling \$1,333,828, with 0 percentage financed with nongovernmental sources. The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement, by NHE, the U.S. Department of Education, or the U.S. Government. For more information, please visit www.ed.gov.



Ala Nu[']ukia (Mission)

To prepare Native Hawaiian CTE and STEM students for employment into high-demand occupations with family-sustaining wages through culturally appropriate college access, engagement, and workforce preparation.

- College & Career Development
- Cultural Enrichment
- Financial Literacy
- Community Engagement





Nā Lawelawe (Services)

- Ke Ala Noelo: Career Readiness Program
- Ka Ihu Wa'a: Entrepreneurship Program
- Makawalu: College Transfer Program
 - Loanout Program
 - Uniforms/Work Gear
 - Certifications/Licenses
 - Memberships
 - Conferences
 - Tax Assistance





	2020-2021	2021-2022
High Barrier	73%	68%
Retention Rate	90%	TBD
CTE Course Completion Rate	85%	TBD
Internships	22	16
Certifications/Licenses	29	17
Professional/Academic Memberships	17	16
Graduates	21	23



Aia i hea lākou i kēia manawa (Where are they now)?

	2020-2021 graduates
Continuing education in UH System	9
F/T employment in field	10
Applied for local union; F/T employment (non-field)	1
F/T employment (non-field)	1
TOTAL	21



Alumni Spotlight Michelle Perez

Tell us about yourself.

My background is something of a Scarface movie but minus the guns (ioi). The lifestyle 1 had was something I overcame. I was hooked on drugs and everything that came with it. I did this for a third of my life at the time and decided to end this brutal cycle of insanity. I got clean and became stagmant in my life, meaning I wasn't pushing my potential is ways that I knew I could have.

I was a fishcutter at the time for 6 years, and decided to go back to school to get a degree in Safety and Health. In my head, I wanted to work smarter not harder. I chose Safety because my sister had a career in it and she suggested if give it a try.

What are you up to now?

My life today consists of working for an amazing HR company as the Lead Safety Trainer and Development Specialist. I'm always accomplishing goals every quarter by pushing myself in learning and developing new skills to help our clients become more aware of hazards and incidents in the workplace.

How has Po'i Nā Nalu helped to influence you and get you to where you are now?

Upon coming to school, I was introduced to F0/1 Ni Nahu and immediately became a part of this family. I was hardly source of my Havaiian aido, and dish't really pay attention to the history of our bountiful ialands. This organization has helped me throughout my years at HCC. Through F0/1 Ni Nahu, I was able to acquire many scholarships, which I thought 1 woulder qualify for_host I di because they pounded me to believe the I wan't losing anything by applying, and it worked. I was able to pay for two full semsetres alone on scholarships. They have helped with my confidence in knowing that I can accomplish anything with determination and integrity.

What was your most memorable experience with PNN?

One of the best memories I had of Po'i Nã Nalu was summer school. We learned so many things about the Hawaiian culture, created beautiful leis, and met some amazing klipuna that had a lot of history to share.

What tips or words of advice do you have for current PNN students?

'Ale Po'i Newsletter - 'Apelila 2022

The advice I do have goes along the lines of....be open to change and ask questions! There are times when you will feel overwhelmed and out of balance. Take deep breaths and assess the situation in an hour or so; don't rush the process. Lastly, you get what you put in.



Nānā i ka wā ma hope (Looking to the future)

- Hālau Kū Mana PCS: Lā 'Ohana College & Career Fair
- Kailua High School College Visit
- Kamehameha School Kapālama: Next Step College Fair
- Moloka'i High School College Visit
- HACAC College Fair at Windward Mall
- Ka Po'e o Kaka'ako Service Fair
- Hoʻoulu ʻĀina Community Day
- Waikīkī Health Center Outreach

Title III Hoʻāla Hou and Kūkalahale Grant Programs

Bringing the campus closer to becoming an indigenous serving institution

Hawaiian Culture and Place-Based Teaching and Learning Programs for the Campus

- Enrolled and trained over 100 employees (faculty, staff, administrators) in a year-long Hawaiian culture and place-based cohort training program aimed at infusing Hawaiian culture, traditions, and values in teaching, learning, and services as a means to support student success and completion.
- Provided over 25 professional development learning opportunities centered around Hawaiian culture and place-based methodologies, strategies, and values to the entire campus per academic year.
- Erected a permitted traditional Hawaiian hale as a means to create a better sense of place at the college for Native Hawaiians and all who respect and honor traditional Hawaiian knowledge and practices.







Return of annual Hoʻolauleʻa, Ka Māla o Niuhelewai Week-long festival, hybrid online and in person April 18-22 (Earth Day), 2022















Staff Senate Executive Council (SSEC)

Heather DeFries, Chair



Operations and Maintenance

Quick Facts

- ✓ Established in 2003
- ✓ One of four governance councils
- Official representative body for staff (Civil Service and APT employees)
- ✓ 11 Senator Representatives
- ✓ 124 staff





Priorities

- ✓ Governance and Staff Development
- Represent the interests and perspectives of staff
- Function in an advisory capacity to the Chancellor and Administration
- ✓ Facilitate communication among the staff body
- Collaborate with Honolulu CC and System Administration on opportunities that will provide inclusion for staff on various advisory committees





Accomplishments

- Provide multiple avenues for communication and engagement with staff (newsletters, surveys, emails, etc.)
- Promote staff engagement in various campus or system initiatives and committees
- ✓ Facilitate staff development experiences that focus on professional development and personal well-being
- Fund independent professional development requests
- Offer opportunities for staff to network with other departments on campus, including faculty and administration





Future Plans & Recommendations

- Continue to advocate for the best interests and welfare of the staff body
- Support the development of the All Campus Council of Staff Senate Chairs (ACCSSC)
- Recommend the continued inclusion of staff representatives on campus and systemwide initiatives and committees
- Encourage the continued offering of leadership development opportunities





Student Leadership

Brigitte Tampon-Aragon, Kristine Manog, Faith Gabour, and Nalea Kaaikala



Accomplishments

Online

- BINGOs (Leadership, Veterans, Financial Literacy, Alcohol Awareness, Black History Month, Native American Heritage, Constitution & Citizenship Day)
- MLK Kahoot! Trivia
- Jack Box Game Nights

In-Person - Social Distanced

- Valentines & Christmas Plushie Giveaway
- Ice Cream/Coffee/Noodles/Chocolate Weeks
- Crochet Kit
- Bullet Journal/Planner
- Hot Cocoa & S'Mores
- Mystery Easter Egg
- No Tricks, All Treats Halloween
- Girls & Boys Day

• Off-Campus

- Movie Nights (6x)
- Blade & Timber Outing



Accomplishments (cont.)

Asynchronous

- Stress Relief: Desk Yoga & Meditation
- Power to the People Padlet (President's Day, Women's History Month)
- Week of Gratitude
- Healthy Eating videos

• Cultural

SNACKS

- Hispanic Heritage BINGO
- Black History Month BINGO
- Mardi Gras
- Lunar New Year
- St. Patrick's Day
- Native American BINGO
- Collaborations
 - Festive Fall Contest
 - Ho'olaule'a
 - Mental Health Matters
- Grad Photo Day
- Intramural Sports Basketball
- Art & Soul Literary Magazine
- Ka Lā Podcast







1,002 672 70 Posts Followers Follow

HonCC Student Life (honcc_sab) People Welcome to HonCC's Student Life home to SAB, SMB, & SG! employed #honcc Email: hccsld@hawaii.edu Follow us for more programs.honolulu.hawaii.edu/studentlife/ Edit Profile Ad tools Insights

Challenges & COVID Impacts

- COVID Challenges
 - Loss of student leaders
 - No summer student employment
 - Student employee unable to work from home
- COVID Impacts
 - Students who are uncomfortable taking online classes are hurting
 - New paradigm for the college experience
- COVID Strategy from Student Leaders
 - Sanitizer & Face masks reusable contest, holiday surgical masks
 - Food assistance cards, Disaster Prep kits, Food events, ...
 - Mailing & Pick up only events to accommodate distancing
 - Online success tips videos, podcast, social media
 - Purchased new furniture covers that could be sanitized





- Sense of belonging
 - Concerns about student identity with crosscampus enrollment
 - Home campus, enrollment, identity
 - **Concerns about possible changes to Student Fees**



Mahalo!!







DTS 22457

22 MAY 12 P1 STNIVERSITY of HAWAI'I" FOUNDATION

MEMORANDUM						
TO:	Randy Moore, Chairperson University of Hawai'i Board of Regents					
VIA:	David Lassner, President University of Hawai'i David Cau					
FROM:	Tim Dolan, Vice President of Advancement $\tau \rho$ University of Hawai'i Foundation					
SUBJECT:	UH Foundation Report					
DATE:	May 10, 2022					

Please find information submitted by the Foundation for the May 19 Board of Regents meeting:

- Development Operations Report as of March 31, 2022 for FY 2022
- Funds Raised Leadership Report by Campus as of March 31, 2022 for FY 2015 through FY 2022
- Funds Raised by Source, Gift Type, Account Category and Purpose as of March 31, 2022 for FY 2022
- Funds Expended by UH Programs as of March 31, 2022 for FY 2019 through FY 2022
- UH Foundation Statement of Operations for Fiscal Periods Ended March 31, 2022, 2021, 2020 and 2019 (unaudited)

Thank you for your assistance and please let us know if anything further is needed or required.

Attachments





Development Operations

Fiscal Year 2022 As of March 31,2022 All dollars in thousands

Fundraising Result (07/01/2021 - 03/31/2022):

\$148.1 M

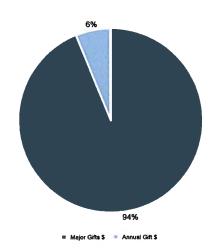
Fundraising Result Summary

Account Type	Gifts & Pledges	Deferred Gifts	Total	
Endowment	\$23,540	\$1,480	\$25,020	
Expendable	\$93,559	\$1,078	\$94,638	
Revocable Deferred Gifts	\$0	\$15,775	\$15,775	
Gifts-In-Kind	\$906	\$0	\$906	
Grants Directly to UH	\$11,758	\$0	\$11,758	
Total	\$129,763	\$18,333	\$148,096	

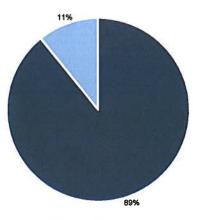
Comparison to Previous Fiscal Year

	Number of Major Gifts \$25k+	Major Gifts Total	Number of Annual Gifts <\$25k	Annual Gifts Total	Gifts Total	
Current Fiscal Year	333	\$139,098	17,774	\$8,999	\$148,096	
Previous Fiscal Year	275	\$67,351	18,302	\$8,072	\$75,424	
Comparison Favorable/(Unfavorable)	58	\$71,746	(528)	\$926	\$72,673	





Previous Fiscal Year



Major Gifts \$ * Annual Gift \$





Funds Raised Leadership Report Fiscal Years 2015-2022

As of March 31, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022

All dollars in thousands (Gifts, Pledges, Matching Gifts, Gifts in Kind, Grants and Planned Gifts)

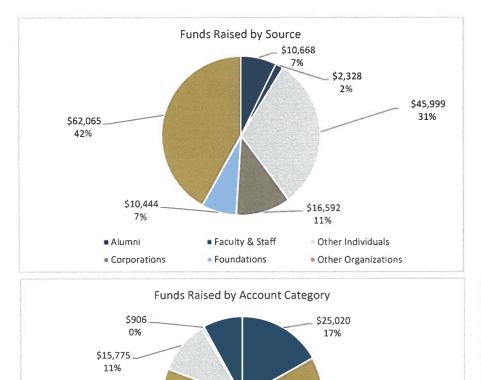
Unit	2015	2016	2017	2018	2019	2020	2021	2022
Manoa	\$98,268	\$25,810	\$31,830	\$30,085	\$31,652	\$34,499	\$58,143	\$122,573
Hilo	\$1,822	\$2,897	\$2,352	\$2,694	\$1,908	\$2,444	\$2,378	\$5,669
West Oahu	\$239	\$1,007	\$142	\$631	\$388	\$881	\$593	\$1,257
Hawaii CC	\$142	\$364	\$231	\$648	\$1,196	\$635	\$1,514	\$576
Honolulu CC	\$144	\$681	\$148	\$222	\$1,270	\$471	\$680	\$112
Kapiolani CC	\$1,506	\$1,375	\$959	\$2,697	\$2,050	\$2,981	\$2,176	\$2,568
Kauai CC	\$707	\$747	\$518	\$353	\$641	\$649	\$204	\$643
Leeward CC	\$147	\$386	\$239	\$169	\$166	\$240	\$223	\$2,197
Maui College	\$506	\$857	\$603	\$671	\$354	\$966	\$737	\$1,210
Windward CC	\$426	\$443	\$1,436	\$281	\$90	\$1,790	\$804	\$573
Multi-Campuses	\$5,119	\$13,954	\$8,629	\$6,536	\$5,560	\$3,912	\$7,972	\$10,719
Totals	\$109,027	\$48,521	\$47,086	\$44,986	\$45,276	\$49,467	\$75,424	\$148,096

Beginning in FY2020, present value (PV) is used in funds raised calculations for deferred gifts. Prior to FY2020, face value (FV) is used.



Funds Raised By Source, Gift Type, Account Category and Purpose

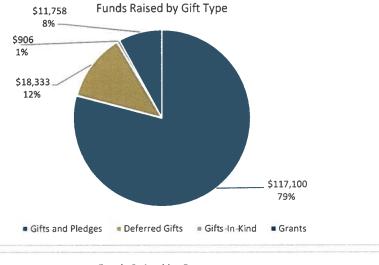
Fiscal Year 2022 As of March 31, 2022 All dollars in thousands

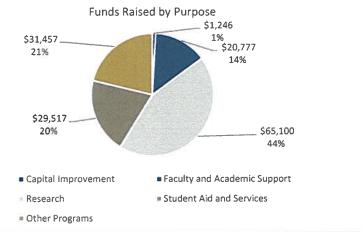


Endowment
 Expendable
 Revocable Gifts
 Gifts-In-Kind

Grants

\$94,638 64%

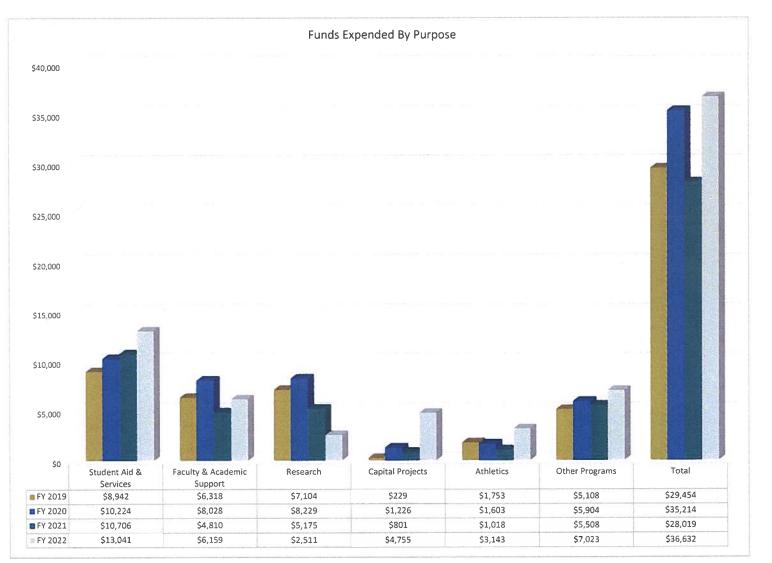






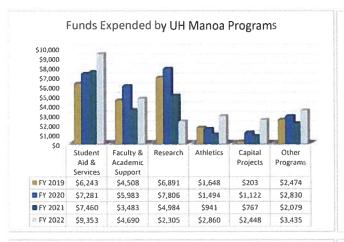
As of March 31, 2019, 2020, 2021, 2022

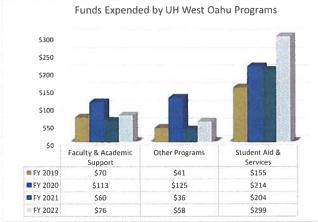
All dollars in thousands

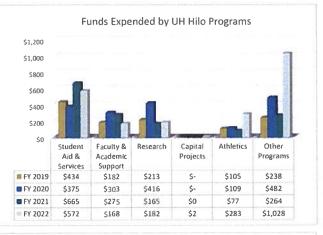


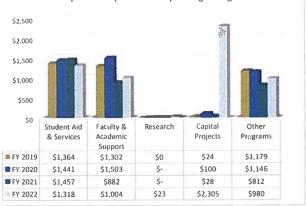
Funds Expended by UH Programs, continued Fiscal Years 2019-2022 As of March 31, 2019, 2020, 2021, 2022

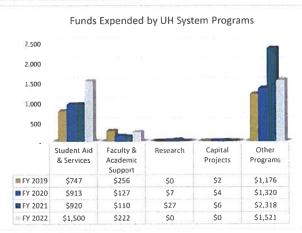
All dollars in thousands











Funds Expended by Community College Programs

UNIVERSITY OF HAWAII FOUNDATION

Statement of Operations- Unaudited

For the Fiscal Periods Ending March 31, 2022, 2021, 2020 and 2019

		March 31, 2022		March 31, 2021		March 31, 2020	 March 31, 2019
REVENUES:							
Unrestricted gifts	\$	310.060	\$	813,451	\$	606,879	\$ 415,115
ncome from expendable accounts	•	2,136,558	•	284,232	·	2,951,285	2,526,668
ncome from endowment accounts		3,757,112		3,268,664		3,190,959	3,057,371
Service fee on gifts and non-gifts		3,000,730		1,769,562		2,196,676	1,844,438
Alumni Relations revenue		-		-		-	22,669
JH contract for services		2,250,000		2,250,000		2,250,000	2,250,000
Other payments for services from UH & UHAA		292,183		271,952		327,628	255,994
otal Revenues	\$	11,746,643	\$	8,657,861	\$	11,523,426	\$ 10,372,257
XPENSES							
evelopment							
Personnel	\$	4,504,696	\$	4,161,246	\$	4,533,600	\$ 4,605,242
Program		1,136,400		985,100		1,031,409	925,315
Campaign		76,400		-		3,200	33,245
lumni Relations							
Personnel		244,851		332,025		403,536	386,586
Program		65,301		64,780		40,375	53,333
ervice & Support							
Personnel		2,219,854		2,093,697		2,064,296	2,560,082
Program		319,951		284,462		352,003	853,472
H Support Fund		112,500		112,500		112,500	112,500
King Street Office		401,423		402,924		414,248	185,230
otal Expenses	\$	9,081,376	\$	8,436,733	\$	8,955,167	\$ 9,715,005
let Revenues Over(Under) Expenses	\$	2,665,267	\$	221,127	\$	2,568,259	\$ 657,252

Summary of May 5, 2022 Meeting

Agenda Items:

Academic Program Actions:

- A. Recommend Board Approval of Established Status for the PhD Program in Nutritional Sciences at the University of Hawai'i at Mānoa (UHM)
- B. Recommend Board Approval of Established Status for the Bachelor of Arts in Astronomy and the Bachelor of Science in Astrophysics at UHM
- C. Recommend Board Approval of Provisional Status for the Master of Architecture Degree at UHM
- D. Recommend Board Approval of Established Status for the Bachelor of Arts in Biochemistry and Bachelor of Science in Biochemistry Degrees at UHM
- E. Recommend Board Approval of Established Status for the Bachelor of Arts in Pacific Island Studies at UHM

Provost Bruno provided an overview of each of UHM's five program requests, noting the benefits and impacts of, as well as successes achieved by, the individual programs. He also explained that UHM continues its effort to provide efficient and effective academic programming at its campus through strategic program investments. Although requests were being made to provisionally establish or make permanent five programs, it has been determined that these programs respond to a community need, address student demand, and capitalize on the university's existing strengths.

Action: The committee voted to recommend board approval for each of the aforementioned UHM academic program actions with Regent Acoba abstaining on the vote for item B.

F. Recommend Board Approval of Established Status for the Master of Arts in Heritage Management (HMMA) at the University of Hawai'i at Hilo (UHH)

Chancellor Irwin provided an overview of the request to grant established status to the HMMA program within the Anthropology Department at UHH stating that the program was created to address the critical shortfall in heritage management professionals in Hawai'i and fills a clear need to provide graduate training in the specific issues of Oceanic heritage. She spoke about some of the early challenges faced by the program as well as its numerous successes including the attainment of employment in government agencies and private consulting firms by its graduates and the cultivation of extensive extramural support and partnerships.

Action: The committee voted to recommend board approval to grant established status to the HMMA program.

G. Recommend Board Approval of a New Provisional Certificate in Labor Studies at the University of Hawai'i – West O'ahu (UHWO)

Chancellor Benham provided an overview of the request to establish a provisional Certificate in Labor Studies at UHWO stating that the distance-delivered certificate will provide a convenient opportunity for working adult learners seeking a course of study focused on the conditions of work from a labor perspective. This certificate will also offer traditional students an opportunity to enhance their major course of study with knowledge

Academic and Student Affairs Committee Report

Summary of May 5, 2022 Meeting

and experience in the field of labor that may prove helpful to draw upon in their future employment. It was noted that the establishment of a provisional Certificate in Labor Studies duly responds to a statutory requirement that UHWO's Center for Labor Education and Research develop and implement a labor studies degree program or programs in the university system.

Action: The committee voted to recommend board approval to establish a new provisional Certificate in Labor Studies at UHWO.

H. Academic Program Actions Report

Debora Halbert, Vice President (VP) for Academic Strategy, stated that the Academic Program Actions Report is an annual report that provides details on programs granted established or provisional status by the board; provisional programs that were extended; authorizations to plan for new academic programs; and program terminations. She clarified that the report reflected actions taken for the prior academic year.

I. Small Programs and Program Review Report

VP Halbert stated that, under Regents Policy, the administration is required to provide two reports related to academic programs. The first report is the review of programs with a small number of graduates and the second is the overview of academic program reviews conducted at each campus during the prior academic year. She spoke about the overall impact of these reports in current unit level planning for program redesign and collaboration, as well as determining plans for future academic programming.

J. Recommend Board Approval of Revisions to Regents Policy (RP) 5.201, Instructional Programs

VP Halbert reviewed and discussed proposed revisions to RP 5.201 stating that the changes were intended to streamline the approval process of new minors, concentrations, and certificates that do not require significant resources as well as align it with proposed amendments to Executive Policy (EP) 5.201 that are intended to accomplish the same goal.

Discussions ensued on the nuances of the proposed revisions including terminology used within both the RP and EP, as well as the applicability of that terminology, and further amendments were requested by regents.

Action: The committee voted to recommend board approval of the amendments to RP 5.201, subject to changes as proposed by regents and the presentation of those changes as a regular agenda item at the next board meeting.

K. Committee Annual Review

The committee annual review matrix was reviewed and no comments were received from committee members.

Page 1 of 2

Agenda Items:

A. Recommend Board Approval of Amendments to the Bylaws of the Board of Regents (Bylaws), Article V., Quorum

Chair Moore explained the rationale for the proposed amendment to Article V of the Bylaws stating that it would clarify questions raised with respect to the board Chair, who serves as an ex-officio voting member of all standing committees, being counted when determining quorum at committee meetings. It was noted that this was in accordance with the board's parliamentary guide, Robert's Rules of Order.

Discussions ensued on the board's past customs and practices regarding quorum; the necessity of amending the Bylaws; the potential impacts of this amendment on standing committee operations; and possible changes to the proposed amendments.

B. Discussion on Board Member Education and Development

1. Report on Association of Governing Boards (AGB) Conference on Trusteeship

Regent Bal provided a report on the AGB Conference on Trusteeship summarizing the contents of each of the sessions he attended which included meetings on presidential responsibility for effective board leadership; presidential assessment and development; emerging risks; and presidential transitions. He also spoke about the benefits of attending AGB conferences stating that they provide regents with networking opportunities, as well as opportunities to build relationships with AGB staff and other conference attendees, and noted that virtual conferences more easily allow for dropping into multiple concurrent sessions.

C. Review of Board Committee Structure

Chair Moore shared some of the findings of a comparative analysis of the board's standing committee structure in relation to those of other public universities in the western United States that he conducted last year. He also noted changes that were made to the board's standing committee structure, membership, and meeting schedule at the beginning of the current academic year and discussed the rationale, goals, and objectives of this restructuring.

Regent Acoba expressed his concerns with the process under which committee restructuring took place, as well as the revised committee structure, and presented proposals to modify this structure that addressed his concerns.

Discussions ensued on, among other things, Regent Acoba's proposals; varying regent perspectives on the board's standing committee structure; committee membership; the number of standing committees; meeting schedules; management of meeting agendas; and the scope and subject matter of standing committees.

Chair Moore noted that this subject would be included in the upcoming board selfevaluation.

Action: This matter was deferred pending the drafting of language taking into consideration the concerns and suggestions raised by committee members.

Personnel Affairs and Board Governance Committee Report

D. Discussion on Board and Committee Agenda Development

After a review of the current process used to develop board and committee agendas was provided by Chair Moore, Regent Acoba expressed his concerns with this process. He presented a proposal to amend the Bylaws to address situations where a regent's request to place an item on an agenda is denied by the board chair; reviewed the work of an advisory task group (ATG) formed in 2013 that addressed this issue and made recommendations to establish a standard process for member input into board agendas, as well as a mechanism to place items on an agenda; provided proposed language for an amendment to the Bylaws that he believed would establish an open, transparent, and equitable process for placing items on an agenda; and provided rationale for the changes.

Brief discussions ensued on the current agenda development process and Regent Acoba's proposal. Chair Moore requested the Board Office to work with General Counsel on a process that follows the spirit of the ATG recommendation.

E. Board Self-Assessment

Chair Moore stated that, in accordance with Regents Policy 2.204, discussions are taking place with the President regarding the planning and development of a self-evaluation form, including its structure, process, and content, and explained that a self-assessment survey will be distributed to regents and discussed at the board's June meeting.

F. Committee Annual Review

The committee annual review matrix was reviewed and discussed.

Research and Innovation Committee Report

Summary of May 5, 2022 Meeting

Agenda Items:

A. Research Project Briefing: *"Basic to Applied Research: Volcanology to Hydrology to Managing Community Risks"* Presentation by Dr. Donald Thomas, Geochemist, Hawai'i Institute of Geophysics and Planetology, University of Hawai'i at Mānoa (UHM)

Dr. Thomas provided an overview the Hawai'i Scientific Drilling Project (HSDP), a project initiated over 30 years ago to gain a better understanding of the planetary processes involved in Hawai'i vulcanism, as well as to investigate the basic geochemical activities occurring within a volcano's base. He noted the various research and scientific activities conducted by HSDP and discussed some of its notable findings, including discoveries made that called into question some of the assumptions used in developing the prevailing model for the subsurface occurrence, movement, and storage of groundwater in Hawai'i. He also spoke about the technical support the university has provided and continues to provide to various state and federal organizations regarding the Red Hill fuel storage facility issue and its potential impacts on groundwater systems.

Discussions ensued on HSDP's findings and their impacts on determining Hawai'i's freshwater needs, as well as efforts to preserve and protect this precious resource.

B. Fiscal Year 2021-2022 (FY22) 3rd Quarter Extramural Awards Update

1. FY22 3rd Quarter Research and Innovation Metrics Summary

2. FY22 Monthly Report of Extramural Awards

VP Syrmos reported on the extramural awards received for the 3rd quarter of FY22; provided a breakdown of trends, significant awards, and award amounts by campus; and summarized data pertaining to various research and innovation metrics. He stated that the university received \$440 million in extramural awards to date, which was 10 percent higher than the same period in FY 2020-2021, and anticipates reaching nearly \$500 million by the end of the fiscal year. He also highlighted that increases in award counts at UHM were experienced across all levels of funding and emphasized the widespread nature of these awards across programs on the flagship campus which indicates a healthy research enterprise system.

Discussions took place on funding for applied research as well as some of the data provided in the materials.

C. Committee Annual Review

The committee annual review matrix was reviewed, noting that the committee did a good job in following the plan.

Item VI.D. Affiliate Reports

NO MATERIALS ORAL REPORTS

DTS 22395

College of Tropical Agriculture and Human Resources Founding College of the University of Hawai'i

Office of the Dean and Director for Research and Cooperative Extension UNIVERSITY OF HAWAII



MEMORANDUM

UNIVERSITY of HAWAI'I* Mānoa

22 APR 27 A9:20

BOARD OF REGENTS

March 14, 2022

TO:	Randolph G. Moore
	Chair, Board of Regents
VIA:	Ernest Wilson
	Chair, BOR Committee on Academic and Student Affairs
VIA:	David Lassner
	President David Lassner David Lassner
VIA:	Debora Halbert Vice President for Academic Strategy LIH System Tubna Walkart
	Vice President for Academic Strategy, UH System
VIA:	Michael Bruno
	Provost Jam F. For Michael Bruno
VIA:	Laura Lyons Jun F. Som Interim Vice Provost for Academic Excellence
VIA:	Krystyna Aune
	Dean, Graduate Division
FROM:	Nicholas Comerford Comerford Comerford
	Dean and Director, College of Tropical Agriculture and Human Resources
SUBJECT:	REQUEST FOR ESTABLISHED STATUS FOR THE PHD PROGRAM IN
	NUTRITIONAL SCIENCES AT THE UNIVERSITY OF HAWAI'I AT
	MĀNOA

SPECIFIC ACTION REQUESTED:

It is respectfully requested that the Board of Regents grant established status to the PhD in Nutritional Sciences in the College of Tropical Agriculture and Human Resources at the University of Hawai'i at Mānoa.

RECOMMENDED EFFECTIVE DATE:

Effective upon approval.

.

Randolph G. Moore March 14, 2022 Page 2

ADDITIONAL COST:

No additional cost.

BACKGROUND:

The Nutritional Sciences PhD program is an interdisciplinary program, across campus, reflecting the interdisciplinary multifaceted topic of nutritional sciences. The PhD in Nutritional Sciences addresses a shortage of nutrition professionals in Hawai'i and the Pacific region. Nutrition-related diseases (obesity, diabetes, heart disease, cancer) are the most significant health problems in Hawai'i and the Pacific Region, and indeed the world. Study in Hawai'i allows the examination of exciting and vital interdisciplinary nutrition topics. We have added tracks in human nutrition, animal nutrition, and food science, that provides a strong pipeline. The field includes tropical foods and aquaculture, island food systems and indigenous nutrition. As a Research 1 university, with unique human, cultural, and natural diversity in food and nutrition practices and environment, lifestyle and health, the research opportunities are vast.

While nutrition, food science and animal science are key feeder degrees into Nutritional Sciences, other degrees such as public health, epidemiology, medicine, exercise science, and biology also provide backgrounds suitable for pursuing a PhD in nutritional sciences. The program has graduated 11 students since its inception, with a steady increase in rate of graduation (until the pandemic); 25 students are currently enrolled. Students are ethnically diverse, a quarter Native Hawaiian, and graduates are working in important positions in Hawai'i, the Pacific and the US Mainland.

The Nutrition program diversified its pipeline of students into the PhD program, including all three graduate programs in HNFAS (Nutritional Sciences, Animal Science, and Food Science). Furthermore, owing to changes in the field of nutrition and dietetics, a master's-level dietetics internship program will soon be required in order for graduates to obtain the dietetics credential. The MS Dietetic Credentialing program was initiated in HNFAS this Fall (2021) with 3 MS students in Nutritional Sciences. This change also has increased the demand for PhD-level faculty to train master's students, and it is anticipated that 2 additional students per year will enter the PhD program from the upcoming revised MS program. We have a large pipeline of 293 undergraduate students in the HNFAS Department, in Food Science and Human Nutrition (98), Dietetics (31), and Animal Science (164).

We have fostered collaboration and growth by working with faculty in research units to increase engagement in teaching and mentoring through shared seminars. We have increased the membership of graduate faculty who are actively acquiring competitive grants and who are engaged in important nutrition-related research in areas such as obesity and food sustainability. Randolph G. Moore March 14, 2022 Page 3

In the last 3-year period, our Nutritional Sciences faculty brought over \$63 million dollars into the university, providing a setting for research, and providing student research assistantships. Student funding is primarily in the form of graduate assistantships, funded through faculty research activity and college teaching assistantships. With added research-active graduate faculty, the department has increased the amount of support available, which in turn has increased the program's visibility and enrollment.

Our program strengthens the University's mission as a Native Hawaiian place of learning. We also serve the Pacific region. We have had 2 Native Hawaiian, 3 Chamorro, 3 Filipino and 1 Samoan PhD students to date. Our faculty address Native Hawaiian nutrition and the Pacific Island context for nutrition. Two of our faculty are Native Hawaiian and one is Filipino. The COVID pandemic has delayed expected graduations in 2020 and 2021, though they are continuing to progress, albeit at a slowed pace. Human contact is required for much of the research, which was impacted by the COVID pandemic.

The need for nutrition professionals (i.e. job growth) is increasing due to need for strengthening the food system and for disease prevention in all sectors of business and society to improve quality of life. This will be evident in the food industry to improve the development and marketing of foods, and throughout the economy to control healthcare costs in both the public and private sectors, and to improve quality of life. This will be true not only in the USA, Hawai'i, and the Pacific region, but worldwide.

ACTION RECOMMENDED:

It is respectfully recommended that the Board of Regents grant established status to the PhD in Nutritional Sciences in the College of Tropical Agriculture and Human Resources at the University of Hawai'i at Mānoa.

Attachment: Proposal for PhD in Nutritional Sciences in the College of Tropical Agriculture and Human Resources at the University of Hawai'i at Mānoa, Establishment of PhD degree in Nutrition (original name; approved 11-9-2007)

c: Executive Administrator and Secretary of the Board Kendra Oishi

Provisional to Established Programs

1. Executive Summary

Enrollment in the Nutritional Sciences PhD program (the Program) has increased dramatically in the last few years. Notably a quarter are Native Hawaiian. Nutritional Sciences (code 30.1901), provides Science, Technology, Engineering, Agriculture, and Medicine (STEAM) training that "focuses on the utilization of food for human growth and metabolism, in both normal and dysfunctional states, from the interdisciplinary perspective of the agricultural, human, biological, and biomedical sciences. Includes instruction in food science, biochemistry, physiology, dietetics, food and nutrition studies, biotechnology, biophysics, and the clinical sciences." The Program highlights foods and nutrition of Hawai'i, Asia and the Pacific. The Program, is based in HNFAS/CTAHR, and integrates existing faculty teaching, research and outreach faculty and programs from units across campus, each contributing areas of strength to the interdisciplinary field of Nutritional Sciences. Nutritional Sciences is vital to the needs of the state, to improve food systems and availability of healthy food, to provide nutrition security and health to residents of Hawai'i. The program currently has 25 PhD students enrolled, and has graduated 11 PhD students (the first in 2013, prior to this reporting period which is since 2015).

2. Alignment of program with mission and strategic planning of the Campus and University System

The Nutritional Sciences PhD program is based in CTAHR, yet has an active complementary relationship with several other units relevant to nutrition, including the UH Cancer Center, JABSOM, SOEST, and Public Health. Nutrition is a broad field ranging from physiology to food and agriculture, to public health promotion. Each participating unit provides research settings for our diverse student body and newly develop tracks (animal science, food science, human nutrition), while enabling research diversity and productivity. For example, UH Cancer Center, has substantial research opportunity and graduate assistantships, but no academic program, creating a synergistic relationship where HNFAS provides coursework and students and Cancer Center provides research diversity and funding (including assistantships). JABSOM provides clinical settings not found in an agricultural setting like CTAHR, and Public Health links us to community public health nutrition programs for broad impact. These partnerships provide rich opportunities for faculty to meet their assigned duties (teaching, research, and extension), and for students to gain valuable research and practical experience, strengthening each program. Directed Reading and Research credits with each of these academic units also bring tuition dollars into the university.

The Program strengthens the University's mission as a Native Hawaiian place of learning. We also serve the broader Pacific region. We have graduated 3 Native Hawaiian, 3 Chamorro, 3 Filipino, 1 Samoan, and 8 South Asian. Our graduate faculty address Native Hawaiian nutrition and the Pacific Island context of nutrition. Two Program graduate faculty are Native Hawaiian, and one is Filipino.

The need for nutrition professionals (i.e. job growth) is increasing due to need for food system strengthening, health promotion and disease prevention in all sectors of business and society to improve quality of life. This is evident in agriculture and aquaculture, the food industry to improve the development and marketing of foods, and throughout the economy to control healthcare costs in both the public and private sectors, and to improve quality of life. This is true in the USA, Hawai'i, and the Pacific region, and worldwide.

3. Program enrollment and graduation of students using anticipated and actual enrollment figures. In other words, did the program meet its proposed targets?

Our student numbers have increased dramatically in the last 5 years, owing to recruitment of 12 new research active graduate faculty from across the university, and to modifications to the curriculum to provide additional tracks (animal sciences, food sciences and human nutrition). However, due to COVID 19 in the last couple of years, graduation rates have not kept pace with the increased enrollment, as many students have had to make modifications to their research plans, especially those working with human participants, delaying their graduation. Students are progressing, though many are taking longer than would otherwise have been the case. The 3 HNFAS MS programs feed into the Nutritional Science PhD program. Over time, we have increased the PhD enrollment to over 20 while maintaining MS student at about 25 across in the MS programs.

	2015	2016	2017	2018	2019	2020	2021
Projected Enrollment	10 PhD	11PhD	12PhD	12PhD	12PhD	12 PhD	12 PhD
Actual Enrollment	11PhD; 22 MS	19PhD; 25 MS	11PhD; 31 MS	15PhD; 29 MS	19PhD; 28 MS	22PhD; 28 MS	23PhD; 22 MS

Table 1. Enrollm	ent in Nutritiona	l Sciences (Graduate I	Programs by `	Year

Program completion was growing, prior to COVID 19, but has not kept pace since COVID 19, which has interfered with academic activities and, especially research activities that involve human participants.

Table 2.	Nutritional	Sciences	PhD	Program	Completion	hy Year
THOIC W	T I GEVE IVIOIIGE	NUICHICCO	T TITL	I I OGI MIII	Compression	N I VILL

	2015	2016	2017	2018	2019	2020	2021
Projected Program Completion (annual)	2	2	2	2	2	3	3
Actual Program Completion (annual)	2	1.	1.	2	2	1	1

4. The instructional resources required for the program and how they were utilized compared with anticipated resources.

PhD Nutritional Sciences program faculty members based in the HNFAS academic home of the PhD program include: Jinan Banna, Monica Esquivel, Rajesh Jha, Soojin Jun, Yong Li, Birendra Mishra, Rachel Novotny, Jenee Odani, Marie Fialkowski-Revilla, Andre Seale, Yong Li, and Jinzeng Yang. These faculty conduct the majority of teaching for the Program, although doctoral advisors are found among the Graduate faculty in partnering units.

In addition to increasing membership in the Nutritional Sciences Graduate faculty among research active faculty across campus, we also fostered collaboration with faculty to increase engagement in teaching and mentoring through shared seminars. This made use of faculty resources that are already employed and actively acquiring competitive grants in important nutrition-related research in areas such as obesity and food sustainability.

Some examples of HNFAS Nutritional Sciences Graduate faculty research that highlight the contribution to the University of a place of Native Hawaiian learning are:

- <u>Andre Seale</u>- Hawai'i Pacific aquaculture revitalization and expansion
- <u>Rajesh Jha-</u> Leveraging established research plantings of breadfruit to understand drivers of fruit quality and its impacts on post-harvest
- <u>Monica Esquivel</u>- Innovating Clinical Nutrition Instruction for the Pacific

- <u>Rachel Novotny</u>- Resiliency in Food Systems for Children's Healthy Living (CHL Food systems)-A Center of Excellence
- <u>Marie Revilla-</u> Healthy Living through Ai Pono in Hawaiian Communities

Some examples of the Nutritional Sciences collaborations with other units that also contribute to the University as a place of Native Hawaiian learning are:

- <u>Pratibha Nerurkar</u>- Empowering women and underrepresented undergraduates with advanced technology research training in agriculture and food sciences
- <u>Cheryl Albright</u> Cluster Randomized Trial of a Mobile Health Intervention to Achieve Appropriate Gestational Weight Gain in Overweight/Obese Women
- May Okihiro- Hawai'i Initiative for childhood obesity research and education
- <u>Kristi West-</u> Hawai'i and Mariana Islands Stranding Analysis and Reports
- <u>Lynne Wilkens-</u> Understanding Ethnic Differences in Cancer: The Multiethnic Cohort Study
- <u>Gertraud Maskarinec-</u> Pacific Island Partnership for Health Equity
- <u>Loic LeMarchand-</u> Understanding the Determinants of Racial/Ethnic Disparities in Liver Cancer and Chronic Liver Disease in understudied and high-risk populations

Nutritional Sciences graduate faculty bring in about <u>\$20 million dollars</u> of competitive grants into the University, per year, providing a rich setting for research, and providing student research assistantships for graduate students. A full list of the Program's faculty organized by home unit and department and showing the diverse research areas are detailed in Appendix A

Instructional Resources (Table 4) were calculated using the University MIRO system data for the HNFAS Department, and thus reflect all HNFAS graduate programs (MS Animal Science, MS Food Science, MS Nutritional Sciences and PhD Nutritional Sciences). Grant resources were derived from the University Office of Research Services and include all grants found for the Nutritional Sciences PhD Graduate faculty.

Instructional Resources	Year 1 2015	Year 2 2016	Year 3 2017	Year 4 2018	Year 5 2019	Year 6 2020	Current Year 2021
Combined Tuition/Summer /Course Fees*	PhD 35,170	PhD 252,096	PhD 383,880	PhD 529,752	PhD 603,960	PhD 617,280	PhD 765,024
Other Allocation (Grants) among Graduate Faculty**	20,269,715	14,825,827	15,274,768	13,368,508	17,674,730	16,547,272	21,219,778

Table 4. Program Instructional Resources

* all HNFAS/CTAHR courses, MIRO

** all Nutritional Sciences graduate faculty, ORS

Table 5. Program Faculty

Personnel	Year 1 2015	Year 2 2016	Year 3 2017	Year 4 2018	Year 5 2019	Year 6 2020	Current Year 2021
Projected Tenured Faculty	5 HNFAS	5 HNFAS	5 HNFAS				
Actual Tenured Faculty	12 HNFAS	12 HNFAS	12 HNFAS				

The Program projected an APT to be the only cost, and has been working with 0.25 FTE of an APT(Table 6).

Table 6. Op	Table 6. Operating Costs							
	Year 1 2015	Year 2 2016	Year 3 2017	Year 4 2018	Year 5 2019	Year 6 2020	Current Year 2021	
Projected Operating Costs (from Provisional proposal, 1APT)	\$47,845	49,759	51,749	53,819	55,972	58,211	60,539	
Actual Operating Costs, 0.25 APT)	0	2,581	4,808	14,470	14,835	15,025	19, 951	

5. How the program is organized to meet its outcomes

The Nutrition program diversified its pipeline of students, including tracks from all three Master's programs in HNFAS (Nutritional Sciences, Animal Science, and Food Science), where the program is administratively housed. Furthermore, owing to changes in the field of nutrition and dietetics, a master's-level dietetics internship program has been initiated and will soon be required in order for graduates to obtain the dietetics credential. The MS Dietetic Credentialing program was initiated in HNFAS in Fall 2021 with 3 MS students in Nutritional Sciences. This change also has increased the demand for PhD-level faculty to train master's students, and it is anticipated that 2 additional students per year will enter the PhD program from the revised MS program. We currently have a pipeline of 293 undergraduate students in the HNFAS Department, in Food Science and Human Nutrition (98), Dietetics (31), and Animal Science (164).

Table 7 shows data on courses and reflect HNFAS' 4 graduate programs, although the Program also benefits from SSH from graduate faculty based in other units who predominantly contribute directed reading and research SSH. The 3 HNFAS MS degrees are important feeders into the Nutritional Sciences PhD program. We are now surpassing projected 240 SSH in HNFAS graduate courses, at 310 SSH/year.

	2015	2016	2017	2018	2019	2020	2021
Projected No. Courses	Not available	Not available	Not available	Not available	Not available	Not available	
No.Actual Courses Offered	5	6	6	6	7	8	8
Projected No. Sections	Not available						
No.Actual Sections Offered	5	6	6	6	7	8	8
Projected Annual SSH	200	220	240	240	240	240	240
Annual SSH	169	190	222	190	237	254	310

Table 7. HNFAS Dept. Graduate Courses and Student Semester Hours (SSH)

6. Evidence of student learning and student and program success.

Graduates of the Nutritional Sciences PhD program are employed in important and diverse aspects of nutrition. Below are the positions held by the 11 graduates of the Program.

- Postdoctoral positions at University of Georgia and Pennington Biomedical Research Center, Louisiana (2)
- Dietetic internship at University of Illinois (1)
- Dietitian in the Army (1)
- Nutritional Epidemiologist at the Centers for Disease Control, Atlanta (1)
- Assistant Professors at UHM (1) and University of Nevada, Reno (1)
- Associate Professor at University of Guam (1)
- Animal Nutrition for a Global Company (1)
- Lecturing at UHM (2)

We conducted several surveys of students regarding their experience in the Program. A survey of 3 graduates from Oct 2018 to 2020, showed that all went to postdoctoral positions. They spent 4 years in Nutritional Sciences PhD program, on average. Their GPA was 3.92, on average. The students published 6.7 papers, on average (5.3 as first author), gave 4 presentations, on average, and received 4 awards, on average.

There were 11 responses to a student survey of achievement of student learning outcomes (SLO's) in 2018 (n=4), and in 2019 (n=7). Overall, the average score was 3.42 out of 5 (min 2.6 [SLO #5], max. 4.0 [SLO #7]).

- 2018 Average score 3.46 (min 2.5 [SLO #5], max. 4.0 [SLO # 3])
- 2019 Average score 3.40 (min 2.7 [SLO #5], max. 4.1 [SLO # 7])

Students felt least prepared in grant writing (SLO 5) and most prepared in research dissemination skills (SLO 7). Since that time, more students are taking a Grant Writing course offered in the CTAHR. To the question, Do you feel you receive(d) enough instruction, guidance, and constructive development from your immediate department faculty, including your committee members and PI, to achieve the program SLOs?, the

overall average was 3.91 out of 5.

- 2018 average: 3.25
- 2019 average: 4.28

We use rubrics (4-point scale, 1 is low and 4 is high) at each graduate examination for faculty to assess student progress. Results are as follows:

Pre-Candidacy Qualifying Exam (Form 1)

- 14 students were assessed from Oct. 2018 to 2022
- 13 out of 14 students passed
- Average total score: 3.12 out of 4 (min 2.58, max 3.5)

Comprehensive Exam & Dissertation Proposal (Form 2)

- 7 students were assessed from Oct. 2018 to 2021
- All students passed
- Average total score: 3.3 out of 4 (min 3.0, max 3.83)

Dissertation Defense (Form 4)

- 4 students were assessed from Oct. 2018 to 2020
- All 4 students passed; 1 student exceeded
- Average total score: 3.50 out of 4 (3, 3.86)

Conclusion

The Nutritional Sciences PhD program has been performing very well, and is growing exponentially. The program helps the University address its mission to serve Native Hawaiians and the Pacific region, with food of Hawai'i and the Pacific region providing an important and understudied niche. More individuals with PhD training in Nutritional Sciences are needed in Hawai'i, the region and world, to prevent disease and to enhance health and wellbeing.

Name	Home Unit/Dept	Research Area
Hetzler, Ronald	COE/KRS	Exercise metabolism, fitness, testing body composition
Latner, Janet D	CSS/Psychology	Obesity and eating disorders; methods of relieving the significant disability, stigma, and impairment associated with these conditions
Banna, Jinan	CTAHR/HNFAS	Nutrition education, program evaluation, community nutrition, child and adolescent nutrition
Butel, Jean	CTAHR/HNFAS	Public health nutrition programs
Esquivel, Monica	CTAHR/HNFAS	Community nutrition, Dietetics
He, Yanghua	CTAHR/HNFAS	Livestock animal production: genomics and epigenomics; Nutrigenomics: studying the mechanisms of how different diets contribute to different phenotypes (e.g. BMI for evaluating obesity) based on omics-data.
Ho, Kacie	CTAHR/HNFAS	Bioactive compounds, bioavailability, food structuring, colloids for nutrient and bioactive stabilization or delivery

Appendix A. Nutrition	al Sciences Program	Faculty by Unit and	d Research Area
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Jha, Rajesh	CTAHR/HNFAS	Animal nutrition, feed evaluation, carbohydrate metabolism, fiber fermentation, gut physiology and health, in vitro digestion and fermentation				
Jun, Soojin	CTAHR/HNFAS	Emerging food processing and packaging technologies, food nanotechnologies, and biosensors				
Kim, Yong-Soo	CTAHR/HNFAS	Methods of improving animal growth performance and carcass composition based on our current understanding of the molecular mechanisms of action of growth regulation. Myostatin, as a potent negative regulator of skeletal muscle growth.				
Lee, Mi-Jeong	CTAHR/HNFAS	Nutritional biochemistry, fatty acid metabolism				
Li, Yong	CTAHR/HNFAS	Food microbiology, food safety, applied statistics				
Mishra, Birendra	CTAHR/HNFAS	Effects of nutrition on the reproductive paradigms such as growth and development, mitigating the environmental stress, and also formulating to protect the hazards of radiotherapy for cancer treatment, and space mission for astronauts				
Novotny, Rachel	CTAHR/HNFAS	Nutritional epidemiology, global nutrition, breast feeding and child growth, Children's Healthy Living Program and Center of Excellence				
Odani, Jenee	CTAHR/HNFAS	Diseases of terrestrial animals & aquatic livestock; veterinary anatomic pathology including disease pathogenesis, disease diagnostic techniques, histology and histopathology				
Revilla, Marie	CTAHR/HNFAS	Nutrition and health in indigenous populations, nutritional assessment, nutrition education for underserved populations				
Seale, Andre	CTAHR/HNFAS	Aquaculture and biomedical research, especially: 1) osmoreception, 2) osmoregulation and 3) environmental adaptation and growth in fish: endocrine and specialized cellular responses to changing environmental conditions				
Thorne, Mark	CTAHR/HNFAS	 1) effects of climate change on range and livestock production in Hawai'i and development management strategies that build resiliency and long-term sustainability; 2) Hawai'i's rangelands and remediation of former sugar and pineapple lands for sustainable livestock production; 3) Integrated Pest Management strategies on Hawai'i rangelands affected by invasive weeds, insects and diseases; 4) ecology of tropical range and pasture communities under different grazing management 				

(1						
		strategies; and 5) grazing animal behavior					
V	CTAHR/HNFAS	and nutrition on tropical rangelands.					
Yang, Jinzeng	CIAHK/HNFAS	Skeletal muscle growth, obesity, diabetes					
		prevention and epigenetic priming of the					
7.1.1. H.1. N		metabolic syndrome					
Zaleski, Halina M.	CTAHR/HNFAS	Swine production management including					
		artificial insemination, livestock waste					
Li Oinerriee	CTAHR/MBBE	management					
Li, Qingxiao	CIARK/MDDE	Proteomics, environmental biochemistry and					
Nerurkar, Pratibha	CTAHR/MBBE	biotechnology Traditional Hawaiian and Ayurvedic					
Nefulkal, Flatibila		medicine, alternative medicines in obesity,					
		insulin resistance and hyperlipidemia, insulin					
Indian Devial	CTAHR/MBBE	signaling, lipid and glucose metabolism					
Jenkins, Daniel	CIAHR/MBBE	developing molecular interactions and					
		handheld instrumentation to enable simple					
D 17 1 1	LADCOM	agricultural diagnostics in the field.					
Fox, Kealoha	JABSOM	Triangulate strategies of program innovation,					
		best-practice research, regulatory					
		management, and clinical practice that					
		strengthen a healthier Hawai'i, reduce					
		minority inequities, and improve the					
		longevity of wellness for all people in the					
		twenty-first century.					
Okihiro, May	JABSOM	Childhood obesity and early metabolic risk					
		among children in Hawai'i, development of					
		obesity and ways to address the issue from					
		clinical and community perspectives.					
Antonio, Mapuana	OPHS	Native Hawaiian nutrition and health					
West, Kristi	SONDH/NURSING	Nutrition and Wellbeing of Marine Mammals					
Albright, Cheryl Lynn	UHCC	Physical Activity, energy balance, body fat					
		distribution in ethnic minorities, eHealth					
		interventions					
Boushey, Carol J	UHCC	Nutritional epidemiology, dietary					
		assessment, interventions, biomarkers of					
		dietary intake					
Franke, Adrian A H	UHCC	Development of biomarkers reflecting					
		exposure to vegetarian foods,					
		pharmacokinetics of chemopreventive					
		micronutrients, development of state-of-the-					
		art analytical techniques to determine					
		metabolites in biological matrices					
Le Marchand, Loic	UHCC	Interactions between genetic and lifestyle					
		factors responsible for the cancer risk					
		differences that exist among ethnic/racial					
		groups in Hawai'i and California, with the					
		goal of advancing our understanding of the					
		causes, mechanisms and prevention of cancer					
Lim, Unhee	UHCC	The role of nutritional, biochemical,					
D		genetic/epigenetic and gut microbial risk					
		factors and their racial/ethnic variations in					
		the etiology of colorectal, liver, and breast					
		cancers and of Alzheimer's disease.					
	1	cancers and or razhenner s disease.					

Maskarinec, Gertraud	UHCC	Preventive medicine and nutritional epidemiology, etiology of breast cancer, Non-Hodgkin Lymphoma (NHL), and type 2 diabetes
Shepherd, John	UHCC	Radiomics, body composition, diagnostic X- ray imaging, mammographic density, bone densitometry, dual X-ray absorptiometry (DXA), single X-ray absorptiometry (SXA), osteoporosis, breast cancer, quantitative ultrasound
Wilkens, Lynne	UHCC	Methodological research that extends statistical techniques of relevance to our research, techniques for studying disease associations when the independent variables are measured with error and ethnic/racial classification

Appendix B. Program Review Data

Data available for Program Review are taken from MIRO, which are organized by department and thus reflect all graduate programs and students in the 4 graduate programs in the department. In this section we describe some demographic characteristics of the students. As of Fall 2021 there were 45 graduate students in the 4 graduate programs in HNFAS. Table 8 shows the gender distribution, showing a tendency for more female students, though recent numbers show a more balanced distribution with 21 male and 24 female students in Fall 2021. Students are roughly one third international, one third from the US mainland and one third from Hawai'i (Table 9). Race/ethnicity (Table 10) data for international students shows them only as international; however, data on the remaining students show a diverse and mixed race/ethnic student body with a third reporting Native Hawaiian or Other Pacific Islanders race/ethnicity. From 2012 to 12/31/2021 Nutritional Sciences PhD program 40 PhD students, 4 left and **11** graduated, and 25 are currently in the program.

Table 8.	Gender	distribution	in	HNFAS	Graduate	Programs
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Gender (count)	Fall 2015	Fall 2016	Fall 2017	Fall 2018	Fall 2019	Fall 2020	Fall 2021
Male	15	16	13	12	18	22	21
Female	18	30	29	32	29	29	24

Geographic	Fall						
Origin (count)	2015	2016	2017	2018	2019	2020	2021
Hawai'i	15	17	17	16	19	22	13
Hawai'i Island	2	2	1	2	2	4	2
Kaua'i	0	0	1	0	2	2	1
Oʻahu	12	14	15	14	15	15	10
US Mainland	11	12	8	13	14	14	16
US	1	0	0	0	0	0	0
National/CFAS							
International	6	17	17	15	14	15	16

 Table 9. Number of Students in HNFAS Graduate Programs by Geographic Origin

 Grouping

Table 10. Race/Ethnicity of HNFAS Graduate Students (Counts)

Race/Ethnicity	Fall						
(counts)	2015	2016	2017	2018	2019	2020	2021
Asian	8	8	8	5	8	5	6
Japanese	3	3	2	0	1	0	0
Chinese	2	1	2	2	3	3	1
Filipino	2	0	0	0	1	0	3
Korean	0	1	1	0	0	0	0
Vietnamese	0	0	1	1	1	1	0
Mixed Asian	1	3	2	2	2	1	2
Hispanic/Latino	1	0	0	1	1	2	2
Multiracial	3	6	5	6	6	9	4
Native Hawaiian or Other Pacific Islander	8	6	6	6	6	9	7
Native Hawaiian or Part-Hawn	7	5	5	4	4	6	5
Samoan	1	0	0	0	0	0	0
Guamanian or Chamorro	0	1	1	1	1	2	1
Other Pacific Islander	0	0	0	1	1	1	1
White	7	9	6	10	12	11	10
International	6	17	17	15	14	15	16
Race and ethnicity unknown	0	0	0	1	0	0	0

Asian	24.2	17.4	19	11.4	17	9.8	13.3
Japanese	9.1	6.5	4.8	0	2.1	0	0
Chinese	6.1	2.2	4.8	4.5	6.4	5.9	2.2
Filipino	6.1	0	0	0	2.1	0	6.7
Korean	0	2.2	2.4	0	0	0	0
Vietnamese	0	0	2.4	2.3	2.1	2	0
Mixed Asian	3	6.5	4.8	4.5	4.3	2	4.4
Hispanic/Latino	3	0	0	2.3	2.1	3.9	4.4
Multiracial	9.1	13	11.9	13.6	12.8	17.6	8.9
Native Hawaiian or Other Pacific Islander	24.2	13	14.3	13.6	12.8	17.6	15.6
Native Hawaiian or Part-Hawn	21.2	10.9	11.9	9.1	8.5	11.8	11.1
Guamanian or Chamorro	0	2.2	2.4	2.3	2.1	3.9	2.2
Other Pacific Islander	0	0	0	2.3	2.1	2	2.2
White	21.2	19.6	14.3	22.7	25.5	21.6	22.2
International	18.2	37	40.5	34.1	29.8	29.4	35.6
Race and ethnicity unknown	0	0	0	2.3	0	0	0

 Table 11. Race/Ethnicity of HNFAS Graduate Students (%)

Graduate course enrollment is show in Table 12. Taking annual SSH from Table 7 and dividing by 12. Enrollment for HNFAS graduate courses was always above 10 and is currently at 26.

Table 12. Oraquate course enrollment for marked course	Table 12.	Graduate course en	nrollment for	HNFAS	Course
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Year	2015	2016	2017	2018	2019	2020	2021
Annual SSH	169	190	222	190	237	254	310
Annual SSH/12	14	16	19	16	20	21	26

College of Natural Sciences Office of the Dean





UNIVERSITY OF HAWAH BOARD OF REGENTS

22 APR 27 A9:18

MEMORANDUM

March 10, 2022

То:	Randolph G. Moore Chair, Board of Regents
VIA:	Ernest Wilson Chair, BOR Committee on Academic and Student Affairs
VIA:	David Lassner President David Pare
VIA:	Debora Halbert Vice President for Academic Strategy, UH System Walhand Walhard
VIA:	Michael Bruno Provost June F. How for Michael Bruno
VIA:	Laura E. Lyons Jam F. Hym Interim Vice Provost for Academic Excellence
From:	Aloysius Helminck Dean, College of Natural Sciences
From:	Douglas Simons Director, Institute for Astronomy
SUBJECT:	REQUEST FOR ESTABLISHED STATUS FOR THE BACHELOR OF ARTS IN ASTRONOMY AND THE BACHELOR OF SCIENCE IN ASTROPHYSICS AT

SPECIFIC ACTION REQUESTED:

It is respectfully requested that the Board of Regents grant established status to the BACHELOR OF ARTS IN ASTRONOMY and the BACHELOR OF SCIENCE IN ASTROPHYSICS in the COLLEGE OF NATURAL SCIENCES at the University of Hawai'i at Mānoa.

THE UNIVERSITY OF HAWAI'I AT MĀNOA

<u>RECOMMENDED EFFECTIVE DATE</u>: Upon Board Approval.

ADDITIONAL COST:

None. These degree programs are taught by existing faculty at the Institute for Astronomy (IfA) and the Department of Physics and Astronomy (P&A). No new facilities or resources are required. Consequently, these programs can be offered in a cost-neutral manner.

2565 McCarthy Mall, Keller Hall Suite 201 Honolulu, Hawai'i 96822 Telephone: (808) 956-6451 Fax: (808) 956-9111 natsci.manoa.hawaii.edu An Equal Opportunity/Affirmative Action Institution Randolph G. Moore March 10, 2022 Page 2

PURPOSE:

The Bachelor of Arts in Astronomy (ASTR-BA) and the Bachelor of Science in Astrophysics (ASTP-BS) were provisionally approved on August 21, 2014. They have now completed their provisional cycle, and in accordance with Board of Regents' policy, were reviewed under the procedures for program review at UH Mānoa and recommended for established status.

BACKGROUND:

Board of Regents Policy 5.201 Parts III.B confer upon the Board the authority to grant established status to provisional degree programs, and states that a request must be made to the Board to transition a degree program from provisional to established status, and that the recommendation by the president for approval by the Board shall include the results of a program review. The results of the program review are presented in the attached document.

Summarize the program's role and its evolution since inception.

- The ASTR-BA and ASTP-BS programs were created to offer UH Mānoa students a pathway to one of Hawai'i's signature fields of scientific research. The programs bridge a long-standing gap between K-12 education and UH Mānoa's Astronomy PhD program, which has a 50-year record as one of the top programs in the country.
- The ASTR-BA and ASTP-BS programs and associated minors expand the range of options for students on the UHM campus.
- Both programs have grown steadily since inception, doubling total undergraduate enrollment in P&A.

Why will this continue as a priority for the campus/college?

- Astronomical research is consistently cited as a strength of UHM which in turn helps build a cadre of outstanding graduate students. Offering undergraduate degrees in astronomy and astrophysics helps directly feed UHM's astronomy graduate program, which through K-12 outreach links back to our community, serving their interests and creating a local and sustained talent pool to lead Hawai'i astronomy into the future.
- The University's deep investments and commitments to astronomy, through the Center for Maunakea Stewardship, 'Imiloa Astronomy Center, UH Hilo astronomy program, and the Institute for Astronomy, demonstrate the long-term strategic interest UH has in astronomy. The ASTR-BA and ASTP-BS programs are natural and essential components of UH's extensive astronomy interests.
- This collaborative program between an Organized Research Unit (IfA) and a College (CNS) demonstrates the benefits of leveraging the strengths of both types of units for undergraduate instruction at UHM.

Will it continue to meet needs and generate demand?

- Astronomy is a foundational science and a thriving field of 21st century research. The strong response to the introduction of the undergraduate programs reflects innate human curiosity about the astronomical universe. Demand is stable and will grow with continued outreach to K-12 schools in Hawai'i. This can form the basis of a STEM pipeline which will create rewarding careers for local students.

Does the program integrate well with programs on this and other campuses? How will developments at other campuses affect this program in the future?

- The ASTP-BS is an interdisciplinary program combining Astronomy, Physics and Math.
- The ASTR-BA is designed to "mix and match" with other degrees, certificates, and minors.
- Our programs complement UH Hilo's established Bachelor of Science in Astronomy, leveraging strengths of both institutions.
- The anticipated availability of an educational telescope at UH Hilo will expand opportunities for collaboration between campuses.

Randolph G. Moore March 10, 2022 Page 3

Assess how well the program met proposed enrollments, completions, operating and instructional resource and facility needs?

- Enrollment in the ASTP-BS program has consistently exceeded projections, while enrollment in the ASTR-BA has been somewhat less than expected. Both programs have grown steadily, and total enrollment is now approaching the projected level.
- Our projections assumed 100% persistence, so completion rates are lower than projected. Actual persistence rates are comparable to those of other CNS programs. Graduates of the ASTP-BS and ASTR-BA programs now account for the majority of P&A's undergraduate degree recipients.
- These programs are offered in a cost-neutral fashion as they rely on existing resources and funding.

What unexpected developments enhanced or challenged the program in its evolution?

- We assumed that most of our students would follow a traditional path to graduation. In practice, it is quite common for students to transfer between institutions, and between majors at UH Mānoa. Students who transfer from outside the UH system are very welcome, but fitting their existing courses into our programs can be challenging.
- Initially, the frequency with which students changed majors was disconcerting. In time, we came to understand that they are finding their niche within the university. Many students who formally transfer out of our programs take a minor in Astronomy or Astrophysics, and report that the knowledge they gained is useful in other fields.
- Creating a collaborative program between an Organized Research Unit (IfA) and a College (CNS) presents non-trivial challenges. Consistent communication, collegial relationships, and transparency are all essential.

Defend the recommendation to make the program permanent.

- Hawai'i has unique advantages as an international center of astronomical research and UH's astronomy program is key to advancing the State's scientific strategic interests, utilizing the clear, calm, and dark skies above Hawai'i as an important natural resource. Like the sea that surrounds Hawai'i and the rich geologic diversity that comprises Hawai'i's islands, research predicated on these unique natural resources (earth, sea, sky) is what helps define Hawai'i's role in a global sense. Hawai'i's natural resources justify long-term education and research commitments to them, by the University, for the betterment of the State.
- The ASTR-BA AND ASTP-BS programs give UH Mānoa undergraduates an opportunity to study Astronomy and Astrophysics without having to travel to mainland institutions. Program graduates can start or be hired by high-tech industries, helping to reduce Hawai'i's dependence on tourism.
- Astronomy has deep connections to Hawai'i's past and future; it is fitting and indeed critical that the State's flagship university offer undergraduate programs in this subject.

ACTION RECOMMENDED:

It is respectfully recommended that the Board of Regents grant established status to the BACHELOR OF ARTS IN ASTRONOMY and the BACHELOR OF SCIENCE IN ASTROPHYSICS in the COLLEGE OF NATURAL SCIENCES at the University of Hawai'i at Mānoa.

ATTACHMENTS:

APPLICATION TO ESTABLISH UNDERGRADUATE PROGRAMS IN ASTRONOMY AND ASTROPHYSICS, APPROVAL OF PROVISIONAL STATUS FOR BA IN ASTRONOMY AND BS IN ASTROPHYSICS

cc: Executive Administrator and Secretary of the Board Kendra Oishi

Application to Establish Undergraduate Programs in Astronomy and Astrophysics

Astronomy Undergraduate Committee: Joshua Barnes (chair), Duncan Farrah, Roy Gal, Shadia Habbal, Eugene Magnier, Karen Meech, Mike Nassir

April 9, 2022

1 Executive Summary

This document¹ reviews the Astrophysics Bachelor of Science (ASTP–BS) and Astronomy Bachelor of Arts (ASTR–BA) degree programs at the University of Hawai'i at Mānoa (UHM). These two programs were jointly proposed in 2014 and granted provisional status on August 21 of that year. Students began registering in significant numbers in Fall 2015. Two one–year extensions on conversion to permanent status were requested and approved so we could gather more data and deal with the COVID–19 pandemic.

The Institute for Astronomy (IfA) administers both programs (hereafter, the ASTRO programs), and IfA faculty teach the Astronomy content, while faculty in the Department of Physics and Astronomy (P&A) teach the Physics content. Both programs are formally housed in P&A.

Although the ASTRO programs have many courses in common, they have very different formats and objectives. These were designed so that neither program competes with the existing ASTR–BS major at UH Hilo, which leverages proximity to Hawai'i Island facilities in a program that emphasizes telescope observing and operation. The ASTP–BS program is tightly structured around a core of the existing PHYS–BS major, with the goal of preparing students for graduate study in Astronomy, Physics, or related fields, or for technical careers. The ASTR–BA program was developed, at the suggestion of former CNS (College of Natural Sciences) Dean William Ditto, to prepare students with interests in Astronomy for careers in STEM education, astronomy administration, science journalism, or public outreach. This program is structured around a sequence of Astronomy courses with basic Physics prerequisites, giving students the option to include more rigorous courses or to mix and match the ASTR–BA with other programs.

The ASTRO programs are closely aligned with UHM's strategic goals, including research excellence and student success. Hawai'i is a global center of astronomical research, and the IfA's graduate program has been producing world–class astronomers for half a century. The ASTRO programs were created so that undergraduates at UHM can fully participate in one of Hawai'i's greatest scientific enterprises; the new programs also support Hawai'i's growing high–tech industry. With our existing graduate program and outreach to K–12 schools, we can now offer Hawai'i students an integrated pathway to careers as research astronomers and knowledge workers in STEM fields.

Enrollment and graduation rates in P&A increased following the introduction of the two ASTRO programs. Both programs continue to grow, and there's no sign that we have tapped the supply of potential students. The ASTP–BS program attracts the majority of our

¹Based on Provisional-to-Established-Proposal-.docx template, available at manoa.hawaii.edu/ovcaa/program-approval-review/established-status-request-for-degrees/

students. While the ASTR–BA program is smaller than expected, it has a definite appeal for students who want to study astronomy without a heavy dose of physics. ASTP–BS students progress in cohorts and complete on schedule; ASTR–BA students progress individually. By number of graduates, our program ranks 24th out of 34 comparable programs, many housed at institutions much larger than UHM. We find that ASTP–BS graduates (and minors) frequently go on to graduate school or employment in STEM fields, while ASTR–BA students are more likely to become STEM educators.

The ASTRO programs draw on existing faculty at IfA and P&A, and leverage existing observational facilities. Consequently, these programs can be offered in a cost-neutral fashion as they rely solely on existing resources and funding.

In terms of program organization, the ASTR–BA is similar to other CNS majors with basic Physics requirements, while the ASTP–BS is truly interdisciplinary, with a modest tilt towards Physics courses. ASTRO program class sizes are generally comparable to those in upper–division PHYS classes. Non–majors, including ASTRO minors, Physics majors, and other CNS students, account for $\sim 30\%$ of ASTR SSH above the 100–level. The ASTRO programs are highly productive, despite their small size, because they use resources already allocated to teaching Astronomy.

Capstone research projects and papers, required in both programs, vary in quality but include outstanding (and professionally published) work. For ASTP–BS majors, the heavy load of required courses may limit research effort. Compared to other majors, ASTR–BA majors take ~ 1 year more to graduate, but by other quantitative measures (credits and GPA at graduation, persistence) the ASTRO programs are close to CNS averages. We are introducing career planning and research guidance in the early stages of both majors to improve program outcomes and employment prospects. The ASTRO programs can already boast of a number of graduates who have gone on to graduate schools and STEM jobs in Hawai'i and on the mainland.

Looking forward, there are several directions for future development which will increase the value of the ASTRO programs:

- Not all of our students understand the culture of scientific research; we are developing a 1–credit at the 100–level course to introduce research topics and related skills.
- Programming is critical for graduate school in Astronomy, and valuable for anyone contemplating a STEM career; our students need more experience with computing.
- To be more employable, students in the ASTR–BA program should be encouraged to take minors, certificates, or second majors in synergistic subjects; we plan to work with the College of Education and other potential partners toward this goal.
- The ASTRO programs are a novel interdisciplinary collaboration between an Organized Research Unit and an Academic College. UHM aims to foster such connections; by "breaking the path" we hope to encourage similar partnerships.
- Credit for the programs should be shared between IfA and P&A in proportion to the number of classes or credit-hours each contributes.

2 Program Alignment

The UHM vision, as articulated in the most recent Strategic Plan (SP), states that "We will be locally and globally recognized as a premier student-centered, Carnegie Research 1, community-serving university". Two of the four Strategic Goals are research excellence and student success. With some of the world's most productive astronomical observatories on Maunakea and Haleakalā, development of observing technologies used in current and future ground-and space-based telescopes, and vast datasets from our sky surveys, it is essential to have a vibrant astronomy undergraduate program. As the SP recognizes, "Our unique

location facilitates advances in our internationally renowned research in earth and ocean sciences, astronomy".

Both astronomy undergraduate degrees combine classroom learning, leveraging the diverse and extensive expertise of the astronomy and physics faculty, with required research projects, taking advantage of our unique access to telescopes, instrumentation, and astronomical data. With these resources, we are clearly aligned with Student Success, which the SP describes explicitly: "The success of our students is interconnected and related to our ability to provide excellent academic programs, outstanding teaching and research learning opportunities, high levels of student engagement", which are exactly what our undergraduate program seeks to do. As we discuss in § 3, we have produced quite a few successful graduates, despite facing both a recession and COVID during the probationary period for our program.

In terms of the Strategic Goal of Research Excellence, astronomy at UHM is already successful. With the inclusion of these undergraduate degrees, this long history of research productivity is extended to our students. We are already incorporating mentoring across academic levels – faculty, graduate students, undergraduates – to develop and enhance a culture of research among our students.

The need for an astronomy undergraduate program was also identified in the 2012 Visiting Committee Report to the IfA, which "strongly endorses the plans to introduce the proposed undergraduate majors in astronomy. They will be important programs that will help the IfA to fulfill its broader obligations to the state." This report led to the creation of the ASTR–BA and ASTP–BS programs.

UHM's peer institutions universally offer Astronomy undergraduate degrees, and there is evident need for such a program here. After only a few years, we already have a relatively large program, and have begun producing graduates who are going on to graduate school, or employment in data–intensive fields where the skills learned through our degree are highly desirable.

The just-released Decadal Survey of Astronomy & Astrophysics highlights the need for increased representation of underrepresented groups, including women, minorities, and indigenous populations. They specifically note that "Funding to PIs at tribal colleges, from Indigenous communities, or at institutions that predominantly serve Indigenous populations, would enable long-term research partnerships and culturally supported pathways for full participation of Indigenous people in science careers." Astronomy faculty hope to use such resources to improve representation within our program, and to deepen our commitment to UHM as a Native Hawaiian Place of Learning.

At present, the astronomy community across the Hawaiian islands employs over 1000 people, and generates about \$100 million in local expenditures, the vast majority of which comes from extramural funds. Employees are not just scientists, but include management, technical, and support staff at the observatories, as well as personnel at the IfA. Our degree programs prepare students for employment as telescope operators, instrument technicians, and other highly–skilled jobs for which there is currently demand but difficulty finding trained individuals locally. Hawai'i also hosts a small but growing high tech/data science hub. Currently employing about 31,000 people², including several hundred data scientists, Hawaii's tech hub is a priority for development over the next decade as part of the "Hawai'i 2.0" effort to diversify the economy. These sectors are envisaged as the primary employment destinations for the ASTP–BS and ASTR–BA graduates. A secondary destination is projected to be science educators; the state faces a critical shortage of Hawai'i Qualified Teachers, who are required to have a college major or 30 credits in their subject area. ASTRO program graduates and minors meet these requirements.

²https://www.bizjournals.com/pacific/news/2021/04/06/hawaii-tech-teconomy.html

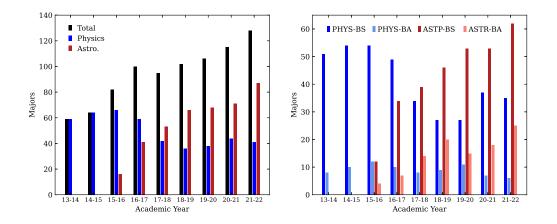


Figure 1: P&A majors by academic year. Left: registered majors in each subject. Right: BS and BA majors are plotted separately. *Total P&A enrollment (black bars) grew rapidly after the ASTRO majors were introduced.*

Program	Majors	F15	F16	F17	F18	F19	F20	F2 1
ASTP-BS	Projected	12	24	36	36	36	36	36
	Registered	12	34	39	48	53	53	62
ASTR-BA	Projected	20	40	60	60	60	60	60
	Registered	4	7	14	20	15	18	25

Table 1: Number of majors in the ASTP–BS and ASTR–BA programs by year.

3 Enrollment & Graduation

3.1 Enrollment

The relationship between Physics and Astronomy enrollment is illustrated in Figure 1, which plots registered P&A majors by year. While the new programs diverted some students who would otherwise have majored in Physics, the marked increase in the total number of majors shows that the ASTRO programs brought many new students into P & A, doubling the overall enrollment.

Table 1 shows the number of majors in the ASTP–BS and ASTR–BA programs by academic year. Projected majors come from Table G.1 of the ASTRO proposal; they were computed assuming that (a) the ASTP–BS and ASTR–BA programs recruit 12 and 20 students per year, respectively, (b) students enroll in the programs as sophomores, (c) students then finish in three years, and (d) 100% persistence. Registered major counts are provided by the Manoa Institutional Research Office (MIRO) and refer to the start of each academic year. The ASTP–BS program is larger than projected, while the ASTR–BA program is smaller. Both programs continue to grow with no sign of leveling off; total enrollment is now approaching projected levels.

The ASTR–BA program clearly has room for further development. Only some of our students take advantage of this program's flexibility; once permanent status is granted, we will pursue Bachelors to Masters and/or Bachelors to Professional Certificate pathway agreements to bridge the ASTR–BA degree with programs in the College of Education. We

also plan to increase outreach to high–schools to bring more students into both programs, and will apply for extramural funding to do this.

3.2 Progress & Persistence

Not all students who declare a major actually follow through. In Table A.7³ we therefore define Active majors by counting students in the ASTP–BS or ASTR–BA programs who enrolled in at least one ASTR class in a given academic year. The progress of these students through the ASTRO programs can be tracked year–to–year by noting when they enrolled in certain milestone courses. The 200–level milestones are ASTR 210 (Foundations of Astronomy), or ASTR 241 and 242 (Foundations of Astrophysics I, II). ASTR 300 (Observational Astronomy) and ASTR 494 (Senior Research Project) are milestones at the 300 and 400–level, respectively.

As of Summer 2021, 31 ASTRO majors have reached the 400–level milestone. This sample includes all students who graduated by Summer 2021 (15 ASTP–BS grads, and 12 ASTR–BA grads), as well as 4 ASTP–BS students who took ASTR 494 in AY 20–21 but have not yet completed their degrees.

For the 19 ASTP–BS students, 15 progressed from 200–level to 400–level in 2 academic years, 2 students took 3 years, and 2 students took only 1 year (by doubling-up milestone courses). The average is precisely 2.0 years. While some of these students faced delays in passing the prerequisites for ASTR 241, we see that ASTP–BS students progress in cohorts and generally hit milestones on schedule.

For the 12 ASTR–BA students, 6 progressed in 2 years, 5 took 3 years, and 1 took 4 years. The average for this sample is 2.6 years. *ASTR–BA students are "self-paced" and do not progress in cohorts.*

Table A.7 also shows how active majors, as defined in § 3.2, are distributed by academic level. Absent attrition, we would expect equal numbers of 200, 300, and 400–level students (once the system reaches a "steady–state"). The shaded cells in this table indicate where we think a steady–state is realized, and the "Mean" values on the far right are steady–state averages. These values allow us to quantify persistence.

For the ASTP–BS program, roughly 70% of the majors who reach each milestone go on to the next. This is supported by a review of individual transcripts. Other CNS programs have similar persistence rates (see Table A.8). Some attrition, especially for students in the early stages of their studies, is expected: the ASTRO programs are open majors, and the ASTP–BS program in particular is more challenging than some students expect. Students who transfer out of the programs at later stages typically stay within CNS, favoring Physics and Mathematics.

For the ASTR–BA program, the situation is more complex. Review of individual transcripts suggests an intrinsic persistence rate comparable to the ASTP–BS program. In addition, the ASTR–BA program *gains* a few majors from ASTP–BS each year; fully half of the 12 ASTR–BA seniors started out as ASTP–BS majors. Some of these students had difficulties with upper–division courses and opted for the less–demanding degree.

The ASTRO programs, along with the Physics BS and BA, do not function as separate entities. Students can and do freely transfer between them, without sacrificing academic progress, as their interests develop. The options afforded by these programs serve student interests more effectively than any single program could.

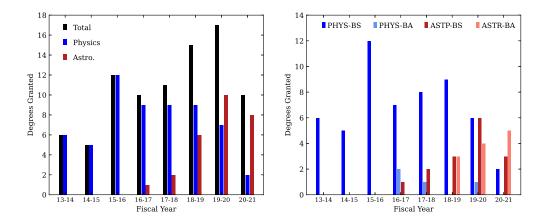


Figure 2: P&A graduates by fiscal year. Left: total number of graduates in each discipline. Right: BS and BA majors are plotted separately. Due to the pandemic, a number of FY2020–21 seniors have not yet graduated.

Program	Graduates	15 - 16	16 - 17	17 - 18	18 - 19	19 - 20	20 - 21
ASTP-BS	Projected			12	12	12	12
	Actual		1	2	3	6	3
ASTR-BA	Projected			20	20	20	20
	Actual				3	4	5

Table 2: Projected and actual graduates from the ASTP–BS and ASTR–BA programs by fiscal year.

3.3 Graduation

Fig. 2 plots all P&A graduates by year. BS and BA degrees are again aggregated on the left, and plotted separately on the right. The total graduation rate increases markedly from AY 2018-19 on as ASTRO students begin to graduate in significant numbers.

Table 2 shows projected and actual graduation rates for the ASTP–BS and ASTR–BA programs by academic year. The ASTRO proposal did not make separate year–by–year projections for the two majors, so the numbers listed here are based on the assumptions listed in § 3.1. These assumptions included a high rate of enrollment in the ASTR–BA program and 100% persistence, both biasing the projections upwards.

Actual graduation rates in Table 2 roughly track the tallies of 400-level students in Table A.7. This is expected; to date, all ASTRO students who reach their senior year stay in the programs (although late-stage transfers from ASTP-BS to ASTR-BA can occur). The upward trend in actual graduation rates was disrupted by the pandemic in AY 20–21. Of the 7 ASTP-BS majors who completed capstone projects in time to graduate that year, 4 had to delay graduation to repeat non-ASTR courses or address financial difficulties; 1 has since graduated, and another 2 are expected to graduate this Spring.

Our graduation rate can be compared to those of US institutions granting Astronomy PhDs as well as undergraduate Astronomy or Astrophysics degrees. According to American Institute of Physics (AIP) surveys, there are 34 such institutions. Each grants an average of

³Tables and figures with an "A." prefix are collected in Appendix A.

15.8 undergraduate degrees per year (average over AY 2018 – 2020), but the distribution is quite broad, and the upper end is dominated by institutions *much* larger than UH Mānoa. Our program ranks about 24^{th} . For a new program in a relatively small state, this is quite remarkable.

3.4 Demographics

Demographic data for all P&A program majors and graduates, extracted from MIRO Unit Profile Reports, appear in Table A.9. ASTRO graduates and ASTR–BA majors are evenly distributed between women and men, while ASTP–BS majors tilt $\sim 40:60\%$ toward men. In comparison, PHYS majors and graduates are more likely to be male ($\sim 30:70\%$ and $\sim 40:60\%$, respectively). Presumably due to Hawaii's reputation for Astronomy, the ASTRO programs attract many mainland and international students; $\sim 60\%$ of the ASTRO majors, compared to $\sim 35\%$ of the PHYS majors, are from out–of–state. It seems plausible that differences in racial makeup are driven by differences in geographic origin (e.g., the large cohort of ASTRO majors from the mainland reflect the racial and ethnic mix of that population, including mainland minorities). However, the total number of students is too small to support a detailed discussion of distribution by race or ethnicity.

3.5 Graduate Schools and Jobs

In Summer 2021, we surveyed ASTRO program graduates and minors to see what they were doing post-graduation. To date, 59% (22/37) have responded; Table A.10 summarizes the results. All told, 50% (11/22) of those responding were admitted to graduate or professional programs at UHM (7/22) and on the mainland (4/22). The ASTP–BS graduates (and ASTRO minors, who generally have BS degrees) are all studying STEM subjects, while the ASTR–BA graduates are more likely to study Education. Another 32% (7/22) of those responding went directly into the workforce, almost all in technical fields (e.g., programming, data science). Just 18% (4/22) of those responding reported they were not working; most are recent graduates who are taking time off or looking for specific employment.

4 Instructional Resources

The ASTRO programs were created by combining new ASTR courses with existing PHYS courses. Most of these ASTR courses are taught by IfA members under a long-standing arrangement with CNS; some instruction is also provided by P&A personnel hired to support the ASTRO programs. While ASTP-BS majors have increased enrollment in upper-division PHYS courses, only one course, PHYS 485 (Professional Ethics), requires a second section, taught by IfA faculty. The ASTRO programs are offered at no additional cost to $P \mathcal{C}A^4$.

4.1 IfA faculty

At the time the undergraduate programs were proposed, the IfA had 36 tenured or tenuretrack R or S faculty, including support personnel for the observatories. We did not project any change in this total (Table 3). The ASTRO proposal (p. 8) lists 32 of these faculty as potential ASTR instructors – although this list, which included the Director as well as several people with critical observatory roles, was somewhat aspirational. Each semester, 16 faculty were temporarily assigned 0.25 FTE instructional positions funded by CNS. This provided 96 cr/yr (credits of teaching per year), nominally sufficient for both the graduate

⁴More generally, we note that P&A bears some administrative costs, e.g. in processing Astronomy TAs.

	15 - 16	16 - 17	17 - 18	18 - 19	19 - 20	20 - 21	21 - 22
Projected IfA Faculty	36	36	36	36	36	36	36
Actual IfA Faculty	36	33	33	32	33	32	33
Projected P&A Faculty	1	2	2	2	2	2	2
Actual P&A Faculty	1.2	1.2	0.2	1.2	1.2	1.2	1.2

Table 3: Personnel for ASTR courses by year. All tenured or tenure–track IfA faculty are counted, regardless of role. The tally for P&A is limited to personnel who support the ASTRO programs (see § 4.2).

and undergraduate programs. In addition, CNS funded 8 TA positions, predominantly supporting service courses.

Instructional resources within the IfA have contracted since the programs were approved. Of the 32 faculty listed in the ASTRO proposal, 9 are no longer with the IfA, while 7 tenure–track R faculty have been hired. To support the undergraduate programs, 2 existing IfA faculty with S positions have assumed significant instructional responsibilities.

4.2 P&A faculty & instructors

The ASTRO proposal (p. 7) lists 18 tenured or tenure-track P&A faculty with I appointments, and 3 I–2 instructors. Of the 18 faculty, 4 are no longer with P&A, while 4 tenuretrack I faculty have been hired. Thus, P&A's staffing level has been fairly stable. Contingent on program growth, we projected that one new P&A hire would be needed in AY 2016–17.

In 2013, CNS funded a new I–2 position in P&A to support the development of the AS-TRO program. Duties as outlined in the ASTRO proposal (p. 18) included service teaching (12 cr/yr), developing and teaching an upper–division lab course (2 cr/yr), and support for remote observing; the person we hired also had significant expertise in program assessment. This individual took a tenure–track job on the mainland at the end of Spring 2017.

The vacant I–2 position was converted to an S–3 position, and a new hire was made by a joint P&A and IfA personnel committee in Fall 2018. Duties specified in the position description include program assessment and revision, helping faculty improve teaching methodologies, advising majors, coordinating capstone projects, articulation with other programs, and teaching both ASTR (8 cr/yr) and PHYS (3 cr/yr) courses. Unlike the earlier I–2 position, this position was charged against the funds CNS provides to the IfA to support ASTR teaching.

One individual in a long-standing P&A I-2 position has taken on a significant role supporting the ASTRO programs and ASTR service courses: they provide semi-annual academic advising for all ASTRO majors, devise alternate program requirements for students with special interests, and coordinate Astronomy TAs. Most of this additional work is *not* part of this individual's assigned duties for P&A. This effort amounts to approximately 0.2 FTE, which is covered as "Salary Overload" by the IfA using discretionary funds – an awkward scheme which we would like to replace with a more rational arrangement.

4.3 ASTR teaching loads

We currently offer a total of 96.5 cr/yr of ASTR courses, following the two-year schedule in Table A.11. This tally does not include courses cross-listed from other fields. Graduate and undergraduate courses account for 34.5 and 62 cr/yr, respectively. The undergraduate total includes 35 cr/yr attributed to the ASTRO program courses at the 200 to 400-level. Out of this grand total, 5 cr/yr of ASTR 110L (Survey of Astronomy Lab) are taught by TAs. Co–instruction of ASTR 430 and 630 (The Solar System) saves 1.5 cr/yr. The S–3 position in P&A teaches 8 cr/yr. The remaining 82 cr/yr are taught by IfA faculty.

The IfA is developing but has not yet finalized a workload policy. To estimate the resources available, we assume that each faculty member listed in Table A.12 teaches 3 credits per year unless excused (e.g., people with major operational roles or "soft money" funding). This yields a total of 87 cr/yr, with 72, 9, and 3 available on Oahu, Maui, and Hawaii Island, respectively. However, Hawaii Island faculty teach 50% at UHH, reducing the total available to 84 cr/yr.

In practice, the number of credits we need to offer exceeds the number readily available. This shortfall is due to factors such as sabbaticals, medical emergencies, geographical distribution of faculty, specialization, and imperfect allocation of available faculty. To offer both graduate and undergraduate programs, some IfA faculty must teach well over 3 cr/yr. Efficient and equitable staffing of ASTR courses is a non-trivial issue. We are developing a workload policy supporting "extra" teaching to ensure that our academic programs are sustainable.

4.4 Budget

Table 4 estimates tuition revenue by multiplying actual SSH from program classes (Table 6) by the in-state tuition rate for each academic year. This estimate is quite conservative as it ignores the high percentage of out-of-state students (§ 3.4), who pay up to ~ 2.9 times more. The ASTRO proposal included a program fee of \$500 per semester, to start in AY 2016–17; this fee was not implemented.

	15 - 16	16 - 17	17 - 18	18 - 19	19 - 20	20 - 21
Tuition (\$)	570,200	647,800	$679,\!500$	$735,\!000$	737,600	$690,\!500$

Table 4: Estimated tuition from ASTRO program (ASTR + PHYS courses) by academic year, rounded to the nearest \$100. We did not apply for any grants.

Table 5 shows Total Direct and Incremental Costs from the "Academic Cost and Revenue Template" in the ASTRO proposal. The projected costs included the FTE for faculty required to teach both ASTR and PHYS courses. Actual costs are much lower since most of the teaching and mentoring is done by existing IfA and P&A faculty. These costs include full salary and overhead for one I–2 position (AY 2015–17) and the S–3 position (AY 2018– present), 0.2 FTE for the other I–2 position (AY 2015–present), and TA support for ASTRO program courses. Non-salary costs, discussed below, were included but are minimal.

	15 - 16	16 - 17	17 - 18	18 - 19	19 - 20	20 - 21
Projected Costs (\$)	264,160	499,160	589,160	$514,\!160$	$532,\!052$	$550,\!656$
Actual Costs $(\$)$	$148,\!200$	$153,\!800$	64,700	$171,\!300$	$197,\!500$	198,700

Table 5: Projected and actual costs for ASTRO program courses by academic year. Actual costs have been rounded to the nearest \$100.

4.5 Facilities & Equipment

The original ASTRO budget included funds for computer hardware and software, an optics laboratory, and \$150,000 for 25% of a robotic telescope to be located on Hawaii Island and shared between UHH and UHM. These funds were not allocated following program approval.

The IfA used RTRF funds of \$1,500 to buy a consumer–grade desktop computer in 2016. This machine is used as a web server for both undergraduate and graduate ASTR classes, and as a compute engine for undergraduate projects. IfA funds of \$3,500 were also used to buy a pool of three laptops to be loaned to undergraduates.

ASTR 300L (Observational Astronomy Lab), which would have used the optics lab, is now focused exclusively on computer–based exercises.

The ASTRO programs do not have a dedicated teaching telescope. ASTR 301 (Observational Astronomy Projects) has made intermittent use of the UH 88" telescope, and some student projects have used LCOGT, a global network of robotic telescopes.

5 Program Organization

The ASTRO programs are collaborations between the IfA and P&A, but they have different mixtures of courses. Table A.13 shows the number of ASTR, PHYS, and MATH classes (including electives) and credits in each program, while Appendix B summarizes the formal requirements. The ASTR–BA requires two semesters of Physics (plus PHYS 485) and two semesters of Calculus; ASTR, PHYS, and MATH provide 64:19:17% of the credits, respectively. In contrast, the ASTP–BS requires four years of Physics courses culminating in PHYS 480 (Quantum Mechanics I), four semesters of Calculus, and one 300–level MATH course; ASTR, PHYS, and MATH provide 34:45:21% of the credits. Thus, the ASTR–BA is similar to other CNS majors with a basic Physics and Math requirements, while the ASTP–BS is truly interdisciplinary.

As the Physics and Math components of both majors are well–established, we focus here on the Astronomy components.

5.1 Changes to programs

The following changes were made since the ASTRO programs were approved in Fall 2014:

- Fall 2015: Renumber ASTR 240 (Foundations of Astronomy) to ASTR 210.
- *Fall 2018:* Reconfigure ASTR 494 (Senior Research Project), with research component now provided via ASTR 399 (Directed Reading & Research).
- *Fall 2018:* Change ASTR 423 (Stellar Astrophysics) from a required course to an elective, given every other year.
- Spring 2020: Make ASTR 110 (Survey of Astronomy) a requirement for the ASTR–BA program and a prerequisite for ASTR 210.
- *Fall 2021:* Introduce ASTR 470 (General Relativity & Cosmology) as a potential elective at the 400-level.
- *Fall 2021:* Change the name and catalog description of ASTR 380 (History of Cosmology and Scientific Thought).
- Pending: Add ASTR 470 to the formal lists of electives for the ASTRO programs.
- *Pending:* Introduce ASTR 197 (Introduction to Astronomy Research), a 1–credit course orienting students toward research and providing basic skills. We expect this will increase persistence and student success, and reduce time–to–graduation.

These changes simplify program administration, ensure that faculty who mentor senior projects are recognized for their efforts, bolster the preparation of ASTR–BA students, and

expand the set of 400-level electives so that we can offer one each semester (on a two-year cycle).

Further changes to the ASTRO programs are contingent on a number of factors. The ASTP–BS major currently requires 124 credits, and we're reluctant to require more. The redesign of the General Education requirements and initiatives within CNS to reassess language requirements may provide room to make changes. Our priorities include:

- Make ASTR 197 a permanent course and a requirement for both ASTRO programs.
- Make ASTR 110 a requirement for the BS–ASTP program and a prerequisite for ASTR 241 and 242.
- Make ASTR 110L (Survey of Astronomy Laboratory) a requirement for the ASTRO programs and a prerequisite for ASTR 300/300L.
- Add ICS 110P (Introduction to Computer Programming in Python) as a requirement for the ASTRO programs and a prerequisite for ASTR 300/300L.

These changes would give students a better foundation in scientific research, ensure they have a broad knowledge of astronomy and some basic grounding in observation, and provide valuable skills in software development. We are also looking into ways to strengthen the ASTR–BA, possibly by upgrading the Physics and Math requirements, or by increasing the capstone project's duration, scope, or range of options.

5.2 Courses, Sections, & SSH

Table 6 summarizes courses, sections, and SSH. The projections shown here are taken from Appendix G of the ASTRO proposal; they are based on assumptions (a)–(d) in § 3.1, along with sample 4–year plans (ASTRO proposal, Appendix B). Since we assumed that students would declare majors at the start of their second year, *only courses taken from year two on were counted*. These courses are ASTR 240 (now 210), 241, 242, 280, 281, 300, 300L, 301, 320, 380, 423, 426, 430, 494, and PHYS 152, 152L, 272, 272L, 274, 274L, 310, 311, 350, 400 (included as a generic Physics elective), 450, 480, 485 (ASTRO proposal, Table G.2).

All 13 of the PHYS courses listed above were in regular annual rotation prior to Fall 2015. If A faculty were already offering the 200–level ASTR courses, as well as ASTR 380. The remaining 300–level ASTR courses started in AY 15–16; 400–level courses followed the next year. As Table 6 shows, we did not offer all of the projected courses. Two required ASTR classes (ASTR 210, 423) were canceled due to low enrollment. Limited availability of IfA faculty forced us to cancel several 200 and 300–level electives; all have since resumed except for ASTR 380, which was last given in AY 18–19. None of these cancellations fundamentally impeded any of our majors.

We anticipated the need to offer double sections of three ASTR courses with intrinsically limited enrollment (ASTR 300, 300L, 301) from AY 17–18 on. The ASTRO proposal did not anticipate that extra sections would be needed for any PHYS courses aside from PHYS 485 (a 1–credit course with E and O foci). Thus, we implicitly assumed that all ASTRO students could be accommodated by 14 PHYS sections per academic year, yielding the projected section count shown in Table 6. In practice, we have not yet needed to offer double sections of any ASTR course except ASTR 494, which is routinely offered in both semesters. Thus, the number of actual sections tracks the number of actual courses.

Projected SSH in Table 6 are taken directly from Table G.1 of the ASTRO proposal. In tallying actual SSH, we again assumed that a single section of each PHYS course would be sufficient, and used the average number of SSH per section for each course in each academic year. We note that enrollment in the PHYS and ASTR courses tallied here include many students who are not ASTRO program majors.

SSH for two courses, which were not included in the original ASTRO proposal, are listed separately. ASTR 399 was added as a requirement for both programs in Fall 2018; the SSH

	15 - 16	16 - 17	17 - 18	18 - 19	19 - 20	20 - 21
Projected Courses Actual Courses	23 23	$\frac{26}{26}$	$\frac{26}{25}$	$\frac{26}{25}$	$\frac{26}{23}$	26 24
Projected Sections Actual Sections	23 23	28 28	31 27	$\frac{31}{27}$	$\begin{array}{c} 31 \\ 25 \end{array}$	31 26
Projected SSH Actual SSH	$\frac{368}{1323}$	$860 \\ 1430$	$\begin{array}{c} 1324 \\ 1500 \end{array}$	$1324 \\ 1591$	$1324 \\ 1566$	$\begin{array}{c} 1324 \\ 1466 \end{array}$
ASTR 399 SSH ASTR 110 SSH	$\frac{2}{175}$	$7\\154$	$\begin{array}{c}2\\162\end{array}$	20 202	$52 \\ 192$	$37 \\ 217$
Projected SSH* Actual SSH*	$520 \\ 1752$	$\begin{array}{c} 1048 \\ 1848 \end{array}$	$1512 \\ 1930$	$\begin{array}{c} 1512\\ 1984 \end{array}$	$1512 \\ 1907$	1512 1818

* – Including required MATH courses.

Table 6: Courses, sections, and SSH for ASTR and PHYS courses used in the ASTRO proposal projections, by academic year. We list SSH for ASTR 399 and 110 separately since these were added later. The last two rows show SSH including MATH courses.

for this course are derived from undergraduate research projects mentored by IfA faculty (note that projects mentored by P&A, SOEST, or Engineering faculty are not included). ASTR 110 was added as a requirement for the ASTR–BA degree in Spring 2020. We offer a minimum of 6 sections of ASTR 110 per year; since a single section would suffice for our ASTR–BA majors, we again tally the average number of SSH per section.

To illustrate the interdisciplinary nature of the ASTRO programs, Table 6 also lists projected and actual SSH including the MATH courses (MATH 242, 243, 244, 311) taken in year two onward.

Table A.14 presents some descriptive statistics for ASTR courses, analyzed by academic level. For comparison, we also provide the same data for PHYS courses. At the 100–level, both ASTR and PHYS offer service courses which generate many SSH; the bulk of these students come from outside CNS. PHYS also offers service courses at the 200–level, mostly taken by students in other CNS programs or in Engineering. Upper–division PHYS and ASTR classes generally have similar profiles, which is inevitable since their student populations overlap. SSH for 400–level ASTR courses is low because ASTRO seniors take ASTR 399 (or an equivalent 399 course) as part of their capstone projects.

As Table A.15 shows, students from *outside* CNS account for over 90% of the ASTR SSH at the 100–level. This is largely due to the popularity of ASTR 110, 110L, and 130 (Archaeoastronomy), which are taken by students throughout UH Mānoa to satisfy Physical Science and Laboratory requirements. At the 200–level, the balance shifts dramatically; as a result, it would be misleading to analyze 100 and 200–level classes together. We note that students from other majors still account for nearly 40% of the SSH at this level, and half of these students come from outside CNS. At the 300 and 400–level, ASTP–BS and ASTR–BA majors generate an increasingly large fraction of the net SSH.

5.3 Costs and benefits

Over the last three years, the ASTRO programs have offered an average of 16 credits per semester of classroom instruction at the 200–level and above. This is equivalent to 1.3 FTE I faculty. Fully staffing all currently approved and proposed ASTR courses would require

18 credits per semester (1.5 FTE I faculty). As noted in § 4, the classes added to provide the ASTRO majors are fully supported by resources already allocated for Astronomy teaching.

This point explains how the ASTRO programs can be productive despite their relatively small size. To be sure, the majors are not entirely free – creating and administering the programs, teaching the new ASTR classes, and mentoring capstone projects all carry opportunity costs. Moreover, some of these costs are passed on to Physics faculty who have larger upper-division classes, and to faculty in Physics and other programs who mentor some of our students. However, these activities are appropriate for faculty at a Carnegie Research 1 university, and support UHM's goal of promoting undergraduate research.

Moreover, the benefits of the ASTRO programs are not limited to the graduates we produce. Closer engagement between the IfA and UHM has advantages for everyone. Prior to the introduction of the ASTRO courses, IfA faculty only encountered undergraduates in 100–level service courses with few science majors; we now have a more accurate perspective on UHM students. This, in turn, better positions the IfA to offer our expertise in the service of UHM and its students.

6 Student Learning

Advising: Advising duties are split between CNS and the ASTRO program. Students with less than 30 credits must meet with the CNS advisor for help with General Education and College requirements; the CNS Advising Office also handles major declarations, academic petitions, certifications and other required paperwork, and graduation and academic actions. In addition, semi–annual academic advising is mandatory for *all* ASTRO majors, regardless of level.

Academic advising of ASTRO majors necessarily covers a wide range of issues. First– year students often need help to pick the program matching their goals. These students must start Math and Physics prerequisites immediately so they can graduate on-time. Students in the ASTR–BA program need guidance finding upper-division classes, and encouragement to select minors or second majors which offer viable career paths in combination with a liberal–arts Astronomy degree. Finally, majors in both programs need support if their goals change or if they encounter academic obstacles.

In practice, students also seek advice for matters (e.g., senior projects, career choice) which fall outside the scope of academic advising. We have started assigning students informal faculty advisors to provide further support and guidance. Advanced students are often challenged to find mentors for their capstone projects, since they may not be comfortable "cold–calling" faculty at random; we expect that informal advising will help match students up with suitable mentors.

Student alignment with program outcomes: The capstone projects undertaken by both ASTP–BS and ASTR–BA majors provide useful measures of student achievement. While not every project involves all of our student learning objectives, conducting and writing up original research is arguably the key ability we want our graduates to acquire. As of Summer 2021, 19 ASTP–BS and 12 ASTR–BA students have completed capstone projects. Table A.16 summarizes their grades in the two capstone courses, ASTR 399 and ASTR 494.

Broadly speaking, an "A" in ASTR 494 fully satisfies the program objectives, a "B" satisfies most objectives, while a "C" indicates significant deficiencies. Grades in ASTR 399 generally track those in ASTR 494 but are more heterogeneous since they are given by different individuals. A majority of students in both programs produce good projects and final papers, but grades for ASTR–BA students have a broader distribution, from frankly disappointing to truly outstanding. We conjecture that while ASTP–BS students generally

have limited time to invest in research, some ASTR–BA students are able to devote more effort to their capstone projects.

Publication in professional peer–reviewed journals is a strong indicator of student achievement. Two of our students have already published first–author papers as undergraduates (see p. 22); others have presented research at Astronomy conferences. Several students now completing degrees are producing work of similar quality, with first–authored or co–authored papers in preparation.

Time to graduation: A total of 66 students took the junior-year milestone course (ASTR 300) in Fall semesters between 2015 and 2020. This sample includes all ASTP–BS and ASTR–BA majors, as well as students taking minors or otherwise interested.

Fig. A.3 shows outcomes for these students: 41/66 = 62% graduated by Spring 2021; of these, roughly three-quarters received degrees by the Spring semester two calendar years after taking ASTR 300. The percentage who graduate two years after taking the ASTR 300 milestone course is consistent with the current UHM average.

To facilitate broader comparisons we summarize and compare in Table A.8 the average number of credits at graduation and the median time to graduation for the ASTR–BA and BS-ASTP programs to those in the Physics major, the CNS averages, and the averages for the College of Engineering.

The credit load for both majors is in line with the CNS and ENG averages, and significantly below those in Physics. The median times to graduation are also comparable to the CNS and ENG averages. Both the credit load and pathways to graduation in both majors are thus reasonable for STEM programs at UH Manoa

A more detailed breakdown of the credit loads in the ASTRO majors is given in Table A.17. On average, ASTRO majors have ~ 164 credits at graduation, with ~ 119 Manoa credits and ~ 45 transfer credits. There is no significant difference between ASTP–BS and ASTR–BA students. Students who take double majors (N = 7) have an average of ~ 185 credits, while those who transfer into the UH system (N = 11) have an average of ~ 184 (there is significant overlap between these sub-samples).

Extant challenges are however apparent from these data. While graduation times are consistent with UHM STEM norms, the fraction who do not graduate within four years is still slightly below initial program goals. Moreover, there is a significant disparity between graduation times in the BS and BA programs (see also Fig. A.4). Most ASTP–BS students graduate four semesters after enrolling in ASTR 300, and within a total time of 48 months. Conversely, only a minority of ASTR–BA students achieve this goal, and on average ASTR–BA students take 10 months longer to graduate than do ASTP–BS students.

Our ongoing strategies to address these issues focus on giving students the knowledge needed to plan their degree, and to attribute academic setbacks to factors within their control. They include:

- Incorporating career planning and guidance into freshman level courses that highlight career options for both majors and the steps needed to achieve them.
- Introducing a one-credit seminar course for sophomores, of which a substantial element is career planning with a focus on the Hawaii science community's needs.
- Enhancing our ongoing academic advising sessions with feedback and experiences gained from our first graduated cohorts.

Persistence: An overview of persistence statistics is presented in § 3.2 and a comparison of retention statistics between the ASTRO program and CNS/ENG averages is given in Table A.8.

The ASTP–BS persistence level is comparable to CNS and ENG norms, while the ASTR–BA level remains somewhat below expectations. We note though that, of those

ASTP–BS and ASTR–BA majors who switch to a different major after taking ASTR 300, most stay within STEM, and over half still take a minor in ASTR (Fig. A.3).

Ongoing strategies for increasing retention include: (1) Increasing the number and visibility of channels of communication between students and faculty, (2) Enhancing the sense of community among the ASTRO majors, to facilitate peer mentoring and transmission of effective study strategies. (3) Thorough and continuous collection and analysis of survey data from program alumni, to identify effective strategies for success.

7 Concluding Statement

Astronomical research in Hawai'i has made enormous strides since the first observatories were built in the 1960's. On Maui, solar and nighttime facilities employ 176 people and account for 31 million in economic output⁵; the Daniel K. Inouye Solar Telescope, now coming online, is the most advanced telescope of its kind in the world, and includes two Hawai'i-built instruments. The Pan–STaRRS and ATLAS telescopes make UH the world leader in planetary defense, accounting for almost 2/3 of new asteroid and comet discoveries. On Hawai'i Island, the unparalleled atmospheric conditions atop a shield volcano in the middle of the Pacific Ocean have prompted the development of the world's most productive ground-based observatories. These international facilities, sponsored by a dozen nations, employ 611 people and generate \$102 million in economic output. Data from Hawai'i telescopes are used in well over a thousand peer-reviewed research papers per year. Notable achievements include finding the first Solar System objects beyond Pluto's orbit, tracking stars orbiting the black hole at the center of the Milky Way (Nobel Prize 2020), discovering the first interstellar asteroid, and mapping the supercluster which contains our galaxy. Across the State, astronomy employs over 1300 people, creates high-tech jobs with minimal environmental impact, brings in approximately \$100 million in funding from the national government and from other nations, and generates \$220 million in economic output.

Given astronomy's role in the State, it's natural for Hawai'i institutions to emphasize astronomical education and outreach. Hawai'i's citizens, collectively, need to know about astronomy to make informed judgements on its value to the State; individually, astronomy careers should be open to every Hawai'i resident with interest and ability. UH Mānoa's PhD program in astronomy, established half a century ago, produces first-rate astronomers. Outreach programs on Oahu, Maui, and Hawai'i Island hold events for the public and introduce K-12 students to astronomy; targeted programs give high-school students a chance to do astronomical research. Since 1997, UH Hilo, with its proximity to observatory facilities, has offered a Bachelor of Science in Astronomy. But until recently, undergraduates at the UH System's flagship university were limited to a few 100-level and intermediate-level astronomy courses. The ASTRO programs, which we now propose to establish, will leverage our access to observatories statewide, and our extensive complement of faculty, to offer a world-class suite of educational pathways opening careers in astronomy and related STEM fields to students across the islands of Hawai'i.

⁵UHIRO 2019 update on Economic Impact of Astronomy in Hawaii.

Program	Majors	15 - 16	16 - 17	17 - 18	18 - 19	19 - 20	20 - 21	Mean
ASTP-BS	200-level	5	15	15	12	11	16	13.8
	300–level	2	3	10	9	11	7	9.3
	400–level	0	2	2	6	6	7	6.3
	Other	9	4	3	3	4	9	
	Total	16	24	30	30	32	39	33.7
ASTR-BA	200–level	2	1	4	2	0	4	2.2
	300–level	0	2	3	4	4	1	. 3.0
	400–level	0	0	0	5	3	4	4.0
	Other	1	3	4	6	5	5	
	Total	3	6	11	17	12	14	14.3

Appendix A: Other Data

Table 7: Active majors in the Astrophysics and Astronomy programs by academic year. Level of study is determined using enrollment in milestone courses (see § 3.2). Means are computed using the shaded cells.

Program	Credits at Graduation	GPA at Graduation	Median Time to Degree	${f Persistence} \ ({f percent})$
ASTR-BA	159.0	2.98	4.67	55.9
ASTP-BS	158.7	3.23	4.11	73.9
PHYS (BS+BA)	173.0	3.23	7.75	64.7
CNS (BA)	148.7	3.18	4.11	72.1
CNS (BS)	155.3	3.35	3.89	73.5
ENG (BS)	152.0	3.13	4.33	76.8

Table 8: MIRO Program Review Statistics (FY18–FY20 averages). The median time to degree for Physics is *formally* correct but reflects only a small minority of all Physics graduates.

Demographic	Enı	ollment	(%)	D	egrees $(\%)$			
	ASTP	ASTR	PHYS	ASTP	ASTR	PHYS		
	BS	BA	BA+BS	BS	BA	BA+BS		
Female	43	49	28	50	50	39		
Male	57	51	71	50	50	61		
Hawaii	41	40	66	50	67	67		
US Mainland	54	54	29	50	25	33		
International	5	6	4	0	8	0		
American Indian/Alaska Native	0	1	0	0	0	0		
Asian	11	28	21	33	58	22		
Black/African American	4	1	0	0	0	0		
Hispanic/Latino	1	1	0	0	0	0		
Multiracial	14	18	29	0	8	33		
Native Hawaiian/Pacific Islander	5	6	12	8	8	11		
White	57	36	32	58	8	33		
Race/Ethnicity Unknown	9	8	6	0	17	0		
Full-time	86	81	76					
Part-time	14	19	24					

Table 9: Demographic data for ASTRO and PHYS students. Enrollment percentages are averaged over FY2018 to FY2021, while degree percentages are averaged over FY2018 to FY2020. Data are taken from MIRO Unit Profile Reports. The MIRO tables for Race and Ethnicity occasionally excluded a few individuals, which we coded here as Race/Ethnicity Unknown.

Program	N	Grad. Sch.	Employed	Unemployed	No Resp.
ASTP-BS	15	5	3	2	5
ASTR-BA	12	2	2	2	6
Minors	10	4	2	0	4

Table 10: Post-graduation activities.

ID	Course Title	$\begin{array}{c} \mathbf{Fall} \\ (\mathrm{odd}) \end{array}$	Spring (even)	Fall (even)	Spring (odd)	Notes
A110	Survey of Astronomy	9	9	9	9	
A110L	Survey of Astronomy Lab	3	3	3	3	TAs teach 5 sec/yr
A130	Introduction to Archaeoastronomy	3		3		
A210	Foundations of Astronomy		3		3	
A241	Foundations of Astrophysics I	3		3		
A242	Foundations of Astrophysics II		3		3	
A280	Evolution of the Universe	3		3		
A281	Astrobiology		3		3	
A300	Observational Astronomy	3		3		
A300L	Observational Astronomy Lab	2		2		
A301	Observational Astronomy Projects		4		4	
A320	Astronomical Spectroscopy		3		3	
A380	History of Cosmology & Scientific Thought		0		0	on hiatus
A423	Stellar Astrophysics				3	
A426	Galaxies & Cosmology			3		
A430	The Solar System		3			with $A630$
A470	General Relativity & Cosmology	3				
A494	Senior Research Project	1	1	1	1	
A622	The Interstellar Medium	3				
A623	Stellar Interiors & Evolution			3		
A626	Galaxies			3		
A627	Cosmology				3	
A630	The Solar System		3			with A430
A631	Radiative Transfer Stellar Atmospheres		3			
A633	Astrophysical Techniques	3		3		
A634	Astronomical Instrumentation				3	
A640	General Relativity	0				now A760?
A6XX	Solar Astronomy		3			new Solar
A6YY	Plasma Physics				3	courses
A699DR	Directed Research	2		2		
A73X	Astronomy Seminar	2	5	2	5	inc. OoM
A740	Astrobiology Seminar	1	1	1	1	
A750	Scientific Grant Writing	1		1		
A758	Programming & Algorithms for Astronomers		2			
A760	Modern General Relativity	0		C		cross–list of P760
A777	Star Formation Seminar			2	-	
A790	Astro-ph Seminar	1	1	1	1	
A791	Cosmology Seminar	1	1	1	1	

Table 11: Class schedule and total number of credits for current and planned ASTR courses.

Name	Island	Type	m cr/yr	Notes
Baranec, C.	Hawaii	TT	3	50% in Hilo
Barnes, J.	Oahu	TT	3	
Baxter, E.	Oahu	TT	3	
Boogert, A.	Oahu	RS	0	IRTF Support
Bottom, M.	Hawaii	TT	3	50% in Hilo
Bresolin, F.	Oahu	TT	3	
Bus, B.	Hawaii	RS	0	IRTF Deputy Director
Chambers, K.	Oahu	TT	3	
Chun, M.	Hawaii	TT	0	Assoc. Director, IfA Hilo; 50% in Hilo
Connelley, M.	Hawaii	RS	0	IRTF Support
Cowie, A.	Oahu	TT	3	
Cowie, L.	Oahu	TT	3	
Ebeling, H.	Oahu	RS	0	
Gal, R.	Oahu	TT	3	
Habbal, S.	Oahu	TT	3	
Haggerty, C.	Oahu	TT	3	New solar courses for NSF
Hodapp, K.	Hawaii	TT	0	UKIRT Director; 50% in Hilo
Hu, E.	Oahu	TT	3	,
Huber, D.	Oahu	TT	3	
Jedicke, R.	Oahu	TT	3	
Keane, J.	Oahu	RS	0	
Kuhn, J.	Maui	TT	3	
Lin, H.	Maui	TT	3	Assoc. Director IfA Maui
Liu, M.	Oahu	TT	3	
Magnier, E.	Oahu	TT	3	
Meech, K.	Oahu	TT	3	
Mendez, R.	Oahu	TT	3	
Raja, N.	Oahu	TT	0	Computer support
Rayner, J.	Oahu	RS	0	IRTF Director
Reipurth, B.	Hawaii	TT	0	Retiring
Sanders, D.	Oahu	TT	3	-
Shappee, B.	Oahu	TT	3	
Sun, X.	Maui	TT	3	
Szapudi, I.	Oahu	TT	3	
Tholen, D.	Oahu	TT	3	
Tonry, J.	Oahu	TT	3	
van Saders, J.	Oahu	TT	3	
Wainscoat, R.	Oahu	TT	3	
Williams, J.	Oahu	TT	3	

Table 12: Nominal teaching loads (cr/yr) for IfA faculty as of Fall 2021. Faculty are classified as TT (tenure or tenure–track) or RS (non-tenured research or support). Hawaii Island faculty who teach divide their efforts between UHH and UHM.

Program	\mathbf{AS}	\mathbf{TR}	\mathbf{PH}	IYS	MA	MATH		
	Classes	Credits	Classes	Credits	Classes	Credits		
ASTP-BS	11	27	14	36	5	17		
ASTR-BA	11	30	5	9	2	8		

Table 13: Classes and credits for the ASTRO majors.

	$\mathbf{Subject}$	100-level	200-level	300–level	400-level
Total SSH/yr	ASTR PHYS	$\begin{array}{c} 1431 \\ 5116 \end{array}$	$\begin{array}{c} 145 \\ 1982 \end{array}$	201 229	54 269
Class size	ASTR PHYS	42.1 26.1	13.2 21.7	12.8 15.7	7.1 7.7

Table 14: SSH and average class size for ASTR and PHYS courses by academic level, averaged over three years (AY 2018–19 through 2020–21).

	100–level	200–level	300 –level	400–level
ASTRO majors (% SSH)	2.3	62.5	66.3	87.5
CNS majors ($\%$ SSH)	4.0	16.7	19.1	8.8
Outside CNS (% SSH)	92.7	20.8	14.6	3.7

Table 15: Distribution of majors in ASTR classes by academic level, averaged over three years (AY 2018–19 through 2020–221).

Program	\mathbf{AS}	\mathbf{TR}	399		AS	TR	494	
	GPA	А	В	С	GPA	А	В	С
ASTP-BS	3.59	12	7	0	3.38	8	11	0
ASTR-BA	3.39	6	4	2	3.29	7	2	3

Table 16: Senior project grades.

Sample	\mathbf{N}	Total	Manoa	Attempt	Transf.	Adv. Pl.	Extern.
All ASTRO	27	163.6	118.9	128.3	44.7	2.9	27.7
ASTP-BS	15	163.7	125.1	129.5	38.5	4.5	21.5
ASTR-BA	12	163.6	111.2	126.8	52.5	0.9	35.5
1 Major	20	156.1	113.7	123.9	42.4	2.5	23.0
2+ Majors	7	185.3	134.0	140.9	51.3	4.0	41.2
Adv. Pl. cred.	8	152.6	132.0	143.9	20.6	9.8	6.1
Extern. cred.	11	184.0	109.4	116.3	74.7	0.3	67.9

Table 17: Average number of credits at graduation. "Attempt" is number of Manoa credits attempted; "Transf." is total number of transfer credits; "Adv. Pl." is advance placement, "Extern." is credits from outside UH system.

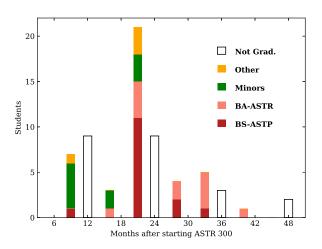


Figure 3: Outcomes for ASTR 300 students. Filled bars represent students who graduated as of Summer 2021 (for simplicity, students graduating in Summer are folded into the previous Spring). Open bars represent students who have not yet graduated; the 9 students not yet graduated at 24 months are the cohort most affected by the pandemic.

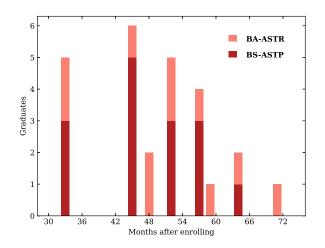


Figure 4: Months between enrolling in UHM and graduating, determined by inspection of transcripts. One ASTR–BA student who took 129 months to graduate is not shown.

Student Achievement

Statistics on graduate destinations – graduate schools and industry careers – are summarized in § 3.5. Below, we highlight a few successes:

John Bredall (ASTP–BS): Graduated Magna Cum Laude and published a first author paper while an undergraduate in a leading professional astronomy journal (Bredall, J., et al; 2020, MNRAS, 496, 3257). He is currently a graduate student in the astronomy department at The Ohio State University.

Marielle Dela Cruz (ASTP–BS): Currently a graduate student in the College of Business at UC Irvine, with a focus on data analytics. She comments of her degree: "I feel very lucky to have my astrophysics background".

Daichi Hiramatsu (ASTP Minor): Attended graduate school in (astro)physics at UC Santa Barbara, and is now a Postdoctoral Fellow at Harvard University.

Alexandria Holthaus (ASTP–BS): Alexandria is one of our students who elected to stay; upon completing her degree, she was admitted to the Physics and Astronomy graduate program at UH Manoa. She is currently undertaking research in cosmic ray physics.

Kaimi Kahihikolo (ASTP–BS): Kaimi is among our graduates of Hawaiian ancestry, and holds deep family connections with Oahu. After graduating, he took up a data scientist position at Booz Allen Hamilton. He said of the ASTP–BS program: "Studying astrophysics has provided me with a skill–set which placed me higher than many of my peers".

Caroline Piro (ASTR–BA): Published a first–author paper while an undergraduate (Piro, C., et al, The Planetary Science Journal, Volume 2, Issue 1, id.33) and was the undergraduate representative on the IfA Directors Search Committee. She is currently employed at the IfA as an Academic Support Specialist.

Erica Sawczynec (ASTP Minor): Graduated with honors and presented the results from her undergraduate research at three major astronomy conferences. She is currently preparing these results for publication, and is enrolled as a graduate student in the astronomy program at the University of Texas at Austin.

Bryan Yamashiro (ASTP Minor): Bryan is another student who elected to stay, and was admitted to the IfA's graduate program. He is now working toward a PhD in Solar Astronomy.

Appendix B: Four-Year Plans & Program Learning Outcomes

Four-year plans

		Coll	lege of Nat	ural Sciences			
		Bachelor	of Arts (l	BA) in Astronomy	y		
	le acad	emic plan. Students should m			istration to f		
Year 1		Year 2		'ear 3		Year 4	
Fall		Fall		all		Fall	
ASTR 110 (DP)	3	MATH 242	4	ASTR 300	3	ASTR 399	2
CHEM 161 or 171 (DP)	3	PHYS 152	3	ASTR 300L	2	ASTR 494	1
CHEM 161L or 171L (DY)	1	PHYS 152L	1	DA/DH/DL	3	PHYS 485	1
Group 2	3	Group 1	3	HSL 201	3	Group 1 Elective 400+	3
FW	3	HSL 101	3	Elective 300+	3	DB	3
FG (A/B/C)	3					DS	3
						Elective 300+	2
Credits	16	Credits	14 (Credits	14	Credits	15
Spring		Spring				Spring	
CHEM 162	3	ASTR 210	3	ASTR 301	4	Group 1 Elective 400+	3
CHEM 162L	1	Group 2	3	ASTR 320	3	Group 2 Elective 300+	3
MATH 241 (FQ)	4	HSL 102	3	Group 2	3	DS	3
PHYS 151	3	Elective 300+	3	HSL 202	3	Elective 300+	3
PHYS 151L	1	Elective 300+	3	DA/DH/DL	3	Elective 300+	3
FG (A/B/C)	3						
Credits	15	Credits	15 0	Credits	16	Credits	15
Summer		Summer		Summer		Summer	
	_						
Credits	0	Credits	0.0	Credits	0	Credits	0

Rev 3/2021

			•		'our-Year Academi tural Sciences	C I Ian		
			Bachelor o	f Science	(BS) in Astrophysi	cs		
							1	
Year		mple acad	Year 2		ademic advisor prior to regist Year 3	ration to I	Year 4	
Fall			Fall		Fall		Fall	
un	CHEM 161 (DP)	3	ASTR 241	3	ASTR 300	3	ASTR 399	2
	CHEM 161L (DY)	1	MATH 243	3	ASTR 300L	2	ASTR 494	1
	MATH 241 (FQ)	4	PHYS 272	3	PHYS 310	3	Group 2: PHYS 400 rec.	3
	FW	3	PHYS 272L	1	PHYS 350	3	PHYS 480	3
	FG (A/B/C)	3	HSL 101	3	MATH 307 or 311	3	PHYS 485	
		- 3			HSL 201	3	DS	
						-	DA/DH/DL	
Crea	Hite	14	Credits	13	Credits	17	Credits	1
Spri		14	Spring		Spring		Spring	<u> </u>
spri	CHEM 162	3	ASTR 242	3	ASTR 301	4	ASTR 399	2
	CHEM 162L	1	MATH 244	3	PHYS 311	3	ASTR 494	
	MATH 242	4	PHYS 274	3	PHYS 450	3	Group 1	3
	PHYS 170	4	PHYS 274L	2	HSL 202	3	Group 1	
	PHYS 170L	1	HSL 102	3	DA/DH/DL	3	Group 2	
	FG (A/B/C)	3	DS	3	DAVDIVOL		DB	
Crea	lite	16	Credits	17	Credits	16	Credits	1
_	nmer	10	Summer		Summer	10	Summer	<u> </u>
un			Summer		Summer		Summer	
	dits	0	Credits	0	Credits	0	Credits	
	al Credits		Total Credits		Total Credits	93		12
018		30	Total credits	00	Total Credits	35	Total credits	
Note								
					H 241. Minimum 45 upper divis			_
		cus require	ments into this plan. Focus de	signations (i.e.,	W, E, O, H) are CRN specific &	e semester s	specific.	_
	trophysics Major Courses							_
	oup 1 (take any two): ASTR							
Gr	oup 2 (take any two): PHY:	S 400 (reco	mmended), 460, 481, 490					

Rev 2/2021

Program Learning Outcomes

Our BA astronomy and BS astrophysics student learning outcomes are:

- 1. Apply basic physical principles to astronomical situations.
- 2. Formulate scientific problems in mathematical terms and find solutions.
- 3. Design research projects using professional telescopes, archival data, or numerical simulations.
- 4. Establish competence in focused areas of astrophysics.
- 5. Value science as a way to illuminate our place in the universe.

DTS 22395

School of Architecture Office of the Dean



UNIVERSITY OF HAWAII BOARD OF REGENTS

22 APR 27 A9:24

MEMORANDUM

March 2, 2022

ΤO:	Randolph G. Moore Chair, Board of Regents
VIA:	Ernest Wilson Chair, BOR Committee on Academic and Student Affairs
VIA:	David Lassner President David Barr
VIA:	Debora Halbert Vice President for Academic Strategy, UH System
VIA:	Michael Bruno Provost
VIA:	Laura E. Lyons Laura C. Lyons Interim Vice Provost for Academic Excellence
VIA:	Julienne K. Maeda Acting Dean, Graduate Division
VIA:	William Chapman Interim Dean School of Architecture
FROM:	David Rockwood DArch Program Director
SUBJECT:	REQUEST FOR PROVISIONAL STATUS FOR THE MASTER OF ARCHITECTURE DEGREE AT THE UNIVERSITY OF HAWAI'I
	ACTION REQUESTED:
It is respect	fully requested that the Board of Regents grant provisional status to the

It is respectfully requested that the Board of Regents grant provisional status to the Master of Architecture (MArch) degree program in the School of Architecture at the University of Hawai'i at Mānoa.

RECOMMENDED EFFECTIVE TERM/YEAR: Fall 2022.

ADDITIONAL COST: No additional cost.

> 2410 Campus Road, Honolulu, Hawai'i 96822-2216 Telephone: (808) 956-3469; (808) 956-6407 www.arch.hawaii.edu An Equal Opportunity/Affirmative Action Institution

AT MĀNOA

October 29, 2021 Board of Regent Chair Randolph G. Moore Page 2

PURPOSE:

(1) Better meet the needs of students who seek to obtain a professional degree, enter the workforce in a reasonable time period and obtain a professional license, (2) Provide a professional degree tailored to the needs of students in advanced architectural practice, and (3) Increase SOA enrollment and resulting tuition revenue.

BACKGROUND:

Significance/Contribution of this degree (address the need of the program):

The MArch degree would provide students with a National Architectural Accrediting Board (NAAB) accredited degree that qualifies them to become a licensed architect. The school's current DArch NAAB accredited degree similarly qualifies students to become a licensed architect. However, the MArch degree requires two years of full-time study in contrast to three years for the DArch. By having an NAAB accredited degree, graduates are qualified to become licensed in all U.S. states. Graduates of the school's non-NAAB accredited Bachelor of Environmental Design (BEnvD) degree can obtain a license in Hawai'i, but only after completing an approved internship that is longer than what is required for holders of an NAAB accredited degree. With the BEnvD they do not hold the educational qualification to become licensed in most all other U.S. states. Through discussions with our students, and as evidenced in a recent student survey, we have found that a MArch program better meets the needs of the majority of our students, most of which are from Hawai'i. Our students have expressed interest in becoming a licensed architect in the shortest possible time, and they wish to have the option of practicing in Hawai'i and any of the other U.S. states.

Demand projections:

Based upon our recent enrollment figures in our DArch program, and in analyzing the recent student survey we anticipate that MArch program enrollment will be around 45 students in year two, growing to around 60 students in year six.

Accreditation impact (if any):

There is no impact to accreditation per se. The school will need to have both the existing DArch and the proposed MArch accredited by the NAAB. Both programs may be put on the same accreditation preparation and visit schedule, thereby reducing time and cost.

Examples (2-3) of similar models from peer institutions:

The DArch program offered by the school is the only such degree offered in the U.S. Therefore, there are no other programs offering both the DArch and MArch degree. There are 120 MArch programs in the U.S. The MArch is currently the most common professional degree and the degree selected by students desiring to enter the profession and become a licensed architect. MArch programs are found at most all top tier universities offering professional architecture programs, such as Harvard, Princeton, UC Berkeley, and University of Michigan.

October 29, 2021 Board of Regent Chair Randolph G. Moore Page 3

Similar programs at other UH campuses (if there is duplication, why is this program necessary): There are no similar programs at other UH campuses. The school's existing DArch degree is currently the only NAAB accredited degree in the state. The DArch is distinct from the MArch through its inclusion of a multi-semester research component and practicum experience.

Statement from campus administration of new program's strategic value within the UH System and campus mission, and the Integrated Academic and Facilities Plan: The MArch will increase and diversify enrollment in keeping with the Systemwide Guiding Principle and Priorities. It will further advance the university's academic mission and improve opportunities to enhance the university's financial base. The MArch will also increase the university's standing and make UHM a more attractive site for graduate education, both in the MArch program and the designed and re-marketed DArch program. It will also encourage local students to complete their architectural education in Hawai'i.

Cost and resource allocation/reallocation implications:

The program can be offered at no additional cost. Students may be housed in the existing school building. Most courses offered in the curriculum will be shared with DArch students allowing efficiency and helping maintain larger class sizes. We anticipate that after launching the MArch that DArch enrollment will decrease but that total graduate architecture enrollment will remain about the same as in recent years. Through increased recruitment, total enrollment is expected to increase.

Impact of new program/program change request on campus budget allocations and mission priority: The impact on campus budget allocations should be zero. The MArch program aligns the campus' mission by providing a shortened path to obtaining a NAAB accredited degree and subsequent licensure. This degree will be attractive to students from Hawai'i, many of which find the DArch program to be too long in duration.

ACTION RECOMMENDED:

It is respectfully recommended that the Board of Regents grant provisional status to the Master of Architecture (MArch) degree program in the School of Architecture at the University of Hawai'i at Mānoa.

Attachment: Proposal for Master of Architecture (MArch) degree program, Approved of Authorization to Plan for the MArch Degree (Appendix 1), Additional Appendix, Resolution of Approval

cc: Executive Administrator and Secretary of the Board Kendra Oishi Interim Dean William R. Chapman

Master of Architecture (MArch) Proposal

University of Hawai'i at Mānoa, School of Architecture 4/9/22

Guidelines for Proposals for New Academic Programs (15-Page Limit)

The program proposal for provisional status should follow the guidelines below. Programs are provisional for 150% of the proposed degree length. Once the college-level review has been completed, please submit the proposal and cover memo to April Goodwin at agoodwin@hawaii.edu.

I. Executive Summary

The School of Architecture (SOA) proposes a new Master of Architecture (MArch) degree. This degree would add to the three degrees currently offered at the SOA: The Bachelor of Environmental Design (BEnvD), The Master of Landscape Architecture (MLA), and The Doctor of Architecture (DArch). The BEnvD degree is termed a pre-professional degree and is not eligible for accreditation by the National Architectural Accrediting Board (NAAB). As such, the degree does not meet the educational qualification in most states for professional licensure. Both the MArch and DArch are termed professional degrees and are eligible for NAAB accreditation. Graduates holding an accredited MArch or DArch degree meet the educational qualification in all states for professional licensure.

The SOA's DArch is the only NAAB accredited degree offered in the State of Hawai'i. The degree requires 3 years of full-time study for students entering with a pre-professional bachelor's degree, and 3.5 years for students entering with an unrelated bachelor's degree. Therefore, BEnvD students need 3 years of additional graduate level study beyond the 4 undergraduate years, for a total of 7 years. Discussion with our students, local architects, and the SOA's Dean's Advisory Council has indicated the need to provide a NAAB accredited degree that can be completed in less than 7 total years. This is provided by the proposed MArch degree, which could be completed in 2 years beyond a pre-professional bachelor's degree, for a total of 6 years. The topic has been the subject of four different Advisory Council meetings in 2018-19 and 2019-20; and all of those attending agreed that the MArch provided the best solution to the problems facing the profession and students currently in the program. There was universal agreement that the MArch would best serve Hawaii's own students. The MArch would encourage more local students to complete a professional NAAB accredited degree and enter the professional workforce in Hawai'i. The SOA faculty have voiced strong support for the implementation of the MArch program as outlined in this proposal.

Time to degree is important for many students, and we have found this to be especially true for our local students. There are very real cost and time implications for the 3 years needed to complete the DArch. Also, many students neither desire nor find necessary the additional year of the DArch, which is primarily devoted to the synergy of design and research. The SOA is currently the only program in the U.S. offering the DArch. While it fits well for a select group of students, it does not for others. We envision that with the addition of the MArch, a high percentage of Hawaii students will elect to choose this option, whereas U.S. and international students may opt for the DArch. Also, the DArch is essential for our Global Track program in which students receive a MArch from Tongji University, and a DArch from SOA/UHM. We project that by catering to different student needs we will meet the needs of employers and job-seeking graduates and increase overall SOA graduate enrollment.

The SOA has been actively developing an articulation for a BEnvD "2+2" program with Honolulu Community College. We anticipate this articulation would be in force around the time the first MArch program cohort has matriculated. This effort has been made to expand access to 4-year college education for Hawaii students, increase SOA enrollment in the BEnvD, and provide a pathway to the SOA's graduate programs.

The MArch program will complement and expand the role of the SOA in professional education, serving the university and state workforce needs. It is also in keeping with the UH strategic plans, particularly in the role of providing sustainable design expertise and community leadership.

The proposed program will leverage existing SOA resources and collaborations to every extent possible. We expect that no new general funds will be needed to launch the program. We plan to share the majority of existing DArch and selected MLA courses and those of adjunct departments with the MArch program. It is expected that the program will attract many local as well as international/out-of-state applicants. The first BEnvD cohort graduated in 2016. Since then, an average of 32.8 BEnvD degrees have been awarded annually. Of these around 20 students apply and enter the DArch program. We estimate that once the MArch is in place a higher percentage of BEnvD graduates would opt for this program, and a lower percentage would elect to apply to the DArch program. However, a recent survey (see Appendix) of BEnvD students suggests that a higher percentage will actually decide to continue with graduate studies, thereby increasing the number of students in the MArch program. In the initial years, total graduate enrollment (MArch and DArch) would likely be about the same as recent years, with an increase in the numbers of MArch students and a decrease in DArch students. With increased marketing, however, we believe both programs could attract additional local, U.S., and international students. Students will apply and be admitted using the same procedures currently used for the DArch program. Applications are made to the UHM Graduate Division, and the SOA conducts a secondary review prior to admitting students.

The SOA has no departments and therefore no department chairs. The current administrative structure is comprised of a director for each program, i.e., Director of Undergraduate Programs (BEvnD), Director of the DArch Program, and Director of the MLA Program. Each director is a faculty member given an 11-month appointment; the directors report to the Dean. A director would be named to head the MArch program, or the duties of the DArch program director would be expanded to include the MArch program, perhaps under the title of Director of Graduate Architecture Programs. The duties of the director of the MArch program would include: advising the Dean on temporary faculty hires and course assignments; conducting transfer credit evaluations; overseeing the Capstone Studio process; coordinating program assessment; and leading WASC and NAAB accreditation efforts.

The proposed MArch curriculum closely follows the courses and sequence in the first two years of the DArch program with strengthened advanced professional practice. This provides economy and efficiency in that it reduces the number of SOA courses needing to be taught, helps ensure sufficient enrollment in courses, and allows for an interactive mix of MArch and DArch students in many classes. The curriculum has been compared with other leading and peer U.S. programs, and has been evaluated to ensure it can meet NAAB requirements. It should be noted that the DArch program received a NAAB accreditation review in 2018 and received the maximum reaccreditation term of 8 years. The MArch curriculum includes courses in appropriate areas, including design studio, professional, technical, history/theory, and electives. Design studio courses form the core of the curriculum, and a studio course is taken each semester, including the Capstone Studio taken in the final semester. This proposal was reviewed by the SOA Curriculum Committee and was approved by the SOA Faculty Senate on April 9, 2021.

All classes and other activities take place in the SOA building. Studio classes consume the majority of space given that all graduate students are given a dedicated workspace. This follows the typical practice for U.S. architecture programs. The SOA building has the capacity to house around 80 additional students over the current total enrollment, for a total of approximately 400 students in all undergraduate and graduate programs. We anticipate the total graduate student enrollment will stay the same or increase slightly during the first years of the MArch program. With additional marketing of both the MArch and DArch, we expect to increase total enrollment. Our objective is to increase graduate enrollment while at the same time increasing student quality through more selective admissions policies.

II. Program Purpose and Outcomes

• Why is this program a priority for the unit? Describe how the program will meet the needs of students, the local community, and the state. Include a market analysis detailing the how the program will respond to the social, economic and workforce needs of the nation and state.

Adding a MArch degree program is a priority for the SOA in that it will: (1) Better meet the needs of students who seek to obtain a professional degree, enter the workforce in a reasonable time period, and obtain a professional license, (2) Provide a professional degree tailored to the needs of students in advanced architectural practice, (3) Increase SOA enrollment and resulting tuition revenue, and (4) address the needs of Hawaii students and the local profession for qualified entry-level employees.

According to the study <u>Long-Term Occupational Projections</u>, <u>State of Hawai'i</u>, <u>2018-2028</u>, architectural positions in Hawai'i are forecasted to increase from 990 to 1,030, or 4%. With regard to demand at the national level, NCARB's 2018 article <u>Architects on Rise</u>, states, "The health of the architecture profession is even more apparent when compared to the U.S. population: the number of architects licensed in the United States has risen over 10 percent since 2008, while the total U.S. population has risen 8 percent, according to data from the U.S. Census Bureau."

This summary indicates that UHM is unique in its professional DArch program but unusual in not offering a professional degree at the master's or bachelor-degree level. It also indicates that demand for architects is expected to increase over the coming years. While the School of Architecture intends to retain the DArch by highlighting its combination of design research and practice, the school believes that the MArch degree would be instrumental in serving the needs and interests in advanced architectural practice of many of our undergraduate students, as well as providing a point of entry to students with preprofessional degrees from other institutions.

Although experience can be the principal factor in pay scales in the private sector, a graduate degree strengthens a professional's credentials. This is especially important when seeking a promotion and rising through the ranks of any firm. For government jobs, a graduate degree will qualify an applicant to begin at a higher step rating, as this is considered a highly desirable qualification.

Discussions with individual undergraduate students and groups of students indicate that local students in particular are cognizant of the significant investment of time and money when their career objective is to obtain a professional degree to prepare them to enter practice. Anecdotal and survey information (see Appendix) suggests that some BEnvD students would be more likely to continue onto the master's level if this could be completed in 2 years.

• Describe how the program aligns with the UH academic master plan and strategic priorities. There are currently no professional Master of Architecture (MArch) degree programs offered in the State of Hawaii. The MArch is distinct from the DArch in that it focuses on advanced architectural practice and its application. The proposed MArch program aligns with the Campus and UH system mission. The SOA is committed to becoming a Hawaiian place of learning. The program will provide graduates that serve the community by their designing and building sustainable and humane environments, improving the quality of life for the people of Hawai'i and beyond. We reach out to diverse student bodies, including Native Hawaiians, international students, and in/out-state students and guide them to engage in the inquiry and experimentation of advanced architectural practice to enhance the value, relevance, and effectiveness of living and community building within our built and natural environments. The MArch program will be housed in the existing SOA building on the Manoa campus. This location provides significant access to other departments to facilitate multi-disciplinary research and learning, thereby aligning with the recommendations in the Integrated Academic and Facilities Plan.

• Provide evidence of the need for the program including projected number of students and graduates, career and graduate education opportunities, etc.

In the U.S., three degrees are eligible to be accredited by the specialized accreditation body, the National Architectural Accrediting Board (NAAB): (1) The Bachelor of Architecture (BArch) - a 5-year degree open to students with the minimum of a high school diploma, (2) The Master of Architecture - a 2-3 year degree open to students with the minimum of an architecture pre-professional degree, or a baccalaureate degree in any field, (3) The Doctor of Architecture (DArch) – a 3-3.5 year degree open to students with the minimum of an architecture pre-professional degree, or a baccalaureate degree in any field. These three degrees are termed "professional degrees" and are distinguished from pre-professional degrees - 4year baccalaureate degrees (BA, BS, or AB) having titles such as "Environmental Design", "Architectural Design", or "Architecture Studies". Pre-professional degrees are not eligible for NAAB accreditation. According to the National Council of Architectural Registration Boards (NCARB), "Most of the 55 U.S. licensing boards require that architects hold a professional degree for a NAAB-accredited program to satisfy the educational requirement for certification." Initial NAAB accreditation may be sought after a first cohort of students graduate from the proposed MArch program. Once accredited status is granted, it is applied retroactively to cover the first cohort of students. According to the 2019 NAAB Annual Report, there were 168 accredited programs in 139 institutions. Of the 168 programs, 112 (62%) are Master of Architecture programs, 55 (30%) are Bachelor of Architecture programs, and 1 (1%) is a Doctor of Architecture program.

As noted above, the majority of U.S. state architectural registration boards mandate that applicants for licensure hold an NAAB accredited degree. Hawai'i is one of the few states that have an exception to this rule. According to the State of Hawaii Board of Engineers, Architects, Land Surveyors, and Landscape Architects, applicants for licensure may apply for licensure without an NAAB accredited degree. For example, holders of a 4-year pre-professional degree are required to accrue 5 years of lawful experience. This contrasts with 3 years of lawful experience required of professional degree (BArch, MArch, or DArch) holders. For additional information on Hawai'i state requirements see Appendix). In addition, students enrolled in a NAAB accredited program may accrue lawful experience (Architectural Experience Program or AXP credits – as monitored by the National Council of Architectural Registration Boards or NCARB). Completion of lawful experience requirements is a prerequisite for taking the Architect Registration Examination or A.R.E. Therefore, while an individual may elect to pursue licensure in Hawaii without a NAAB accredited degree (such as the SOA's BEnvD), they will need more time to become a registered architect than those holding an NAAB accredited degree. Also, in most cases non-NAAB degree holders will typically be paid lower wages during their internship period. Finally,

those without a NAAB accredited degree will face hurdles should they wish to gain reciprocity and practice in any of the states which require a NAAB accredited degree.

The SOA currently offers the pre-professional Bachelor of Environmental Design (BEnvD), the professional Doctor of Architecture (DArch), and the professional Master of Landscape Architecture (MLA). The Doctor of Architecture (DArch) consists of the combination of advanced practice and research components. For students with an interest and aptitude to focus on architectural practice with professional studies, the MArch has become an instrumental degree not only with the content but also with the shortened duration of the study.

From a career perspective, the MArch degree has become the usual entry degree for those entering the profession of architecture. The master's degree also places students in a higher employment category—especially for government jobs—than students holding a bachelor's or a professional BArch degree.

The SOA intends to retain the DArch program. The DArch would continue to offer both an alternative and an additional possible educational track for students holding pre-professional degrees or degrees unrelated to architecture. By offering both the MArch and DArch, the school will be able to cater to students having differing educational and career objectives. MArch students will typically enter the profession and seek to practice as licensed architects. DArch students may similarly engage in professional practice. However, due to their additional research background and specialization, they may also conduct research within the context of practice, and/or teach, consult, or work for NGOs or government. In addition, students holding a professional degree would be able to pursue specialized research interests in a new post-professional doctoral level degree. This degree is currently undergoing initial planning. In addition to its benefit to the research-oriented students, a post-professional doctoral level degree program will provide a lifelong education opportunity for the population who already have professional experience and look for developing the second cycle of life.

The SOA also intends to re-market the DArch for: 1) students lacking a pre-professional degree and those wishing to join our Global Track (GT) program, and 2) international students who already have MArch degrees and wish to pursue a DArch degree accredited in the US. The Global Track (GT) program will extend its collaboration to various international institutions. For example, the current China GT program is a dual degree offering in partnership with Tongji University in Shanghai, China. This program provides an opportunity for U.S. and other international students to obtain a DArch at UHM and a separate MArch from Tongji (In reverse, the Tongji students obtain their professional MArch from Tongji and the DArch from Hawai'i.). This unique offering has given the Chinese students an opportunity to obtain a higher research degree with which they are able to enter government service, private practice, or academia. American and other international students gain both the unique DArch degree and a second graduate degree from one of the most prestigious institutions in Asia. We also intend to establish other similar dual degree GT programs with other foreign universities, and to thereby increase DArch program enrollment.

The SOA plans to undertake aggressive student recruitment efforts both locally and internationally to increase graduate enrollment. We project that a higher percentage of our BEnvD graduates will elect to enter the MArch program. Therefore, DArch program enrollment will be augmented by: 1) the recruitment of pre-professional and unrelated degree holders both in US and other countries, 2) the recruitment of U.S. and international students holding a bachelor's degree in a field unrelated to architecture, 3) the growth of Global Track enrollment and by U.S. mainland and international student enrollment. In keeping with the SOA and UH mission we intend to give particular emphasis on recruiting students from Asia and the Pacific. As an example of one such recent effort, the SOA/UH recently signed

an agreement for a 2+2 program with Hoa Sen University in Ho Chi Minh City, Vietnam. The program will bring students to the SOA to complete the last two years of their BEnvD. It is expected that some of these students will continue on in the DArch program or the MArch program.

Discussion with the SOA's Dean's Advisory Council and with the local and national professional architectural community has provided additional evidence of the need for a professional MArch degree. The industry is clear that what it needs is well trained professional architects with a solid grounding in architectural practice. The increased number of projects in Hawai'i will require more architecture professionals. The MArch degree will become another option for the residents of the state of Hawai'i to prepare for licensure. In addition, the location of Hawaii and its focus on the Asia Pacific region bode well for graduates pursuing architectural work abroad. Asia is experiencing a major building boom, and architects - particularly foreign architects - are in high demand. In addition, many Asian students are especially interested in obtaining a foreign graduate level degree. They see that such a degree will offer them distinction and lead to their career advancement in industry, government, and academia.

The typical path for a MArch graduate is to obtain employment in an architectural firm, accrue needed internship credits, and pass the Architectural Registration Exam (A.R.E) to become a licensed architect. Graduates can also find employment with companies related to the design of the built environment, such as consulting engineers, contractors, landscape architects, and planners. They could also work for state or federal agencies regulating planning and construction activity.

We project student enrollment in the MArch program to be approximately 30 students after year three of the program, with around 12 students graduating each year. These percentages are based on a survey to SOA students conducted in November 2020 (see Appendix). Since the MArch program is a graduate level program, the vast majority of students will take this as a terminal degree and enter the professional workforce. It is of course possible that some students may elect to obtain another graduate degree in a related or unrelated field at UH or another university. The SOA considering offering a post-professional doctoral degree. Should such a degree be proposed and approved it would allow MArch students to continue their studies at the SOA.

The BEnvD recently underwent Academic Program Review for Provisional to Established status. The review team's report indicated, "...the BEnvD program articulates well with professional graduate degrees already offered in the School of Architecture including...3-year Doctor of Architecture (D.Arch.) degree. The proposed 2-year Master of Architecture would provide an even more efficient path to licensure." In the report's final recommendations, it was noted, "Create a Master of Architecture (M.Arch.) Degree to provide BEnvD students with a more efficient pathway to professional licensure in architecture."

• Describe the profile of students who will likely enroll in the program and provide evidence of student demand (i.e. needs assessment).

The Association of Collegiate Schools of Architecture (ACSA) provides a useful overview of programs in the United States, setting out degrees, enrollments, and admissions standards. The University of Hawai'i's undergraduate pre-professional BEnvD program is one of 74 pre-professional degrees in public universities, and one of 105 in all. Only 57 colleges and universities maintain a BArch undergraduate professional degree; of these only 27 are in public universities. The MArch degree is the first professional degree at 82 public universities and institutions and 46 private colleges and universities, for a total of 126, compared to 57 with BArch degrees. Hawai'i offers the only professional DArch degree.

A typical student enrolling in the program would hold a pre-professional degree and be seeking to obtain a graduate-level NAAB accredited professional degree which is the educational qualification for professional licensure. A high percentage of students enrolling would be our own BEnvD graduates, particularly during the early years of the MArch program. In polling our BEnvD students (see Appendix), 69.2% of respondents indicated they would be likely or very likely to apply to a MArch program should it be offered at the SOA. With increased marketing and recruitment efforts, it is expected that an increased percentage of students from one of the 74 U.S. programs offering a pre-professional degree would enroll. We believe the MArch will meet the demands of local students and the design industry.

- Includes an enrollment and completion estimates with an explanation on how these number was derived.
- Please complete tables 1 and 2 below.

Table 1. Enrollment Projects: Provisional Years

	Year	Year	Year	Year	Year	Year	Current
	1	2	3	4	5	6	Year
Projected Enrollment	15	25	30	30	30	30	0

Table 2. Program Completion Projection

	Year	Year	Year	Year	Year	Year	Current
	1	2	3	4	5	6	Year
Projected Program Completion (annual)	0	10	12	12	12	12	0

III. Program Organization

• Provide a description of curriculum organization, total credits to complete the program including all prerequisites requirements, admission policies, advising, and other aspects of the program, with reference to its goals/outcomes. Provide additional justification if the program is more than 120 credits (bachelor's).

The proposed MArch program is planned as a NAAB accredited, 60-credit_professional architecture program to be housed in UHM SOA, where it can build upon, strengthen, and broaden the focus of existing resources. The MArch program will add a new degree option to the school's existing pre-professional (non-NAAB accredited) Bachelor of Environmental Design (BEnvD) program, the professional Master of Landscape Architecture (MLA) program, and the professional, NAAB accredited Doctor of Architecture (DArch) program.

Admissions Policies

The program will admit students holding pre-professional architecture degrees and professional BArch degrees. Students holding a bachelor's degree in a field unrelated to design of the built environment would have the option of applying to the SOA's DArch program or Master of Landscape Architecture (MLA) program. The admissions process would mirror what is currently in place for the DArch program. Admissions procedures for the planned MArch program will follow general UHM Graduate Division policy. In addition,

MArch specific requirements and admissions policies will be closely aligned with established School of Architecture practices for the professional Doctor of Architecture program (DArch).

Admissions to the MArch program will be Fall only with a January 1 application deadline. Applicants will need to demonstrate a GPA of 3.0 or above for undergraduate course work and for any post-baccalaureate or graduate course work. Standardized exam and English proficiency requirements will be in accordance with UHM Graduate Division rules. Initially, applicants will not be required to submit GRE scores. This practice will be evaluated a few years into the operation of the program. Minimum TOEFL score for international applicants: 61 (internet) or 500 (paper) or minimum IELTS score for international MLA applicants: 6.00 for the overall band test results.

Because the number of qualified applicants is expected to exceed the number of spaces available, admission will be competitive. Meeting minimum admissions standards will not guarantee admission.

Advising

Academic advising for the MArch program will follow procedures currently employed in the DArch program. These have been found to be effective and meet NAAB requirements. Effective MArch student advising will address academic development, career development, professional opportunities, advanced educational opportunities, licensure requirements, as well as continuing education requirements associated with professional practice. Academic advising tasks will be distributed among the SOA's Director of Student and Academic Services and the MArch program director. Upon admission into the program, MArch students will meet and work individually with the MArch program director to go over program requirements and the recommended sequence of courses. Subsequently, MArch students will meet on a regular basis with the Director of Student Services who will work with students to keep on track toward their degrees, navigating the system, offering assistance with curricular and registration-related questions and procedural documents, performing degree checks, etc. Students will also be encouraged to meet with faculty to discuss various aspects related to their educational goals, ideas for capstone project topics, professional/career opportunities, licensure procedures, contacts with the professional community, etc. The MArch program director, as the program's liaison with the UHM Graduate Division, in close coordination with the Dean, and Director of Student and Academic Services, will oversee academic advising and students' advancement from admission to graduation. The MArch program director will maintain the integrity of the program and degree by upholding program-related policies and procedures. The Director of Student and Academic Services will oversee students' progress toward their degree and will further support and promote the scheduling of regular advising meetings for all MArch students. The MArch program director will have signing authority for MArch program-related documents and will review and approve all student forms that require a signature.

Curriculum

On April 9, 2021, the School of Architecture's curriculum committee approved the proposed program of study for the new MArch program, stating, "[A] motion to approve the MArch program proposal draft dated April 6, 2021 with the understanding that parts in yellow, UH forms and specificities of courses will be adjusted as necessary in the future was discussed and unanimously approved by the committee." Subsequently, on 4/9/21, the Architecture Faculty Senate approved the MArch program proposal.

In an effort to operate as efficiently as possible, the proposed program leverages existing curricular School of Architecture and campus resources and collaborations to every extent possible. Incorporating and/or cross-listing existing relevant courses avoids the duplication of course content, stimulates transdisciplinary faculty/student interactions, and strengthens existing options and concentrations in allied programs and fields. The chart below titled "Master of Architecture with Pre-Professional Degree" (below) illustrates how the MArch curriculum is organized.

	•	Hawai'i at Mānoa				student name				
Ма	ster of A	Architecture (MA	Arch) with Pre-F	Professional De	gree	ID or username		entry semester		
									120 UNDERGRADUATE C	CREDIT
S	SEM / YEAR	DESIGN &	RESEARCH	TECHN	IOLOGY	PRACTICE	HISTORY/THEORY	ELEC	IVES	CRDS
Year	Fall	ARCH 742 [6] Arch Studio III: Complex Building	ARCH 733 [3] Advanced Design Com II	ARCH 723 [3] Arch Sys II: Qual Bio Struct Perform		-	ARCH 715 [3] Asia-Pacific Arch History & Theory DArch Major	-		15
ar 1	Spring	ARCH 743 [6] Arch Studio IV: Urban Design	ARCH 739 [3] Research Methods	ARCH 724 [3] Arch Sys III: Qual Struct Anal & Design	ARCH 725 [3] Arch Sys IV: Environ Tech, Sust & Anal	-		-		
	PRE-REQ	Arch 742, 733	Arch 715	Arch 723	Arch 723					15
Y	Fall	ARCH 744 [6] Comprehensive Studio Arch 726 concurrent; Arch 724, 725, 743	- - - -		ARCH 726 [3] Systems V: Integration Arch 744 concurrent; Arch 724, 725, 733, 744	ARCH 745 [3] Advanced Professional Practice Arch 739, 743	ARCH 716 [3] Arch & Urban Design Theory	-		15
Year 2	Spring	ARCH 783D [6] MArch Capstone Studio	ARCH 783R [3] MArch Capstone Research		ALGI 124, 120, 100, 144		ARCH 6xx [3] Arch Elective	ARCH 6xx [3] Arch Elective		
	PRE-REQ	Arch 744	Arch 765A concurrent;					-		15
	1								TOTAL	60

Notes:

1) New SOA courses specific to the MArch program are *italicized*.

Degree Requirements

General degree requirements for the MArch program are set forth by the UHM Graduate Division policy. MArch -specific degree requirements are:

MArch core requirements [45 credits]:

-ARCH 715 [3] Asia-Pacific Architectural History and Theory

-ARCH 716 [3] Architecture and Urban Design Theory

-ARCH 723 [3] Architecture Systems II: Qualitative Bioclimatic and Structural Performance

-ARCH 724 [3] Architecture Systems III: Quantitative Structural Analysis and Design

-ARCH 725 [3] Architecture Systems IV: Environmental Technology, Sustainability, and Analysis

-ARCH 726 [3] Architecture Systems V: Building Systems Integration

-ARCH 733 [3] Advanced Design Communication II

-ARCH 739 [3] Research Methods Seminar

-ARCH 742 [6] Architecture Studio III

-ARCH 743 [6] Architecture Studio IV: Urban Design

-ARCH 744 [6] Architecture Studio V: Comprehensive Design

-ARCH 745 [3] Advanced Practice

Required electives [6 credits]: -ARCH 6XX [3] -ARCH 6XX [3]

Capstone [9 credits] -ARCH 783D [6] MArch Capstone Studio: Design -ARCH 783R [3] MArch Capstone Studio: Research

MArch total: 60 credits

In order for the SOA to be able to implement this new program without requesting additional resources, the majority of courses in the MArch program will utilize existing DArch courses, with a mix of MArch and DArch students enrolled in these same courses.

SOA Programs Synergy

Besides offering economy and efficiency, the sharing of courses between the MArch, DArch, and MLA programs provides opportunities for cross-disciplinary collaboration and exchange. It also serves to promote unity, communication, and understanding among the SOA community.

Cooperative Arrangements

The MArch curriculum leaves room, mainly through its electives, for potential additional cross-listed courses with

the Department of Urban and Regional Planning (DURP) programs well as other UH Mānoa departments such as Geography, Civil Engineering, Art, etc.

Accreditation

To ensure that the MArch program will be able to achieve a successful initial NAAB accreditation, the curriculum has been compared to other current accredited MArch programs, and a NAAB matrix of courses has been completed showing the NAAB Student Criteria (SC) and Program Criteria (PC). This matrix is shown below. The required courses in sum cover the needed criteria. It should be noted that NAAB uses the same Student Criteria and Program Criteria for the MArch and the DArch.

• Describe provisions for articulation with UHCCs.

The MArch is a graduate program and would not therefore have a direct articulation with the UHCCs.

- *Attach (in appendix) relevant program/academic plans.*
- Please complete Table 3 below.

I able 3. Anticipa	tea Cou	rses, Se	ctions, S	SH			
	Year	Year	Year	Year	Year	Year	Current
	1	2	3	4	5	6	Year
Number of new	2	0	0	0	0	0	0
courses offered							
Number of new	4	0	0	0	0	0	0
sections offered							
Annual SSH	360	0	0	0	0	0	0

Table 3. Anticipated Courses, Sections, SSH

IV. Program Resources and Efficiency

- What operating and instructional resources will the program need and where will they come from? What are the program's facility needs?
- What are the risks associated with this program?

It is anticipated, that at least for the beginning years of the MArch program, no additional permanent faculty will need to be hired. Should enrollment increase beyond the steady state enrollment of around 30 students in years 3- 6 (See Table 1), additional faculty (lecturers or permanent faculty) will be needed as instructors for the additional Capstone Studio and Capstone Research course sections. These sections may be taught by permanent faculty should new faculty lines be approved by the university, or by reallocating courses assigned

to permanent faculty. It would also be possible to have lecturers teach one or more of these sections. As a professional program, the MArch seeks to find an appropriate balance between permanent faculty and lecturers. It is typical for architecture programs to employ a relatively high percentage of lecturers as they serve to forge relationships with the professional community and allow students exposure to current issues in the practice of architecture. The integration of the MArch into the overall curriculum structure of the SOA will take approximately 2 to 3 years. During this period, enrollment fluctuations in the MArch and DArch programs will be expected.

Support Personnel

The School of Architecture Student Services Office, through its Director of Student and Academic Services and other staff, will provide MArch support in student advising, admissions, communications with UHM Graduate Division, curricular matters, and degree administration. Office of the Dean staff, such as the SOA's Administrative Office, will continue to provide MArch -related HR and funds management support. Further, the school's directors of Digital Media/IT Lab and Fabrication Shop and their student staff members will support MArch student and faculty needs. Thus, no additional staff will be needed during MArch program implementation. As the School of Architecture faculty and student body continues to grow, however, additional pressure will be placed on administrative and staff resources. Once the MArch has been established, with sufficient and growing enrollment/revenue, additional staff support may be needed.

Library Requirements

The UH Mānoa Library holds a significant number of basic architectural resources in digital and print formats. The school also has book and periodical holdings in the John and Maria Lynn Reading Room which is housed in the SOA building. These resources have proven to be adequate for all NAAB reaccreditation visits for the DArch program. Because the requirements for library resources are the same for MArch and DArch programs, we are confident that this requirement will be sufficient for initial accreditation of the March program.

Supplies and Equipment

The MArch program will take advantage of existing School of Architecture supplies and equipment. Win the event that additional equipment is needed for the establishment of the program, we will use differential tuition revenue and/or existing expendable gift accounts to help fund the expenses.

Physical Resources/ Facilities

During the first years of program establishment, existing School of Architecture spaces will be sufficient to accommodate incoming MArch classes. School of Architecture classrooms and teaching spaces are appropriate for lecture courses and seminars and general-purpose classrooms can be used for lecture courses. Dedicated studio spaces should also be adequate. However, should the total SOA student enrollment increase in the future, additional space will be needed. Such possible growth may result in an increase beyond the MArch steady state projection or other new programs.

Students in the proposed MArch program will use the School of Architecture's Digital Fabrication Services lab (room 207) for scanning, printing, laser-cutting, and 3D printing, as well as the Fabrication Workshop (room104/105) for woodworking and CNC milling. As the program matures, we will seek to augment and update physical resources and equipment to accommodate the needs of MArch students. SOA student professional fees will help fund these additions and improvements. The SOA's existing facilities have proven adequate to meet DArch NAAB accreditation and are deemed adequate to meet initial MArch accreditation standards.

• What impact will developing this program have on resource (re)allocation in the unit?

<u>Funding</u>

No additional resources are expected in the early years of the program. As noted above, should enrollment in the program grow, new faculty and additional space may be needed. In this case, additional tuition revenue is expected to cover the increased expense. The SOA has one approved replacement position now on hold due to the hiring freeze and another retirement that will need refilling. Otherwise, the MArch program will depend on existing faculty (12.75 FTE) and our pool of lecturers from the professional community. The program will not require any new faculty members other than those to be replaced once the hiring freeze ends. For maximum efficiency, relevant existing DArch, and MLA courses will be incorporated in the proposed MArch curriculum and lecturers from the professional field will be utilized. As it is common practice in other, established MArch programs, some courses are more appropriately taught by local professionals hired as lecturers. If needed with increased enrollment in future years, it is expected that any additional FTE and/or lecturer costs required will be covered through the reallocation of internal resources (e.g. teaching assignments, course development, and cross-listing required coursework); and through future strategic recruitment for open faculty positions. No new general funds will be needed to launch the program.

Cost Comparison with Other Programs

Average class sizes for required MArch design studio courses are expected to be equivalent to the sizes of existing studio courses in our professional DArch program (6-15 students). The addition of MArch students will increase enrollment in these existing studio and lecture courses and thus make them more financially viable. The same is true for existing graduate-level DArch courses that will be MLA requirements (ARCH/PH 682, ARCH 695, ARCH 739, ARCH 743, ARCH 690). The addition of MLA and DArch students will make these courses more efficient in terms of their student/instructor ratio. The remaining MArch lecture and capstone courses will be comparable in size to those in other relatively small professional programs such as the Master of Urban and Regional Planning (MUR) or the DArch.

List similar programs that currently exist in the UH system. Describe how this program compares and provide a justification for a new program in this field.

No MArch degree or similar programs exist in the UH System or in the state with the exception of the DArch which is offered by the SOA. The MArch and DArch are both subject to specialized NAAB accreditation. The MArch is distinguished from the DArch in that it requires less time to complete and has fewer research requirements.

- Has there been consultation at the program level between campuses and within the originating campus? Please provide documentation of who was consulted, in what capacity, and when? Provide a summary of the results of the consultation.
- Please complete tables 4-6 below.

Existing Resources	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Current Year
Combined Tuition/Summer/Course	45,890	62,780	92,670	97,000	102,000	107,000	0
Projected Fees	15,000	25,000	30,000	30,000	30,000	30,000	0

Table 4. Existing Resources and Funding

Tuble et Tintit							
Personnel	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Current Year
Full-time	0	0	0	0	0		0
Faculty							
Lecturers	1	2	2	2	2	2	0
Instructional	13,268	27,066	27,608	28,436	29,289	30,168	0
Costs							
Other	0	0	0	0	0	0	0
TOTAL	155,891	306,752	312,887	322,273	331,942	341,900	0
COSTS							

Table 5. Anticipated Personnel and Operating Costs*

Faculty Costs*	0	0	0	0	0	0	0
Lecturer Costs	13,268	27,066	27,608	28,436	29,289	30,168	0

*Faculty costs are covered by General Funds and are listed here only for proportional comparison with the school's other programs. No new positions will be required.

Table 6. Anticipated Operating Costs**

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Current Year
		2	0		0	<u>^</u>	
Unique	0	0	0	0	0	0	0
Projected							
Operating							
Costs (from							
Provisional							
proposal)**							

**There are no unique equipment and purchases or other program costs for the MArch program. Equipment purchases are paid for using RCUH funds.

V. Program Effectiveness

- Briefly describe (one paragraph or less) the plan for assessing the quality of student learning.
- Identify relevant program accreditation and plans to meet accreditation requirements.

The NAAB Student Criteria (SC) and Mānoa Advanced Degree Learning Objectives (ILO) will be included in all required MArch course syllabi. Please refer to the UHM-1 forms and supporting materials (justifications and generic syllabi) for new MArch courses in the Appendix for examples. Admission of applicants into the MArch program acknowledges student competency and varying levels of preparedness. As is common practice in professional design degree programs, the evaluation of students during their final studio presentations by invited professionals as well as the participation of outside committee members (experienced professionals) on capstone committees and juries will play important roles in the assessment of MArch learning at various stages throughout the program (also see curriculum map). Additionally, as has been a long-standing and successful tradition in the school's NAAB-accredited DArch program, at the end of each semester, SOA program faculty engage in an all-faculty review of the semester's program course work, specifically design studio work. During this assessment session, all SOA faculty and the Dean gather for one day and evaluate/discuss how studio courses and the overall program curriculum might be adjusted to better align course content with NAAB SC criteria and improve overall program learning outcomes. NAAB Criteria and how they are mapped to the MArch curriculum is shown in the Appendix.

Program Accreditation and Plans to Meet Accreditation Requirements

The proposed MArch will seek NAAB accreditation candidacy status during the first and second year of program operation (application for candidacy status during first year of MArch operation; NAAB candidacy team visit and review during the second year). Candidacy is an accreditation classification granted to a program that is in the early stages of development or an intermediate stage of program implementation. Upon graduation of its first MArch class the program will apply for initial NAAB accreditation. NAAB accreditation for the program, once granted, will be retroactive and include the first graduating class.

Throughout this program proposal we have highlighted important NAAB accreditation criteria and how they relate to the MArch program outcomes, curricular and administrative organization, resources, and assessment. The SOA administration and faculty possess a wealth of experience with NAAB program accreditation. The School of Architecture's administration and faculty are well prepared to undertake the upcoming MArch accreditation candidacy and initial accreditation applications. At the time of the submission of this proposal, pending program approval, the school already meets all criteria necessary for a NAAB accreditation candidacy status application. The proposed MArch degree is not expected to interfere with the School's NAAB accreditation of its DArch program) or UH Mānoa's accreditation by the Western Association of Schools and Colleges (WASC). NAAB recognizes WASC as a regional accreditation agency.

B. NAAB Criteria (2020 Edition) and Curriculum Map

3.1 Program Criteria (PC)

A program must demonstrate how its curriculum, structure, and other experiences address the following criteria.

PC.1 Career Paths—How the program ensures that students understand the paths to becoming licensed as an architect in the United States and the range of available career opportunities that utilize the discipline's skills and knowledge.

PC.2 Design—How the program instills in students the role of the design process in shaping the built environment and conveys the methods by which design processes integrate multiple factors, in different settings and scales of development, from buildings to cities.

PC.3 Ecological Knowledge and Responsibility—How the program instills in students a holistic understanding of the dynamic between built and natural environments, enabling future architects to mitigate climate change responsibly by leveraging ecological, advanced building performance, adaptation, and resilience principles in their work and advocacy activities.

PC.4 History and Theory—How the program ensures that students understand the histories and theories of architecture and urbanism, framed by diverse social, cultural, economic, and political forces, nationally and globally.

PC.5 Research and Innovation—How the program prepares students to engage and participate in architectural research to test and evaluate innovations in the field.

PC.6 Leadership and Collaboration—How the program ensures that students understand approaches to leadership in multidisciplinary teams, diverse stakeholder constituents, and dynamic physical and social contexts, and learn how to apply effective collaboration skills to solve complex problems. PC.7 Learning and Teaching Culture—How the program fosters and ensures a positive and respectful environment that encourages optimism, respect, sharing, engagement, and innovation among its faculty, students, administration, and staff.

PC.8 Social Equity and Inclusion—How the program furthers and deepens students' understanding of diverse cultural and social contexts and helps them translate that understanding into built environments that equitably support and include people of different backgrounds, resources, and abilities.

3.2 Student Criteria (SC): Student Learning Objectives and Outcomes

A program must demonstrate how it addresses the following criteria through program curricula and other experiences, with an emphasis on the articulation of learning objectives and assessment. SC.1 Health, Safety, and Welfare in the Built Environment—How the program ensures that students understand the impact of the built environment on human health, safety, and welfare at multiple scales, from buildings to cities.

SC.2 Professional Practice—How the program ensures that students understand professional ethics, the regulatory requirements, the fundamental business processes relevant to architecture practice in the United States, and the forces influencing change in these subjects.

SC.3 Regulatory Context—How the program ensures that students understand the fundamental principles of life safety, land use, and current laws and regulations that apply to buildings and sites in

the United States, and the evaluative process architects use to comply with those laws and regulations as part of a project.

SC.4 Technical Knowledge—How the program ensures that students understand the established and emerging systems, technologies, and assemblies of building construction, and the methods and criteria architects use to assess those technologies against the design, economics, and performance objectives of projects.

SC.5 Design Synthesis—How the program ensures that students develop the ability to make design decisions within architectural projects while demonstrating synthesis of user requirements, regulatory requirements, site conditions, and accessible design, and consideration of the measurable environmental impacts of their design decisions.

SC.6 Building Integration—How the program ensures that students develop the ability to make design decisions within architectural projects while demonstrating integration of building envelope systems and assemblies, structural systems, environmental control systems, life safety systems, and the measurable outcomes of building performance.

NAAB Criteria Curriculum Map

The following matrix (curriculum map) illustrates the alignment of instruction with NAAB Program Criteria (PC) and Student Criteria (SC) throughout the proposed MArch curriculum. Individual course syllabi specify the NAAB SC assigned to each course.

Alpha/No	Cr	Courses	Pro	gram	and	Stude	ent Ci	riteri	а							
		A - Ability U- Understanding									U	U	U	U	Α	Α
			PC.1 Career Paths	PC.2 Design	PC.3 Ecological Knowledge and Responsibility	PC.4 History and Theory	PC.5 Research and Innovationk)	PC.6 Leadership and Collaboration	PC.7 Learning and Teaching Culture	PC.8 Social Equity and Inclusion	$^{\rm SC.1}~$ Health, Safety, and Welfare in the Built Environment	SC.2 Professional Practice	SC.3 Regulatory Context	sc.4 Technical Knowledge	SC.5 Design Synthesis	SC.6 Building Integration
			Prog	ram Cr								ent Crit				
		MArch REQUIRED COURSES								44 1						
ARCH 715	3	Asia-Pacific Architectural History and Theory				х				х						
ARCH 716	3	Architecture and Urban Design Theory				х	х			х	х					
ARCH 722	3	(Bootcamp) Architecture Systems I: Introduction to Systems		x	x						х			х		
ARCH 723	3	Arch Sys II: Qualitative Bioclimatic Structural Performance			x						х			х		
ARCH 724	3	Arch Sys III: Quantitative Structural Analysis and Design		x							х			х		
ARCH 725	3	Arch Sys IV: Environmental Technology, Sustainability, and Analysis			x						x			х		
ARCH 726	3	Architecture Systems V: Building Systems Integration					х				х			х	х	х
ARCH 731	3	(Bootcamp) Advanced Design Communication I		x				х								
ARCH 733	3	Advanced Design Communication II		x				х						х		
ARCH 739	3	Research Methods Seminar					х	x			х	_				
ARCH 742	6	Architecture Studio III: Complex Buildings		x				x			х		х		х	
ARCH 743	6	Architecture Studio IV: Urban Design			x			х		х			x	х	х	
ARCH 744	6	Architecture Studio V: Comprehensive Design		x	x			x				x	х	х	х	x
ARCH 745	3	Advanced Practice	x					x				x	х			
ARCH 765	6	Capstone Design Studio	x	х	x						х	x	х	х	x	х
ARCH 766	3	Capstone Design Research			x	х	х									

C. 2020 MArch Program Interest Survey & Results

8/2021	MArch Survey - Google Forms			
=		Õ	≥ :	J
MArch Survey				
Questions Responses 14				
14 responses				:
		Accept	ing responses	•
Summary	Question		Individual	
If a 2-year MArch had been avail chosen the MArch over the DArc 14 responses	lable at the time you applied to th ch?	ne DArch, wou	ld you have	
		yes		
		no		
Contraction of the second	14.3%			
85.7%				
4				•
s://docs.googie.com/formsid/1Ch/WJu2sKH78pEW	/NsF24FofsCHnMZqfS0XjPhuKhcRU/edit#respon	ses		1/

3/8/2021

MArch Survey - Google Forms

If yes, why?

12 responses

Because it is a shorter program which mean less money spent. Assuming it's a professional degree like the DArch. As well as it is more understood in the professional world

A 3-year commitment is a difficult decision to make for a student under financial and academic pressure. With Hawaii being the only school in the country offering a D.Arch, it is hard to compare the program and the degree's standing to all other architecture schools in the U.S and for mainland employers to compare as well. I believe more of my undergrad classmates would have enrolled in grad school if the program was shorter, or if the AXP opportunities within the D.Arch program was longer (2 semesters-whether joined or separate).

I think given the opportunity to graduate with an MArch will allow me to still acquire an accredited professional degree and help me to start exploring firms at a much earlier time. Financially, this is also a more appealing option as tuition is not always easy to come by each semester. Although the opportunity to research and develop a thesis is not available for those pursuing the MArch, I think it at least allows students to experience professional education and get us working in firms sooner.

I would like to start practicing ASAP. Having the possibility of becoming a professor with the DArch is great, but the structure of the MArch and DArch sound very similar. If I could get an accredited degree a vear earlier and get my license a year earlier. I definitely would've chosen the MArch.

If no, why not?

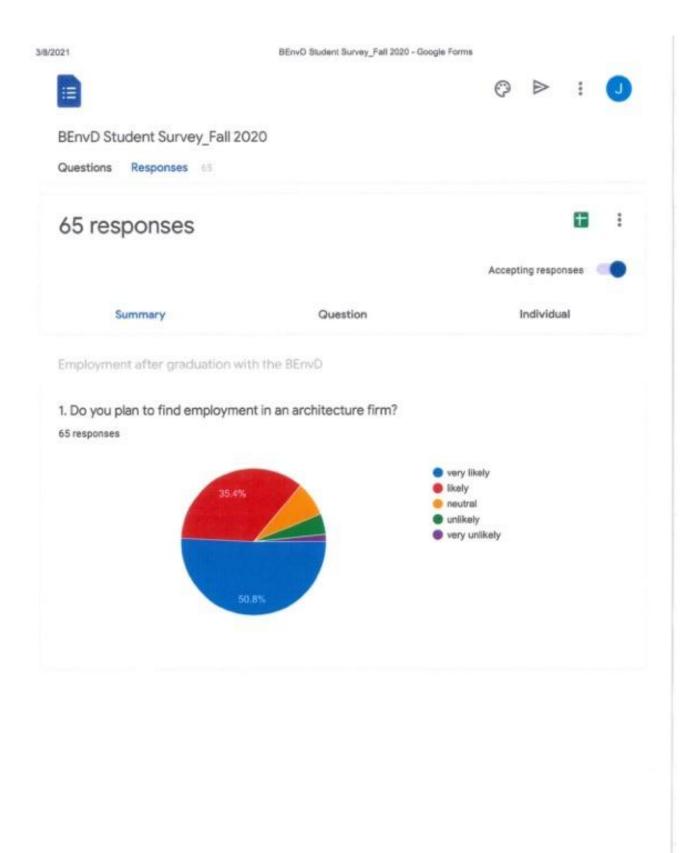
2 responses

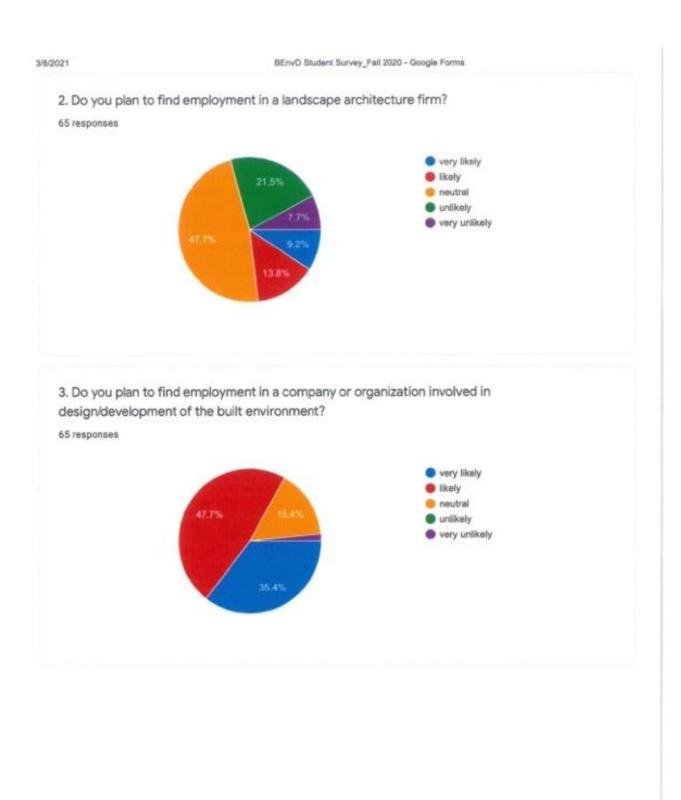
As GT student I find more value in having distinguished levels of both a masters and doctorate degree as part of the program. I don't think it'd be as valuable to simply have dual masters degrees (if GT would even be available in a two year program). To be honest if UH offered an M.Arch instead of D.Arch I would've chosen to study elsewhere for graduate school.

The DArch program represents a proof of understanding of critical research and design. This program is not about designing in the present but pushing forward and the boundaries of design in the future of the Asia-Pacific region. However, I see the benefits of a two year program for those who wish to affect the present and immediate future rather than the next step in the human environmental design.

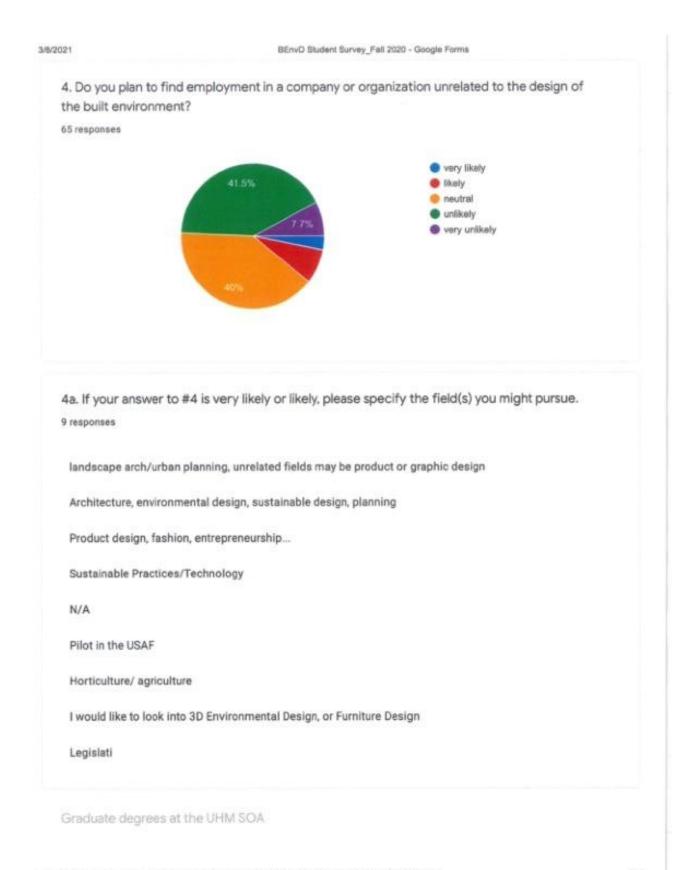
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2/2



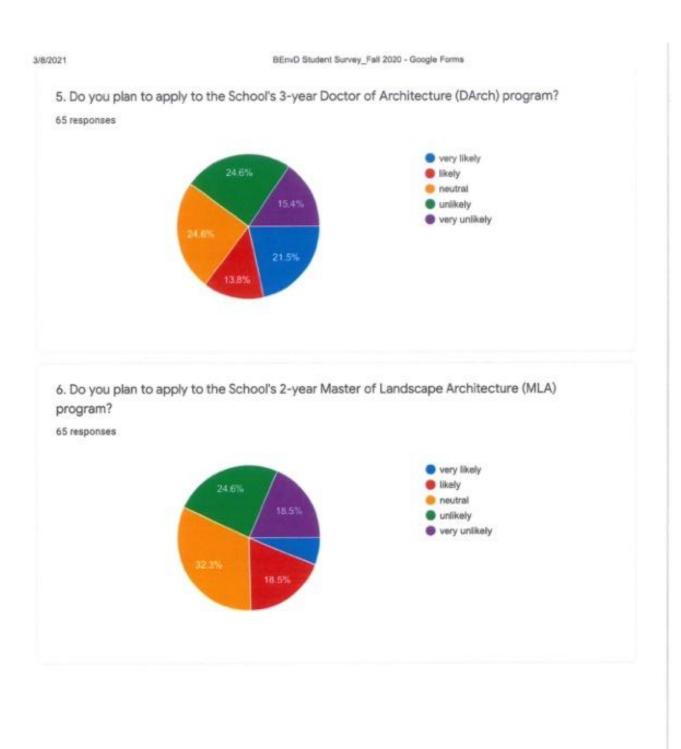


29



https://docs.google.com/formsid/1y6ByfhL7mOukt4-cWLQTFYX1wfl5Hp2fq-_mRM1PzXw/edit#responses

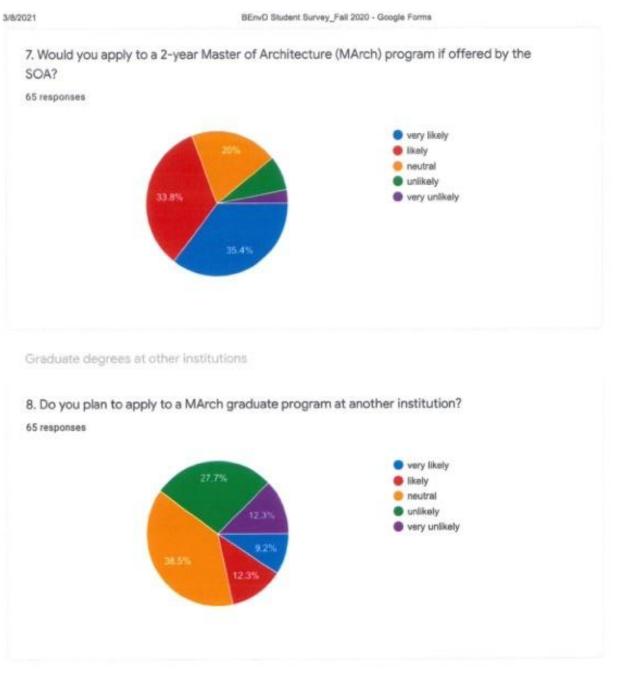
3/8



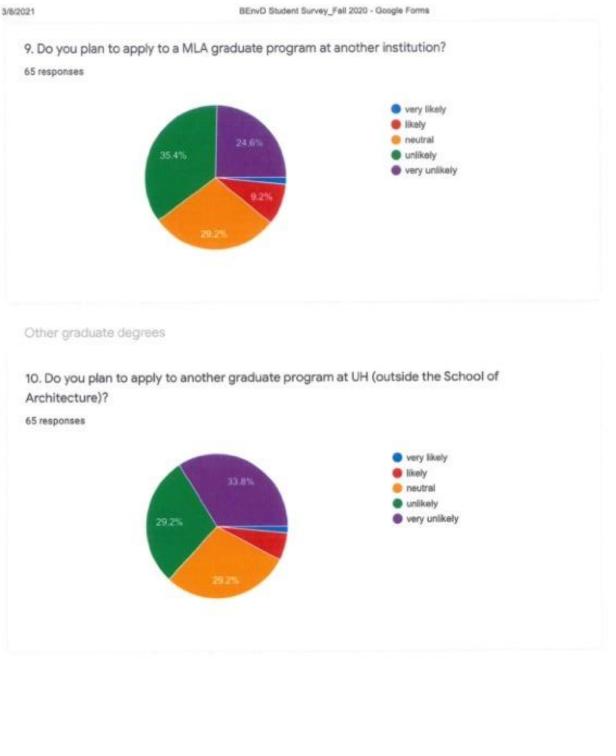
https://docs.google.com/forms/d/1y6ByfhL7mOukt4-cWLQTFYX1wfi5Hp2fq-_mRM1PzXw/edit#responses

4/8

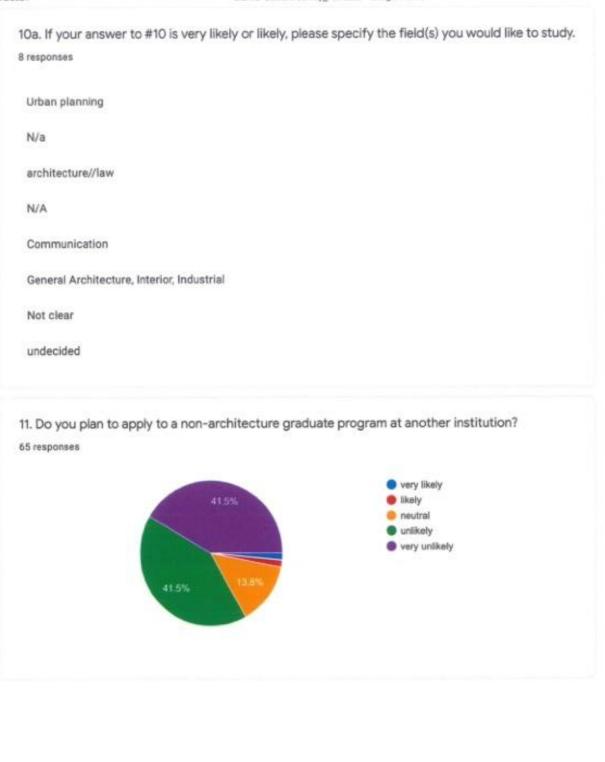








3/8/2021



7/8

3/8/2021

11a. If your answer to #11 is very likely or likely, please specify the field(s) you would like to study. 3 responses

N/a

law/film/finance/art criticism

Urban design and planning

Thank you! We appreciate your time in taking this survey.

https://docs.google.com/forms/d/1y6ByfhL7mOukt4-cWLQTFYX1wfl5Hp2fq-_mRM1PzXw/edit#responses

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D. State of Hawaii Architectural Licensing Requirements (Excerpt)

REQUIREMENTS FOR LICENSURE - ARCHITECT

Access this form via website at: cca.hawaii.gov/pvl

REQUIREMENTS

- 1. Possess the proper education and/or experience as contained below; and
- 2. Pass the NCARB's A.R.E.

PATHWAYS

There are two basic pathways to licensure:

- 1. If you are currently licensed in another state, you will be seeking licensure via endorsement.
- 2. If you are **NOT** licensed in any other state, you will be seeking licensure via AXP/exam.
- On page 1 of the application form, please indicate which pathway (1 or 2) for licensure you are taking.

NOTE: If you passed any examination but are not licensed in any other state, have your exam results sent to the Hawaii Board directly from the other state board you passed exam for.

MINIMUM EDUCATION & EXPERIENCE

The amount of experience required is dependent on the level of education you have and the pathway applicable to you:

	EDUCATION LEVEL	LAWF [via endorsement]	UL EXPERIENCE [via AXP/exam]
1 -	Bachelor's, master's or higher degree in architecture from a school or college approved by the Board: OR	3 years	AXP
2 -	Graduate of a 4-year architectural, pre-architectural or arts and science curriculum from a school or college approved by the Board; OR	5 years	5 years, including completion of AXP
3	Graduate of a 2-year architectural technology curriculum from a community college or technical training school approved by the Board; OR	8 years	8 years, including completion of AXP
4 -	No Degree	11 years	11 years, including completion of AXP

On page 1 of the application form, please indicate which level of education (1 to 4) you have.

FOREIGN EDUCATION

In addition to the foregoing, graduates of foreign colleges (other than from a Canadian accredited college) must have their foreign architectural degree evaluated <u>if</u> they wish to have their degree(s) considered. (See below)

Applicants shall be required to have an Education Evaluation Services for Architects ("EESA") evaluation through The National Council of Architectural Registration Boards ("NCARB") by opening a My NCARB account.

To open a My NCARB account, please go to the NCARB website at: www.ncarb.org.

(CONTINUED ON PAGE 2)

E. Letters of Support

March 15, 2021

Dean William R. Chapman School of Architecture University of Hawali, Manoa 2410 Campus Road Honolulu Hawali 96822-2316

Re: M. Arch Program

Dear Dean Chapman:

I am writing to strongly support the school's plan to create an M.Arch program. As a longtime member of the School's Advisory Council, participant in the D.Arch program, and employer of student interns and graduates, I believe this is an appropriate expansion of the School's programs. While the school's respected D.Arch program is a great option for many students, the school should also offer a more traditional program, such as the proposed M.Arch, for the many other students who want to pursue a more typical architectural education. I hope this proposed program is approved and implemented in the near future. My partners and I look forward to meeting the students and graduates of this program.

Sincerely, Bradford Perkins FAIA

Chairman

Perkins Eastman Architects DPC 115 Fifth Avenue, New York, NY 10003 | +1 212 353 7200

PERKINSEASTMAN.COM

KATH WILLIAMS + ASSOCIATES

P.O. Box 1191 Bozeman, MT 59771 Phone: 406-586-3175 www.kathwilliams.com

March 12, 2021

Dear Dean Chapman,

I strongly support the MArch route as the most attractive and advantageous for the students Asyou know, I head a global firm that works on sustainable projects from design through construction, operations and maintenance. Many of my associates from around the world hold a Bachelor in Environmental Design as the most appropriate degree for what we do. We are not designers but we do sit at the table with the owners and design teams, providing a resource in current global sustainable practices and processes.

Although we are not designers, it is important that we all have a deep understanding and appreciation for architecture. An MA in architecture would be an asset to my team and others around the world, giving them that "higher degree". Devoted, focused time to architecture learning and research would be invaluable and pair well with their interests and chosen professional pursuits

Please add this letter to others who strongly endorse David Rockwood's leadership in developing this academic path. I would be proud to continue my own support of the DArch students at University of Hawai'i Manoa and contribute to the professional preparation offered through MArch.

Best wishes,

Kath Williams, Ed.D LEED Fellow President Kath Williams + Associates, Inc. P.O. Box 1191 Bozeman, Montana 59771-1191 406-586-3175 (office)

A Montana Corporation



CERTIFIED FINANCIAL PLANNER BOARD OF STANDARDS, INC.

Dean William R. Chapman School of Architecture University of Hawaii – Manoa Honolulu, Hawaii 96822

March 10, 2021

Dear Bill,

I commend, and endorse, the decision of the School of Architecture for moving forward with the MArch degree.

As you know, I was a Vice President at the American Institute of Architecture for more than seven years overseeing several initiatives including those that promote the influence of architecture in the many ways people live, work and play. It is this important role that necessitates expanding the pipeline and opportunities for those seeking a career in architecture. The MArch degree offers such an opportunity.

In my current role as the Chief Operating Officer for the CFP Board, the standard setting organization that administers the requirements for CFP® certification in financial services, we are in constant competition for talent to ensure the profession's growth and relevance. Architecture faces the same competition. Providing pathways to pursue this career is imperative. The MArch program provides an additional pathway to the profession.

As an Advisory Council member and a donor, I support this direction wholeheartedly.

Best regards,

Elizabeth on Speward

Elizabeth M. Stewart, Esq. Chief Operating Officer



March 16, 2021

University of Hawaii School of Architecture 2410 Campus Road Honolulu, Hawaii 96822-2216

Attention: Mr. William R. Chapman, Dean

Subject: Re-instatement of MArch Degree

Aloha Bill,

This letter is written in support of the School of Architecture's decision to re-establish the MArch degree program. I agree that, besides the School's current BEnvD (Bachelor of Environmental Design) and DArch (Doctor of Architecture) degrees, an accredited MArch degree should be added. This will allow our students to receive professional education in compliance with a standardized national curriculum accredited by NCARB (National Council of Architectural Registration Boards) and NAAB (National Architectural Accrediting Board).

Your initiative will allow more students to engage with local work force communities and achieve licensure earlier without having to leave the state. Hawaii's design and building industries are extremely unique from anywhere else; and are in dire need of filling positions vacated by aging personnel. As a practicing architect, general contractor and Hawaii's 2020 BIA-Hawaii (Building Industry Association of Hawaii) President, I have been made very aware of the impending workforce shortage the State will experience within the design and building communities.

Your offering of a (4+2) MArch degree will certainly strengthen the School, attract students locally and from abroad, increase enrollment and tuition receipts; and provide greater value for our students and employers. I would like to also offer the following for consideration:

- That the School continue its teaching collaboration with HCC (Honolulu Community College)... to strengthen the technical skills of UH BEnvD students while also allowing HCC to develop a Pre-Architecture degree program.
- That the BEnvD curriculum be realigned to assist with the preparation of students interested in continuing on to their Master's degrees.
- That an accelerated MArch program be considered... providing added value ... through summer school sessions and/or other means.

2020 S. King Street + Honolulu. Hawaii 96826 T 808.949.1601 + F 808.942.0054 + www.pacarchitects.com I greatly appreciate this opportunity to voice my support of the School of Architecture's efforts to re-establish its MArch Degree. I implore the Board of Regents and the Administration to look favorably upon your initiative and to provide all support necessary for its implementation and success.

Mahalo and Best Regards, Pacific Architects, Inc.

Dwight Mitsunaga, FAIA, ArchD, NCARB President

University of Hawaii: BA '72, MArch '75, ArchD '00

University of Hawaii, School of Architecture Advisory Council Chair Honolulu Community College, AEC Program Advisory Committee Member Chaminade University, E+ID Program Advisory Committee Member Building Industry Association of Hawaii, Education Committee Member

> 2020 S. King Street + Honolulu, Hawaii 96826 T 808.949.1601 + F 808.942.0054 + www.pacarchitects.com

March 12, 2021

William R. Chapman Dean, University of Hawaii School of Architecture

Dear Bill:

I agree completely with the idea of reviving the MArch degree at the University of Hawaii School of Architecture. To do so provides a professional degree that will allow graduates to take the next steps toward the practice of architecture in less time and with less financial investment. It also puts Hawaii in line with every other school of architecture.

Retention of the BEnvD will allow graduates who wish to work in an allied field but do not require a professional degree to finish their education in less time. And the DArch, of course, will continue to benefit those who look toward a future in education or seek a deeper understanding of a specific subject before becoming a licensed architect.

Adding the MArch to the list of educational opportunities at the University of Hawaii School of Architecture is an excellent i dea.

Best,

Bob Liljestrand, MArch, AIA Associate President, Liljestrand Foundation

LILJESTRAND FOUNDATION

(808) 537-3116 • 3300 TANTALUS DRIVE, HONOLULU, HAWAII 96822 INFORLILJESTRANDFOUNDATION.ORG • LILJESTRANDFOUNDATION.ORG



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architecture = preservation = planning = interiors

March 17, 2021

Dr. William R. Chapman University of Hawaii, Manoa School of Architecture 2410 Campus Road Honolulu HI 96822-2216

Via email: sekimoto@hawaii.edu

Aloha Dean Chapman,

We are writing to express our support for the reinstitution of the Masters of Architecture program at the UHM School of Architecture. We have a number of very valued UHM alumni in our office, the vast majority do not have the Doctorate of Architecture. We believe this will help more local students stay in Hawaii for their education. It offers students the flexibility to do their Bachelor's of Environmental degree or their Masters of Architecture degree out-of-state, yet keep a portion of their education affordable and in state.

We also have a number of staff that have their Masters from various schools throughout the United States and Canada. We believe there is value in having a graduate degree in their training and knowledge base.

We fully endorse the reinstitution of the Masters of Architecture degree at the UHM School of Architecture. Thank you for the opportunity to express our opinion.

Sincerely,

Louis Fung, President |/Fung Associates, Inc. 2013 President | AIA Honolula Chapter 2016 Louise Blanchard Bethune Fellow | AIA Strategic Council 2016-2018 President | AIA Hawaii State Council 2019-Present Member | UH SOA Advisory Council

Tonia Moy, Vice President MArch, UHM School of Architecture Fung Associates, Inc. 2020-Present Member | UH SOA Advisory Council

ahl.

Architects Hawaii Ltd. 733 Bishop Street, Suite 3100 Honolulu, Hawaii 96813

> 808.523.9636 www.aht.design

David A. Miller AIA, LLED AP Bettina Mehnert FAIA, LEED AP William A. Brizee AIA, LEED AP W. Terry McFarland AIA, LEED AP Emile C. Alano AIA, LLED AP Lisa Y.T. Rapp AIA, LEED AP Lester H. Ng LEED AP Nathan Saint Clare AIA Myles M. Michibata AIA, LLED AP

Jean-Louis Loveridge LEED AP Garret S. Horimoto RA Michael G. Kim IFTD AP Daniel B. Moats LEED AP Ethan J. Twer AIA Brad K. Inovejas AIA, LEED AP Jeffrey L. Lee AA, ITTD AP Katie Stephens AIA

Cynthia M. Work RA, LEED AP Sara B. Belczak IIDA, ASID Daniel S. Funakoshi CPA Charles H. Nishimoto AIA, LEED AP Raymond N. Okamoto CSI Joel L. Ganatisi RA, IFFD AP Keane K. Kakuda AIA, IFFD AP Keane K. Kakuda AIA, IFFD AP Colette Abe Lee IIDA, LEED AP Colette Abe Lee IIDA, LEED AP James Neu-Wa O'Neill Associ AIA Ina Wong AIA, LLED AP Frederick Hong AIA, LEED AP Deirdre Stearns AIA, LEED AP March 23, 2021

Dean William R. Chapman University of Hawai'i at Manoa School of Architecture 2410 Campus Road Honolulu, HI 96822

Aloha Dean Chapman,

We are writing to you in support of the Master of Architecture (MArch) program at the University of Hawaii at Manoa.

Reinstating the MArch degree would allow the UH School of Architecture to preserve the BEnvD and DArch degrees currently in place, while providing an option for an advance professional Architecture degree.

With the current BLnvD program in place, the MArch program will allow students of the BEnvD program to obtain an additional professional degree in 2 years, should they want to further their education, without having to complete the lengthy research project required in the DArch program. While the DArch program is the logical path for many students, particularly those looking ahead to a research or academic profession, the MArch program would offer an opportunity to obtain additional focused studies and an advance degree that is more obtainable due to financial and time commitments, and that would provide them with additional skills and tools to utilize in their career.

The MArch program also offers students with a non-Architectural Bachelor's degree (BArch) an opportunity to pursue obtaining an advanced architectural degree, creating a more diverse and broadly developed group that would be available to the Hawaii professional scene.

Here at ALL, we have several employees who are a product of the ULI MArch program, and we appreciate the skills that they have brought to our firm and profession. Signed below, we readily endorse the reinstatement of the MArch program at the University of Hawaii at Manoa.

Sincerely.

Bettina Mehnert, FAIA, LEED AP President & CEO

Ma. M

David A. Millor, AIA, LEED AP Chairman & Principal

F. SoA MArch Program Supplemental Information for Admission Form:

University of Hawaiʿi at Mānoa SCHOOL OF ARCHITECTURE Master of Architecture (MArch) Supplemental Information for Admission

Name (Mr. / Ms. / Mrs.) (please print)		
Phone	Em ail	
UH System Application form being submitted for	r entry to MArch in:	Fall 20

SUPPLEMENTAL DOCUMENTS (become the property of the School of Architecture):

- Statement of Interest: An essay of approximately 500 words addressing the following: ∀ Why do you want to study at UHM School of Architecture? ∀ What are your goals and expectations from study in the MArch program?
- Resume: A listing of educational background, professional experience or internships, and educational and/or
 professional awards and honors, including any volunteer or community service. Other relevant experiences or
 skills as may be appropriate.
- 3. Portfolio: 8.5" x 11" is preferred size; not to exceed 11"x14" Portfolio should include samples of creative and professional work, such as art or craft work, construction work, graphic design, computer aided design, poetry, photography, examples of architecture or related disciplines that exhibit graphic or written creativity, or any other creative work.

Portfolio submission must be in *PDF format as ONE multiple-page PDF document at 300 dpi, not to exceed 20 MB in file size*.

4. Letters of Recommendation: Three letters of recommendation endorsing your potential to succeed in a rigorous professional architecture program. Please be sure to have the recommender clearly identify you as the student for whom the letter is being written. We recommend that at least two of the three letters of recommendation be written by former undergraduate program faculty members.

SUBMISSION OF SUPPLEMENTAL DOCUMENTS:

Supplemental documents, 1 thru 4, to be uploaded to the Graduate Application Supplemental Documents site at https://documentupload.manoa.hawaii.edu/upload/#/login

Please provide the link to the authors of your letters of recommendation to upload letters directly to the site. Letters should not be submitted by the applicant.

Hardcopy submittals of recommendation letters should be signed across the sealed envelope flap and mailed to: University of Hawai'i at Mānoa School of Architecture, MArch Admissions Committee, 2410 Campus Road, Room 202, Honolulu, Hawaii 96822-2216





UNIVERSITY OF HAWATI BOARD OF REGENTS

22 APR 27 A9:18

College of Natural Sciences Office of the Dean

February 16, 2022

MEMORANDUM

To: Randolph G. Moore Chair, Board of Regents

VIA: Ernest Wilson Chair, BOR Committee on Academic and Student Affairs

VIA: David Lassner President

VIA:

Doviel Paus

- VIA: Debora Halbert Vice President for Academic Strategy, UH System 77 uhna Walkart
- VIA: Michael Bruno Provost April 5 - Son for Michael Bruno

Laura E. Lyons F. S. Interim Vice Provost for Academic Excellence

From: Dean Aloysius Helminck College of Natural Sciences.

2. Muno

SUBJECT: REQUEST FOR ESTABLISHED STATUS FOR THE BACHELOR OF ARTS IN BIOCHEMISTRY and BACHELOR OF SCIENCE IN BIOCHEMISTRY DEGREES AT THE UNIVERSITY OF HAWAII AT MANOA

SPECIFIC ACTION REQUESTED:

It is respectfully requested that the Board of Regents grant established status to the BACHELOR OF ARTS IN BIOCHEMISTRY and BACHELOR OF SCIENCE IN BIOCHEMISTRY degrees in the COLLEGE OF NATURAL SCIENCES at the University of Hawai'i at Mānoa.

RECOMMENDED EFFECTIVE DATE:

Upon Board approval.

ADDITIONAL COST:

There are no additional costs associated with the establishment of this degree program. All courses are currently being taught.

2565 McCarthy Mall, Keller Hall Suite 201 Honolulu, Hawai'i 96822 Telephone: (808) 956-6451 Fax: (808) 956-9111 natsci.manoa.hawaii.edu An Equal Opportunity/Affirmative Action Institution Randolph G Moore February 16, 2022 Page 2

BACKGROUND:

Board of Regents Policy 5.201 Parts III.B confer upon the Board the authority to grant established status to provisional degree programs, and states that a request must be made to the Board to transition a degree program from provisional to established status, and that the recommendation by the president for approval by the Board shall include the results of a program review. The results of the program review are presented in the attached document.

Program's role within Mānoa and other UH campuses:

In 2012 the University of Hawai'i at Mānoa was granted provisional status for degrees in Biochemistry within the College of Natural Sciences. The Biochemistry Degree Program is organized within the Department of Chemistry to provide a broad education in cross-disciplinary topics that lie at the interface of chemistry and the life sciences, leading to Bachelor of Arts in Biochemistry or Bachelor of Science in Biochemistry. The courses leading to these degrees prepare students for careers in fields where a core understanding of the chemistry of biological processes is essential. Examples include scientific disciplines such as biochemistry and chemistry, medicinal and pharmaceutical chemistry, biotechnology, biomedical sciences, and environmental sciences, as well as the various health disciplines such as medicine, dentistry, pharmacy, and veterinary medicine. The addition of advanced major elective lecture and lab courses in chemistry, biology, microbiology, physiology, or bioengineering allow students to gain exposure to the cutting edge of theory and techniques in these specialized fields of particular relevance in the COVID-era.

At UH Mānoa, conceptually related degree programs in Molecular Cell Biology (BS MCB, CNS) and Molecular Bioscience and Biotechnology (BS MBB, CTAHR) exist, but there is no significant overlap as the Biochemistry curriculum requires significantly more Chemistry/Math/Physics courses and fewer courses in the biological sciences. The Biochemistry program within CNS remains a popular degree choice for students and is vital for attracting STEM students. Average enrollment has consistently been between 150-170 students in the last five years indicating considerable demand among students for training in Biochemistry with an emphasis on the fundamental chemical, as opposed to biological, principles. For comparison, related BS degrees in Molecular and Cell Biology and Molecular Bioscience and Biotechnology that approach some of the same questions from a biological perspective, have averaged 63 and 41 majors since AY2015.

Since our provisional status was approved, the U.H. Hilo Chemistry Department recently introduced a Biosciences Track within their BS in Chemistry Degree. This track takes a similar approach of combining courses from the traditional chemistry curriculum with a selection of biology courses. As such, it serves a similar purpose of preparing students for admission to health-related professional schools. However, due to the broader scientific expertise within the UH Mānoa faculty, our campus can offer a more diverse range of advanced science courses and advanced laboratory courses that are included in the biochemistry curriculum as major elective courses. Failure to continue to offer the degree would place UH Mānoa in a unique situation, relative to our peer and benchmark institutions, of being the only R1 institution that does not offer an undergraduate biochemistry degree.

Assessment of program's ability to meet proposed enrollments, completions, operating and instructional resource and facility needs:

Average enrollment has consistently been between 150-170 students in the last five years indicating considerable demand among students for training in Biochemistry with an emphasis on the fundamental chemical, as opposed to biological, principles. For comparison, related BS degrees in

Randolph G Moore February 16, 2022 Page 3

Molecular and Cell Biology and Molecular Bioscience and Biotechnology that approach some of the same questions from a biological perspective, have averaged 63 and 41 majors since AY2015.

As outlined in the proposal, the Biochemistry Degree Program has successfully met these goals. We have \sim 140 graduates in the past six years. Many of our top graduates have been awarded admission to and attended outstanding graduate and professional schools, including the John A. Burns School of Medicine and the Daniel K. Inouye College of Pharmacy. Program enrollment has been consistently >160 students per year over the last six years, with an average time to degree of 3.67 years.

The program is highly efficient and cost-effective because it primarily uses existing courses required by Chemistry majors and courses offered by other units on campus. The estimated tuition revenue is \sim \$1.7M, with an average annual cost of \sim \$0.5M.

ACTION RECOMMENDED:

It is respectfully recommended that the Board of Regents grant established status to the BACHELOR OF ARTS IN BIOCHEMISTRY and BACHELOR OF SCIENCE IN BIOCHEMISTRY degrees in the COLLEGE OF NATURAL SCIENCES at the University of Hawai'i at Manoa.

Attachment: Proposal for Provisional to Established Status for Biochemistry, Approved Provisional Status for BA and BS in Biochemistry

cc: Executive Administrator and Secretary of the Board Kendra Oishi

Provisional to Established Status Proposal

Bachelor of Arts (B.A.) Degree in Biochemistry

Bachelor of Science (B.S.) Degree in Biochemistry

Department of Chemistry College of Natural Sciences University of Hawai'i at Mānoa

January 2022

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1. Executive Summary

The Biochemistry Degree Program is organized within the Department of Chemistry to provide a broad education in cross-disciplinary topics that lie at the interface of chemistry and the life sciences, leading to a Bachelor of Arts in Biochemistry or Bachelor of Science in Biochemistry. The courses leading to these degrees prepare students for careers in fields where a core understanding of the chemistry of biological processes is essential. Examples include scientific disciplines such as medicinal and pharmaceutical biochemistry and chemistry. chemistry. biotechnology, biomedical sciences, and environmental sciences, as well as the various health disciplines such as medicine, dentistry, pharmacy, and veterinary medicine.

The Biochemistry Degree Program has successfully met these goals, with *ca.* 140 graduates in the past six years. Many of our top graduates have been awarded admission to and attended outstanding graduate and professional schools, including the John A Burns School of Medicine and the Daniel K. Inouye College of Pharmacy.

In this report, we outline the current organization of the program, demonstrate the success of the provisional program, and petition for approval as an established program.

2. Alignment of the Program with the Mission and Strategic Planning of the Campus and University System

Relationship to the University Mission and Strategic Plans

The Biochemistry Program within the Department of Chemistry provides a broad education in applying chemical principles to biological topics, leading to the degrees of Bachelor of Arts or Bachelor of Science in Biochemistry. The curriculum is designed to provide students with the foundational understanding of chemistry, physics, and biology that is required for admission to graduate school in a variety of STEM disciplines, for admission to professional schools in a variety of health-related disciplines, and to enter the workforce in a variety of STEM-related occupations. In addition, the addition of advanced major elective lecture and lab courses in chemistry, biology, microbiology, physiology, or bioengineering allow students to gain exposure to the cutting edge of theory and techniques in these specialized fields of particular relevance in the COVID-era.

The UH Mānoa strategic plan¹ includes a focus on "Enhancing Student Success" and "Excellence in Research," both are areas to which the Biochemistry Program

¹ 2015-2025 Strategic Plan: https://manoa.hawaii.edu/wp/wp-content/uploads/2020/12/manoa-2025-strategic-plan.pdf

contributes. The faculty and advisors within the Biochemistry Program have demonstrated that we can guide students through a complex, academically rigorous curriculum with high graduation rates (~60% of students graduate with a biochemistry degree, ~80% overall graduate with a degree), and ~65% of students graduating with a biochemistry degree have a GPA > 3.0, allowing them to be competitive for admission to graduate and professional schools. In terms of our support for the research enterprise, many of our students participate in undergraduate research. Many students eventually choose to continue their scientific education as graduate students in various departments at UH Mānoa, JABSOM, or at top-ranked mainland universities. The training these students receive through the Biochemistry Program prepares them to succeed in their future research endeavors at UH.

The State of Hawai'i faces shortages of healthcare workers at all levels, including doctors, nurses, physician's assistants, and pharmacists. The Biochemistry Program provides a foundational education that allows our graduates to gain admission to professional schools in these disciplines and excel in fields related to Biochemistry once they have completed their education. We have numerous examples of graduates who have attended JABSOM to earn their M.D. and become practicing doctors, attended the UH Mānoa School of Nursing, and now work caring for others in our community, or attended UH Hilo School of Pharmacy and become pharmacists safely providing prescription medications and vaccines throughout our state.

The biochemistry degree program also aligns with UHM's goals of becoming a Native Hawaiian Place of Learning. During this period, three Native Hawaiian APTs and two Native Hawaiian lecturers were hired within the department to support this program. After developing his skills as a teacher at UHM, one lecturer went on to become faculty at another campus with the UH system. The other lecturer was hired to teach classes in collaboration with the Native Hawaiian Student Services program on campus in 2017 and 2018 to facilitate Native Hawaiian student success. Those efforts lead to a wonderful summer course in which students learned about the chemistry of the oceans and took a field trip to a surfboard factory to actively learn about the complex chemistry that unpins both, helping students realize how chemistry is an important aspect of their kuleana to Hawaii and aloha 'āina. Tenure track faculty within the program are also engaged with the community and integrate place-based concepts in the undergraduate classes and grants to provide a more enriching experience and additional opportunities for students. Both junior faculty in the program currently have NSF CAREER awards with strong place-based initiatives. For example, one initiative funded by the NSF involves partnering with the Bernice Pauahi Bishop Museum to develop an exhibit entitled "Knots in Hawaiian and Polynesian Culture." Content from this exhibit is then brought back into the classroom to illustrate how knots that were traditionally used in Hawaii can provide insights into the 3D structure of folded proteins. Biochemistry also is strongly connected to the goals of malama 'aina. Many of the pressing problems in sustainability have solutions in biochemistry, whether that is the degradation of waste products or environmentally friendly ways to mitigate our dependence on fossil fuels. Students within the biochemistry program get to participate in research projects trying to solve these types of problems. Faculty and students within the department are also involved in an effort to understand our local environment through studying the chemical produced by Hawaii's marine organisms and our participation in the Integrative Center for Environmental Microbiomes and Human Health focused on microbiome research in the Hawaiian Islands.

Uniqueness of the Biochemistry Program within the U.H. System and Evidence of Continuing Need of the Program

Our recent analysis of peer and benchmark universities showed that all of these institutions offered an undergraduate biochemistry degree through either biochemistry, chemistry, biology, or agriculture department. When the Biochemistry Program was implemented as a provisional program, it was the only program to offer undergraduate degrees in biochemistry within the UH system, and this remains the case today. At UH Mānoa, conceptually related degrees in Molecular Biology exist, but as pointed out by the CMB Department Chair in our provisional application in 2012, there is no significant overlap as our "curriculum requires significantly more Chemistry/Math/Physics courses and less Biology/Microbiology courses than their program." These facts remain true. Since our provisional status was approved, the UH Hilo Chemistry Department has recently introduced a Biosciences Track within the B.S. in Chemistry Degree. This track takes a similar approach of combining courses from the traditional chemistry curriculum with a selection of biology courses. As such, it serves a similar purpose of preparing students for admission to healthrelated professional schools. However, due to the broader scientific expertise within the UH Mānoa faculty, our campus can offer a more diverse range of advanced science courses and advanced laboratory courses that are included in the biochemistry curriculum as major elective courses. By successfully completing these courses, students are better prepared to excel in graduate school in the various STEM disciplines or begin STEM-related careers. Average enrollment has consistently been between 150-170 students in the last five years indicating considerable demand among students for training in Biochemistry with an emphasis on the fundamental chemical, as opposed to biological, prinicples. For comparison, related BS degrees in Molecular and Cell Biology and Molecular Bioscience and Biotechnology that approach some of the same questions from a biological perspective, have averaged 63 and 41 majors since AY2015.

3. Program enrollment and Graduation

Program Enrollment

The Biochemistry Program began in Fall 2012 with eight existing UHM students that changed their majors from Chemistry and Biology. It quickly grew as entering firstyear students discovered the new degree options. The current major has stabilized at approximately 160 total students, with around 40 entering students declaring as biochemistry majors each year One initial concern during the development of the program was that the biochemistry major would drain students away from the chemistry major, resulting in no net gain in students for the Chemistry Department. There was an initial loss of enrollment in the chemistry major – a decrease from ~130 students before AY14 to ~80 students in AY19. However, growth in the biochemistry major to ~160 total students resulted in a net increase of ~90 undergraduate majors in the Chemistry Department. This increase is a little lower than our initial projections but consistent with response rates from surveys taken in GenChem, which predicted approximately 40/year as mentioned in the proposal for provisional approval.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Current Year
Projected Enrollment	45	90	130	165	185	195	195	195	195	195
Actual Enrollment	13	71	112	153	166	183	186	157	163	163

Course Enrollment

Three new courses, CHEM 361, 462, & 462L, were introduced for the Biochemistry Program (CHEM 361 was recently renumbered to 461). One course, CHEM 372, was modified from an elective course for the chemistry degree to a core course for the biochemistry curriculum. The enrollment of these courses has remained relatively constant over the last five years (AY2015 – AY2020 average shown):

	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	AVG
CHEM 361	9	11	13	37	33	31	34	28	33
CHEM 372	22	26	38	37	40	45	34	38	39
CHEM 462		5	12	18	22	13	13	19	17
CHEM 462L		4	5	20	20	13	18	17	18

Program Completion

The average number of graduates from the program has stabilized at approximately 28 students per year. As this was not estimated in the provisional proposal, a direct comparison with initial estimates is impossible. Entering and transfer students are often encouraged to enroll initially in the B.S. degree, as the increased requirements for advanced courses will generally prepare the students for a broader range of advanced education and career options. The B.A. degree remains a popular option for students specifically interested in pharmacy school or for students who fall behind the recommended 4-year plan and wish to graduate in a shorter amount of time.

	Year								
	1	2	3	4	5	6	7	8	9
Annual Program Completion	0	5	9	22	28	27	29	18	29

The annual average number of graduates (25 students) seems low compared to the

average number of students in the program (150 students), suggesting either attrition from the program or a long time to completion for the degree. Analysis of the persistence of entering students in the Fall 2015 cohort suggests the former accounts for this disparity. Of the entering students that declared as biochemistry majors in Fall 2015, only 72.3% remained in the degree program in Fall 2016. However, 13.5% of the students that left the biochemistry major remained at UHM in other degree programs, while 13.4% left UHM entirely.

	End of 1 YR	End of 2 YR (Cumulative)	End of 3 YR (Cumulative)	End of 4 YR (Cumulative)	End of 5 YR (Cumulative)
Fall 2015 BA/BS Biochem Cohort Remaining in Major	72.3%	67.8%	61.9%	61.1%	60.3%
Transferred to Another CNS major	4.0%	8.7%	9.5%	7.9%	7.9%
Transferred to Another UHM major	9.5%	9.5%	11.1%	11.9%	10.3%
Left UHM	13.4%	16.7%	16.7%	18.3%	20.7%

Persistence after five years primarily reflects the percentage of entering students that graduate with a degree. Of the entering students declared as biochemistry majors in Fall 2015, 60% persisted in the major after five years and likely received a biochemistry degree, while an additional 19% persisted in CNS or received another degree from UHM. Reasons for attrition of our students are currently being assessed with the goal of trying to develop targeted interventions.

The 5-year attrition rate for entering students who declare as biochemistry majors is 20.7%, close to the 5-year attrition rate for all entering UHM students in the 2015 cohort of 19.7%.

The median time-to-degree for entering students in the biochemistry program is 3.66 years, while the mean time-to-degree is 4.22 years, which compares very favorably with the overall UHM time-to-degree of 4.33 years (median) and 4.61 years (mean). The disparity between median and mean times reflects a small number of students that take 5-8 years to graduate. Major advisors comment that these long graduation delays are usually due to personal reasons and do not reflect any identifiable bottlenecks in the program.

Another reason for our lower median time-to-degree is the ease at which students can transfer courses taken at other UH campuses or mainland schools. The content required in the first two years of the major (Chemistry, Biology, Math, and Physics) is somewhat standardized across the United States making transfer straightforward if a student has completed the entire series at another school. Credit for upper division transfer courses is also relatively common as well given the wide range of electives our majors are allowed to use to fulfill major requirements.

4. The Instructional Resources Required for the Program and their Utilization Compared with Anticipated Resources.

Many factors complicate the analysis of the instructional resources needed for the biochemistry program. These factors include the fact that faculty who teach classes required for our Biochemistry major also teach large service classes at the 100-level, that our biochemistry majors are required to complete courses also required by CHEM majors, and that the major uses classes taught by other units to fulfill Upper Division Major degree requirements. Calculating accurate metrics like costs is exceedingly difficult as the required data is not directly available to the department, e.g., the fraction of biochemistry majors in other units' classes, instructor salaries, etc. We have made our best attempt to estimate both cost and revenue below.

Instructional Resources

The provisional application indicated that the Biochemistry program would need four faculty, three of whom were already CHEM faculty and one new hire. Currently, we have only three faculty supporting the biochemistry program directly. During the review period, two of the three original faculty members departed UHM to accept positions on the mainland, primarily due to offers of enhanced research facilities and opportunities. After they departed (2014), we used a temporary instructor on a two-year contract to cover the teaching load. We are, therefore, currently operating the program with one fewer faculty member than anticipated. While the program can be sustained at this level, the eventual hiring of a fourth tenure-track faculty member for the program would allow for the existing faculty more opportunity to contribute to the teaching of our service and graduate courses while also allowing us to develop an additional upper-division course focused on more recent developments in the field.

Revenue

Given the caveats above, we have calculated tuition revenue in two ways. The first is calculated using only enrollment numbers for only Chem 361, 462, and 462L, as these are the only new classes created as part of the biochemistry program. A percredit cost of \$471/credit (AY2021) is used each year for consistency, yielding ~\$30K per year in revenue. A second approach that perhaps provides a more realistic picture of the revenue generated by the program is obtained by assuming all majors are full-time students. At \$5652 tuition per semester for full-time residents, this latter method estimates ~\$1.7M in revenue for the last four years. Lab fees for our 400-level advanced biochemistry lab were approved recently, which should generate an extra \$3000 in revenue per year starting in Fall 2022

Instructional Revenue	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Projected	522K	722K	812K	815K	872K	933K	NA	NA	NA
Combined Tuition	4K	9K	12K	35K	35K	26K	29K	30K	29K
Full Resident Tuition based on # majors	90K	542K	1,017K	1,401K	1,548K	1,729K	1,786K	1,616K	1,729K

Costs

The primary costs directly attributable to the program are salaries and benefits for three existing full-time tenure-track faculty (two I3 and one I5) and two one-semester TA positions (25% FTE each). Figures for AY20 are based on current salaries and benefits rates, while prior years represent estimates based on scheduled pay increases and benefits rates. In addition, the biochemistry lab course accounts for *ca.* \$20,000 per year in lab supply and equipment costs paid from the Chemistry Department's operating budget. Project expenses for the 5th and 6th in the original provisional application are shown and slightly lower than actual operating expenses. Operating costs range between \$130-150 per SSH during the last four years. This is a high-end estimate as biochemistry faculty are also teaching service classes and/or courses required as part of the existing CHEM major. We have not factored this consideration into the cost estimates to be consistent with the original proposal.

	Year 5	Year 6	Year 7	Year 8	Year 9
Faculty Salaries + Benefits	\$431,000	\$449,000	\$461,000	\$477,000	\$493,907
Grad Student GA Salary + Benefits	\$19,940	\$19,940	\$19,940	\$20,734	\$21,567
Total Salary & Benefits Costs	\$450,940	\$468,940	\$480,940	\$497,734	\$515,474
Projected	\$355, 065	\$365, 718	NA	NA	NA
SSH	2976	3288	3672	3792	3432
Cost per SSH	\$151.53	\$142.62	\$130.97	\$131.26	\$150.20

Space Resources

The program required the renovation of two rooms of Bilger Hall to create a new dedicated biochemistry lab space with an adjoining general use classroom. The space consists of a dedicated biochemistry lab space with room for up to 24 students, a shared instrumentation and equipment room that will also be used for undergraduate and graduate student research, and an attached general use classroom with a capacity of up to 24 students. The renovation was begun in 2015.

In Fall 2021, about a month before the department was to take possession, the new lab was badly flooded during heavy rains. At the time, that section of Bilger Hall was being re-roofed. The resulting damage delayed use of the rooms until Spring 2022. While the space is not completely restored yet, repainting has been delayed due to COVID-related supply chain issues, we began utilizing the lecture hall for classes this semester and in mid-March began teaching our advanced biochemistry lab in this beautiful new lab space.

Going forward we anticipate this classroom and lab will be used primarily for the Advanced Biochemistry Lecture and Lab courses during the spring semester. In addition, the lecture room is well suited for general chemistry recitations or upperdivision lectures throughout the year. We also anticipate using the teaching lab as swing space when renovations of our general chemistry labs begin next year, while the shared instrumentation and equipment room will be used year-round. At this time, we anticipate this new space will be sufficient for our current and future teaching needs (5-10 yrs) for the biochemistry program.

5. Is the Program Organized to Meet its Objectives?

The overarching objective of the Biochemistry Degree Program is to provide a broad scientific education guided by the application of chemical principles to the biological sciences. This educational foundation is intended to prepare students for careers in the sciences and the various health disciplines.

To fulfill this objective, the courses chosen for the degree programs include foundational courses specifically required for admission to medical and pharmacy schools and advanced courses that prepare students for graduate school or direct entry into careers in the sciences. In addition, we have provided significant flexibility for students to tailor their degree towards specific biological sciences by incorporating a selection of upper-division major elective courses in the degree path.

The program is meeting its learning objectives. The program objectives are fulfilled by incorporating several specific learning objectives into courses required for both degrees. For example, one of the learning objectives is to "...demonstrate a qualitative and quantitative understanding of biomolecular structure and reactivity...." These concepts are initially taught in Organic Chemistry (CHEM 272 & 273), are reinforced in Bioorganic Chemistry and Physical Biochemistry (Chem 372 & 361), and are then taken to an advanced level of understanding in Principle of Biochemistry (BIOL 402) and Advanced Biochemistry (CHEM 462). In this way, we can reinforce complex concepts through repetition at increasingly sophisticated levels and demonstrate how these concepts influence modern scientific research and the practical applications in biotechnology and medicine.

The program is also aligned with campus and system goals. At both the systemand campus-level, a significant focus is on enhancing student success (UH Graduation Initiative, UHM Enhancing Student Success), excellence in research (UH Hawai'i Innovation Initiative and UHM Excellence in Research), and UH's Native Hawaiian Place of Learning strategic focus area. In addition, through faculty hires and other collaborative efforts, we have increased our research impact throughout the Manoa campus. For example, one of the biochemistry faculty is involved in research endeavors related to material science, an area of priority for the campus. Faculty within the program are engaged with the community and integrate place-based concepts in the undergraduate classes and grants to provide a more enriching experience and additional opportunities for students. For example, one initiative funded by the NSF involves partnering with the Bernice Pauahi Bishop Museum to develop an exhibit entitled "Knots in Hawaiian and Polynesian Culture." Content from this exhibit is then brought back into the classroom to illustrate key relationships between biochemistry and Hawaiian Culture. Biochemistry also is strongly connected to the goals of sustainability. Many of the pressing problems in sustainability have solutions in biochemistry, whether that is the degradation of waste products, environmentally friendly ways to mitigate our dependence on fossil fuels, or to understand their fate and persistence in the environment. The degree

uniquely prepares students to tackle these sorts of problems. In addition, we have increased the number of STEM degree holders within the state and developed a degree that is well suited for undergraduates bound for the Daniel K. Inouye College of Pharmacy and the John A. Burn School of Medicine.

Program Modifications

The primary changes to the approved program have been a slight adjustment to the order of courses and some additions to the approved major elective courses.

Two significant changes to the suggested order of courses, as provided to students in the 4-year plan, have been approved:

- Students have been given some flexibility to take Introductory Biochemistry (BIOL 402) at any point during the third or fourth year. This change was necessitated by the addition of biochemistry topics to the Medical College Admission Test (MCAT), necessitating that students to take a biochemistry course prior to taking this exam, which many premed students choose to take in the Spring or early Summer of the third year.
- Physical Biochemistry (CHEM 361) has been renumbered to CHEM 461 and is now offered in the Fall semester of the fourth year. This change was necessitated by the addition of a prerequisite requirement that students complete two semesters of both calculus and physics before taking physical biochemistry. Entering students who require remedial math courses often do not fulfill this prerequisite requirement until the third year.
- The capstone biochemistry laboratory was renumbered Chem 462L from its original Chem 463L, and is now offered concurrently with the lecture course rather than one semester later.

The degree requirements rely heavily on major elective courses offered by the life science departments to complete the advanced training in more specialized areas. The Biology Department canceled one course during a reorganization of its curriculum, the MBBE department canceled one course in the original proposal due to the lack of a suitable instructor, and four courses have been added to allow more flexibility for students to follow their particular interests:

Canceled:	MBBE 480 – Integrative Genomics & Biotechnology
	BIOL 406 – Cellular Biology

Added: PHYL 301, 301L, 302, 302L – Adv. Anatomy and Physiology & Lab

Program Advising

The Biochemistry Degree Program requires that students submit a curriculum plan every semester that is then reviewed by a major advisor. If the advisor has relevant questions or advice, the student is required to meet with the advisor prior to registration. We work with the College of Natural Sciences Student Academic Success Center to divide up the advising workload as follows:

- Freshman and incoming new students: CNS SASC
- Sophomores: Chemistry Department Academic Support (Mr. Kelly Ching)
- Juniors & Seniors: Major advisors (currently Profs. Jarrett and Sun)
- Transfer students: CNS SASC and Prof. Jarrett
- Graduation and degree certification: CNS SASC and Prof. Jarrett

Students are able to access a description of the degree requirements through several sources, including:

- Chemistry Department website (<u>http://manoa.hawaii.edu/chem/academics/undergraduate/</u>)
- UH Mānoa Catalog (<u>https://manoa.hawaii.edu/catalog/schools-</u> <u>colleges/arts-sciences/nat-sci/chem/</u>)
- Program sheets and academic plan templates (OVCAA) (<u>http://www.manoa.hawaii.edu/ovcaa/programsheets/</u>)

6. Evidence of Student Learning and Student and Program success.

Concrete evidence that we are meeting the cognitive learning objectives for the program includes assessments on a standardized exam where our majors scored an average of 10% higher than the national average. The completion rate for degrees in the department is 56%, which is the highest in CNS and higher than the UHM average of 46%. The overall median time to degree is 3.67 years. Both statistics demonstrate the effective organization of the program. In addition, year-to-year retention is above 80%, reflecting student satisfaction with the program.

Assessment Activities

American Chemical Society Biochemistry Exam

Students in CHEM 462 (capstone course for the B.S. in Biochemistry major) must take the ACS Biochemistry Exam, a 60-question multiple-choice standardized test designed to be used as a graduation learning assessment tool or a graduate school entrance exam. The mean score on the exam from AY16 to AY20 was 68%. In comparison, the national mean as reported by ACS was 56.7%, suggesting our students, on the whole, have learned a significant amount of what is considered the foundation content of biochemistry.

A closer inspection of questions with a high incorrect response rate indicates the following areas are not covered well in the current curriculum: lipid and membrane biochemistry and nucleic acid biochemistry. These areas will be further addressed with new courses once additional faculty positions become available.

CNS Student Academic Success Center Exit Surveys

The College of Natural Sciences Student Academic Success Center coordinates

applications for graduation by all biochemistry majors. The following responses correspond to 27 students that filled out the survey from Fall 2016 through Fall 2018 semesters. There were approximately 35 graduates during this time period, so the response rate is 77%.

- What are your plans after graduation:
 - Professional school: 52%
 - Graduate school: 22%
 - Employment or other: 26%
- If you are continuing your education, what type of program:
 - o M.D. 25%
 - Pharm.D. 45%
 - M.S. or Ph.D. 20%
 - Other 10%
- What aspects of the program could be improved: (top 2 responses)
 - More class availability
 - Broader selection of course offerings
- What did you like most about the program:
 - Faculty
 - Courses
- What did you like least about the program:
 - Class availability
 - Equipment (broken, old, damaged, etc.)
- What other type of support could the program have provided:
 - More graduate school information
 - Improved academic advising
 - More career and internship information

Biochemistry Program Alumni Survey

A survey of former graduates was conducted via email link to an anonymous online survey in October 2020. Out of 134 graduates, 31 alumni responded to the survey, for a response rate of 23%.

The following questions reflect the immediate continuing education of the respondents:

- Continuing education. Did you enroll in or have you been accepted to:
 - A Medical Professional School: 14 (45%)
 - Graduate School: 8 (26%)
 - Neither: 9 (29%)
- If you went on to a medical professional school, was it:
 - Medical School: 5
 - Pharmacy School: 5
 - Dental School: 2
 - o Other: 2

- If you are enrolled or accepted to a Graduate or Professional School, where is the school located?
 - Hawai'i: 10
 - o U.S. Mainland: 12
- If you are employed, what type of position:
 - Pharmacy technician Diagnostics lab
 - Lab technician
- Firefighter

5. Appendix

BA and BS in Biochemistry Curriculum

The Biochemistry Degree Program meets the program objectives and learning objectives through the following course requirements:

Foundational Courses

CHEM 161 & 161L – General Chemistry I & Lab^{b,c} CHEM 162 & 162L – General Chemistry II & Lab^{b,c} BIOL 171 & 171L – Introduction to Biology I & Lab^{b,c} BIOL 172 & 172L – Introduction to Biology II & Lab^{b,c} MATH 241 – Calculus I^c MATH 242 – Calculus II PHYS 170 & 170L – General Physics I & Lab^b PHYS 272 & 272L – General Physics II & Lab^b

Core Courses

CHEM 272 & 272L – Organic Chemistry I & Lab^{b,c}

CHEM 273 & 273L – Organic Chemistry II & Lab^{b,c}

CHEM 274 & 274L – Analytical Chemistry II & Lab

BIOL 275 & 275L – Cell and Molecular Biology & Lab

CHEM 372 - Bioorganic Chemistry

CHEM 361 – Physical Biochemistry

BIOL 402 – Principles of Biochemistry^b

CHEM 462 & 462L – Advanced Biochemistry & Laba

Elective Courses

{Students must choose at least 11 credits (BA) or 16 credits (BS) of upper-division elective courses including a combination of lecture and lab courses}

BIOL 375 & 375L – Genetics & Genetics Lab

BIOL 401 – Molecular Biotechnology

BIOL 407 - Molecular Cell Biology I

BIOL 408 – Molecular Cell Biology II

BIOL 483 – Bioinformatics

CHEM 399 or 399L – Directed Reading or Directed Research

CHEM 425 & 425L – Synthesis and Analysis of Inorganic Compounds & Lab

CHEM 427 – Advanced Inorganic Chemistry

CHEM 445 & 445L – Synthesis and Analysis of Organic Compounds & Lab

MICR 351 & 351L - Biology of Microorganisms & Lab§

MICR 431 & 431L – Microbial Physiology & Lab

MICR 461 & 461L - Immunology & Lab

MICR 463 & 463L – Microbiology of Pathogens & Lab

MICR 475 & 475L – Bacterial Genetics & Lab

MICR 490 & 490L – Virology & Lab

PHYL 301 & 301L – Advanced Anatomy and Physiology & Lab PHYL 302 & 302L – Advanced Anatomy and Physiology & Lab ZOOL 430 & 430L – Animal Physiology & Lab ZOOL 442 – Introduction to Neuroscience

^aRequired for the BS degree only ^bRequired course for admission to medical school ^cRequired course for admission to pharmacy school

Undergraduate Research

Students are encouraged to participate in laboratory research in any STEM department at UH Mānoa. Students in the Honors Program are given major elective credit for completion of HON 496. In departments that have a course designation for research (e.g., MICR 499, MBBE 499, etc.), students are given credit towards the major elective requirements using this course designation. In departments without a course designation for research (e.g., the CMB Department at JABSOM), students are given credit for CHEM 399 or 399L through a co-mentorship agreement between the research mentor and one of the chemistry department faculty.

Capstone Experience

Advanced Biochemistry (Chem 462) and Advanced Biochemistry Lab (Chem 462L) serve as a capstone experience for the B.S. in Biochemistry degree. Advanced Biochemistry is a lecture and discussion class in which cutting-edge research topics are discussed and analyzed, using both current textbooks and literature articles as resources for exploring cutting-edge topics in human biochemistry. For example, a recent offering of the course included 4-week modules on the use of CRISPR for gene editing, protein (mis)folding diseases such as Alzheimer's disease, and problems with insulin regulation in type II diabetes. The corresponding lab course includes instruction in modern lab techniques and is taught in a research project format, where students work in teams to purify and characterize a new protein or enzyme given only previously published literature protocols. In both courses, students write research proposals and research reports that are similar to those written by professional scientists.

DTS 22935

Office of the Dean College of Arts, Languages & Letters

April 12, 2022

	UNIVERSITY of HAWAI'I*
the state of the	Mānoa

MEMORANDUM

UNIVERSITY OF HAWAII BOARD OF REGENTS

APR 27 A9:19

Randolph G. Moore To: Chair, Board of Regents Ernest Wilson VIA: Chair, BOR Committee on Academic and Student Affairs David Lassner David Laur VIA: President VIA: Debora Halbert Vice President for Academic Strategy, UH System VIA: Michael Bruno (F. Gmr for Michael Bruno Provost VIA: Laura E. Lyons Interim Vice Provost for Academic Excellence Pet and Peter Arnade VIA: Dean, College of Arts, Languages & Letters Alexander Mawyer FROM: Acting Chair, Department of Pacific Islands Studies

22

SUBJECT: REQUEST FOR ESTABLISHED STATUS FOR THE BA IN PACIFIC ISLANDS STUDIES AT THE UNIVERSITY OF HAWAI'I AT MANOA

SPECIFIC ACTION REQUESTED:

It is respectfully requested that the Board of Regents grant established status to the BACHELOR OF ARTS IN PACIFIC ISLANDS STUDIES in the COLLEGE OF ARTS, LANGUAGES & LETTERS at the University of Hawai'i at Manoa.

RECOMMENDED EFFECTIVE DATE: Upon approval.

ADDITIONAL COST: None.

PURPOSE:

The BA in Pacific Islands Studies was approved for provisional status in 2010. After two extensions the program is prepared to submit a request for established status.

BACKGROUND:

Since the establishment of the Pacific Islands Studies program in 1950, the University of Hawai'i at Mānoa (UHM) has been the leader for higher education within and about the Pacific Islands region.

1

Reorganized as the Center for Pacific Islands Studies in the 1970s around an MA degree program, this unit has long been recognized as the premier program for Pacific area studies nationally and internationally, and

as a home for initiatives bringing together people and resources to promote an understanding of the Pacific Islands and Islanders. Advancing these foundations, the BA program in Pacific Studies offers innovative regional, comparative, and interdisciplinary instruction. By providing integrating expertise from community-specific to regional scale, this program complements and enhances the undergraduate expertise and professional training offered within UHM's discipline-focused departments, supports student preparation toward meeting contemporary regional challenges, and advances critical workforce needs within Hawai'i, the U.S., and beyond.

Granted provisional status in 2010, in response to student demand, particularly from underserved minority students enrolled in PACS 108 sections in the prior period, alongside state and national needs for individuals knowledgeable about Pacific Islander communities in the U.S. and in home(is)lands across Oceania, the BA in Pacific Studies has been designed to complement and address imperatives in UHM strategic plans. Particularly it enhances UHM's place within the Pacific region and role as a Native Hawaiian place of learning—noting that the islands of Hawai'i are "Pacific Islands" with broad and deep, past and present, relations to neighbors across Oceania. Nurturing and maintaining such relationships in domains as diverse as government, conservation, or business, requires material knowledge about those communities and their sociocultural contexts, political histories, and economic dynamics. The value of this BA's community-centered and community-engaged approach was freshly illuminated when one of its core courses was uniquely called out by name in the fall 2021 WASC Accreditation Report, "The institution provided many opportunities for students to connect their in-class learning to communities and industry at the undergraduate and graduate levels. One example is the Pacific Communities in Hawai'i course [PACS 301] that listed explicit learning outcomes and included a service-learning component that required a minimum of 15 contact hours within the community" (13).

If anything, the need for this BA is greater than ever. Critically, historically marginalized and nationally underserved minorities attending the University of Hawai'i include Pacific Islander students of diverse heritage. Today, there are over 20 non-Hawaiian Pacific Islander communities in Hawai'i with astonishing population growth. For instance, between 2000 and 2010 the Chuukese community grew by 544% and the Solomon Islander community by 388% (Kosraean, 301%; Marshallese, 237%; Pohnpeian, 194%; Guamanian or Chamorro, 60%; Tongan, 55%; Samoan, 38%). As the 2020 Census comes into view, it seems clear that these demographic trends continue. The Pacific Studies BA is a critical opportunity for UHM and for UH to meet the needs of this fast-growing student community.

Equally importantly, the Pacific Islands are of global importance in terms of geopolitical security, climate change, migration, sustainability, and the development of Blue Economies, among other critical dynamics. As President Biden noted in 2021, "The United States is a proud Pacific power and will continue to be an active, engaged partner in the region ... [because] a free and open Indo-Pacific is vital to each of our nations' security and prosperity and to all our shared futures." Pacific Islands are vital to the strategic interests of both the U.S. and state of Hawai'i. The BA is well positioned to provide expertise towards pressing challenges and opportunities confronting Oceania and its islands and peoples not found within the traditional disciplines by offering regional scale and interdisciplinary perspectives, often in close conversation with rare empirical, expert knowledge of the sociopolitical, historical, and cultural contexts of diverse Pacific Islands countries, territories, and states which will be critical towards success in any of the areas mentioned above. The BA is thus aligned with and supports the strategic mission, educational equity and workforce development of State via faculty development of new courses in recent AY such as *China in the Pacific* and *Natural Resources and Economic Development in Oceania* alongside a BAM 4+1 pathway for high-quality BAs into the MA program, implemented in AY 2021-22.

While a small program, the Pacific Studies BA hits above its weight across UHM/UH institutional goals. Approximately 85% of Pacific Studies majors are underserved minorities. Most are transfer students from the UH system using articulation pathways from MSI CCs in place among 6 campuses since 2015. At the same time, undergraduate, graduate, and professional students from many departments take courses established to serve this BA to ground valuable empirical knowledge of this vast, globally significant region. With the introduction of the BA, the number of regularly offered undergraduate CPIS courses expanded from 3 in 2007–08 to 12 in 2020-21, with 16 declared majors in Fall 2021. Though the BA remains a small program which has not yet met its ten new majors/year benchmark goal from the original proposal, further growth expected as the PI student body grows, and as faculty pivot with the refreshed U.S. and HI state interests in the region.

Since its inception, DPIS has graduated 44 majors, the vast majority of whom have gone on to noteworthy jobs or advanced study drawing directly on the regional and Pacific Studies expertise developed through the BA—including permanent positions at the Bishop Museum, 'Iolani Palace, HPD, HI DOH, HI DOE, and in government roles in home islands, among others. With the rapidly growing Pacific Islander student population, potential to infuse Pacific Studies expertise in the College of Arts, Languages & Letters, and contribute to advancing UHM as a Hawaiian place of learning acknowledging its place with Oceania, the BA will meet prior and generate new demand.

Establishing the Pacific Studies BA is cost neutral to UHM and UH. No additional resources are required to permanently establish this program. The small, committed and passionate, core-faculty of this BA are already established as a graduate faculty of a high-revenue relative to faculty-size generating unit through the valuable (approximately \$500,000/year) U.S. DOE Title VI National Resource Center successfully maintained since 1973, as well as U.S. National Science Foundation, and other significant grant funding. The establishment of this BA will materially and concretely demonstrate UH and UHM's commitment to Area Studies of and within this region and support the success of this faculty in maintaining and increasing extramural funding which advances UHM and UH national and regional impact, relevance, and reputation. Moreover, permanently establishing the Pacific Studies BA provides an anchor for critical expertise, fosters coordination between affiliates and faculty in diverse units, advances educational equity for some of our state's least served student communities via exceptional pathways between UH CCs and UHM, supports UHM's national and international reputation as an institution providing educational pathways not available anywhere else, and advances a wide range of 21st-century workforce needs, including health sciences, STEM, diplomacy, education, defense, economics, and information technology, by complementing and enhancing the work of our students within the traditional disciplines with islandcommunity-to-regional-scale expertise. By granting established status, UHM meets some of Hawai'i's fastest growing and least-served communities in their desire for critical scholarly recognition and educational equity and further advances strategic missions to develop our university as a Hawaiian place of learning noting traditional and contemporary genealogical, historical, and cultural ties between the Hawaiian Islands and communities across the region.

ACTION RECOMMENDED:

It is respectfully recommended that the Board of Regents grant established status to the BACHELOR OF ARTS IN PACIFIC ISLANDS STUDIES in the COLLEGE OF ARTS, LANGUAGES & LETTERS at the University of Hawai'i at Manoa.

Attachments: Proposal for Request for Established Status for the BA in Pacific Islands Studies; Provisional approval for the BA in Pacific Islands Studies

cc: Executive Administrator and Secretary of the Board Kendra Oishi

Provisional to Established Status Proposal

Bachelor of Arts (B.A) Degree in Pacific Islands Studies

Department of Pacific Islands Studies College of Arts, Languages and Letters University of Hawai'i at Manoa

March 2022



Request for Established Status Bachelor of Arts Degree in Pacific Islands Studies

> Department of Pacific Islands Studies College of Arts, Languages and Letters University of Hawai'i at Mānoa

1. EXECUTIVE SUMMARY

A special commitment to Pacific Islanders and their communities in Hawai'i and beyond. Since the establishment of the Pacific Islands Studies program in 1950, the University of Hawai'i has made a special commitment to the Pacific Islands region, its peoples, and their environment. Reorganized as the Center for Pacific Islands Studies (CPIS) in the 1970s, this unit has been the home for initiatives that bring together people and resources from across the University of Hawai'i, region, and nation to promote an understanding of the Pacific Islands and issues of concern to Pacific Islanders. This includes critical efforts to improve recruitment and retention rates among students of Pacific ancestry, an underserved population at UH Manoa. The ATP for the BA in Pacific Islands Studies was approved in 2009, and provisional status was approved in 2010. The degree was designed to respond to student demand¹ and meet the educational needs of underserved Pacific Islanders in the state of Hawai'i through rigorous coursework, intensive community engagements and collaborations, and exposure to broad regional issues across the Pacific Islands, which bear on the past, present, and future of Hawai'i and its peoples. In 2020, the BA program was reorganized along with the longestablished MA program into a new Department of Pacific Islands Studies (DPIS). The BA serves the UH system by anchoring seamless educational pathways between the community colleges and UHM, fostering professional and scholarly development for students engaged with the Pacific Islands region in collaboration with other disciplines, and contributing to the strategic mission of the College of Arts, Languages & Letters (CALL) to reinvigorate and enhance its focus on Asia and the Pacific, an area for which UH is internationally known.

2. ALIGNMENT OF PROGRAM WITH MISSION AND STRATEGIC PLANNING OF THE CAMPUS AND UNIVERSITY SYSTEM

"We need to focus particularly on those who have been under-represented and for whom higher education can make the greatest difference. Educational disparities are most evident for the economically disadvantaged, those who live in more rural areas, and those under-represented in higher education including Native Hawaiians, Filipinos and **Pacific Islanders**." (David Lassner, UH President)

¹ Surveys of students enrolled in PACS 108 in period preceding the provisional establishment of the PACS BA program indicated a strong interest in a BA or joint BA (27/70) in exemplar semesters, documented in the approved 2010 BA proposal, Appendix C.

The BA in Pacific Islands Studies directly addresses the pressing issues identified by President Lassner. It is well-aligned with and supports the strategic mission, and educational equity and workforce development goals of UHM, UH, and the State of Hawai'i, as well as the U.S. This program supports University goals designed to address the educational inequity for Pacific Islander communities and students, it complements and extends student development to other units and colleges across the university. By providing courses with an island-community centered, island-to-regional scale, and regional community perspectives and empirical grounding, the BA advances opportunities for all UH Mānoa students to develop the expertise needed to meet the pressing challenges and opportunities confronting Oceania not found within the traditional disciplines. This is done by offering regional scale and inter-disciplinary perspectives, often in close conversation with rare empirical, expert knowledge of the sociopolitical, historical, and cultural contexts of diverse Pacific Islands countries, territories, and states which will be critical towards success in any of the areas mentioned above. The program contributes to efforts to make Mānoa a native Hawaiian and Pacific Islands place of learning, as well as a model indigenous-serving institution in a variety of ways including:

- More than 80% of our majors are heritage students, and most are the first in their families to attend college. The program serves as a home for students from across the US affiliated Pacific Islands and beyond, who receive extensive mentoring as they navigate their educational journeys.
- The BA courses also serve as a point of critical support for Pacific Islander students who are not PACS majors but are seeking to complement their disciplinary training with empirical and expert knowledge about their heritage communities, past and contemporary regional dynamics, and Pacific Studies scholarship emerging in our partner institutions across the region including the University of Auckland, Australian National University, Victoria University of Wellington, University of Otago, University of Guam, and the University of the South Pacific, among others.
- Approximately 72% of general education students who take undergraduate PACS classes are Pacific Islanders, and 38% are Native Hawaiian or Part-Hawaiian. Having dedicated faculty with deep ties and expertise in the Pacific region acting as mentors to Pacific Islands heritage students is a critical strategy for addressing the educational equity gaps for Pacific Islanders in the state of Hawai'i.
- The recent UH Equity Leadership Acceleration Grant report to the Lumina and Rockefeller Foundations, demonstrated that between 2012 and 2017, the overall percentage of Pacific Islander students enrolling in higher education dropped in both the continental United States and in Hawai'i. This decline was far greater in Hawai'i (-39.4%) than on the US continent (-11.6%).
- Supports goals of the Department of Education and Department of State through the development of new courses such as *China in the Pacific* and *Natural Resources and Economic Development in Oceania*.

The University's support of this program, which is guided by world-class faculty with regional and area expertise who share a profound commitment to the education and professional development of our Pacific Islander students and beyond, shows our shared commitment to address these pervasive, historically-grounded educational inequities.

3. PROGRAM ENROLLMENT AND GRADUATION OF STUDENTS

Since 2013, the number of majors each year has ranged from 13 to 20 (see Table 1). As of fall 2021, DPIS has graduated 44 students with a BA in Pacific Islands Studies. While the degree is a 4-year program, the majority of PACS majors are transfer students from the UH system community colleges. We currently have six articulation agreements enabling seamless transfer pathways from the Community Colleges into the BA program. The program serves as a significant pathway for students between the MSI community colleges and UHM and is a significant contributor toward system level goals to advance the educational equity of historically underserved and minority students from this region. If approved, the BA will provide substantial opportunities to advance new and much needed articulation agreements with partner institutions across the Freely Associated States (RMI, FSM, and Palau, as well as with partners in Guam, the CNMI, and American Samoa. Moreover, the BA program has been and, if approved for permanent status, will continue to provide substantial benefits and service to non-majors through diversification (genes) options as well as focus options covering all the required focus requirements in a subject content area that profoundly serves to advance the University's commitment towards maintaining a Hawaiian place of learning which reflects Hawai'i's place within the broader Pacific Islands regions. For many years all PACS courses contained focus designations including lower and upper division Writing Intensive, Ethics, Oral Communication, and a significant University mission serving HAP (PACS 108: Introduction to Pacific Worlds).

	F12	F13	F14	F15	F16	F17	F18	F19	F20	F21
Projected	40	50*	60*	70*	N/A	N/A	N/A	N/A	N/A	N/A
Majors ²										
Actual	7	14	19	13	19	19	20	15	15	16
Majors ³										
Service to										
Non-majors ⁴	176	178	167	155	174	162	148	111	93	144
BA	1	1	1	10	4	6	5	9	35	3
Graduates										

TABLE 1: PACS BA PROGRAM ENROLLMENT & COMPLETION (FY 2012-FY 2021)

Pathways Toward Employment. One of the ways we attempt to prepare our students for employment is to provide internships. Between spring 2016 and spring 2018, we provided 10 semester-long internships (requiring 140 hours) at the following places: Hawaii Community Development

² Multiply documented by the authors of the original 2010 BA proposal, the F13, 14, 15 projected majors lines failed to account for the subtraction of 10 majors per year, the complement of the expected 10 new majors per year. Incorrectly inflated counts of projected majors in Table 1 are marked with an asterisk.

³ Our data strongly suggests that the decrease in majors since S20 reflects pandemic-related effects including 7 approved leaves of absence (LOAs) in the four semesters F20, S21, F21, and S22. We note 3 of the students with approved LOAs returned in Spring 2022 and anticipate further returns.

⁴ Number of non-majors who have benefited from PACS undergraduate courses which might not otherwise exist.

⁵ PI communities were among those most impacted by the 2020 covid pandemic, the program's students were not an exception, with over 85% of our majors as persons of regional heritage, graduate numbers in 2020 and 2021 may reflect unexpected impacts of pandemic.

Authority (HCDA), 'Iolani Palace, Fuetsan Famalao'an, Honolulu Museum of Art, UHM Hamilton Library, and the Honolulu Museum of Arts.

Related to this, are the numerous capstone and service-learning opportunities (approximately 700+ hours a year) that provide opportunities for students to be engaged in communities and apply their skills toward employment. In 2021-2022, new internship opportunities with the Pacific Forum, Pacific Islands Development Program, Hawai'i Council for the Humanities, and South Pacific Commission, among others are actively in development. The value of this BA's community-centered and community-engaged approach was freshly illuminated when one of its core courses was uniquely called out by name in the fall 2021 WASC Accreditation Report, "The institution provided many opportunities for students to connect their in-class learning to communities and industry at the undergraduate and graduate levels. One example is the Pacific Communities in Hawai'i course [PACS 301] that listed explicit learning outcomes and included a service-learning component that required a minimum of 15 contact hours within the community." In early 2022, the high impact of the BA program's active student professional development and cultivation was freshly brought into view when the Hawai'i Council of the Humanities featured its two fall 2021 interns, both Pacific Studies BA majors, in their January newsletter.

Students Serving Community, State, and Regional Needs. Despite its current small program status, the BA in Pacific Studies has an impressive placement rate for recent graduates in the public and private workforce, and in pursuit of advanced study. Over 89% of our tracked alumni are gainfully employed in striking endeavors serving community, state, and national-to-regional needs. Of the 44 graduates, 20% work in education, 20% are employed at non-profit organizations, 12% work in media, 12% have returned to their island nations to serve in national government positions, 5% work for Hawai'i' state agencies or local government, and 20% have gone on to pursue graduate studies. Across all of our graduates from 2012-present, it is easy to see the direct legacy of Pacific Islands Studies areal training and professional development provided by our program for our graduating majors in their diverse post-graduation employments including: government positions in the RMI, and FSM, U.S. Peace Corps, graduate degrees programs at UHM, NGOs in Hawai'i serving Hawaiian, Pacific Islander and other minority community youths such as the Estria Foundation, Pacific Forum, and EWC), HI DOE and private school educators including Kamehameha, postsecondary teaching at KCC, and even a celebrated up-and-coming journalist for <u>Civil Beat</u>.

We have selected four students who exemplify some of the post-graduation patterns of local to regional, community to national, impact of our major. Our very first graduate, Nikola Komailevuka, class of 2012, is employed in her home of Fiji at the Foreign Policy Research Institute, after spending prior years at the Pacific Forum, a Honolulu-based foreign policy research institute focused on the Indo-Pacific which collaborates with a network of research institutes from around the U.S., the region, and globally. Teoratuuaali'i Morris, class of 2016, went on to complete the MA in Pacific Studies at UHM and then accepted the position of Bishop Museum Press Operations Manager. Chantelle Matagi, class of 2017, went on to the MA program and, early in the pandemic was offered a position as the Hawai'i State Department of Health Contact Tracing Lead Investigator for Pacific Islander communities, a position which requires exceptional knowledge of cultural and social protocols which can profoundly differ between distinct Pacific Islander communities. Exemplifying yet another pattern, Halia Hester, also class of 2017, turned her internship at 'Iolani Palace into a full-fledged career as Collections Manager, fulfilling a long-standing dream of contributing directly back to the Lāhui Hawai'i and our broader communities, bringing a foundation of sensitivity to the

Hawaiian Kingdom's relationships to neighbors and diverse histories of past and present engagements across the region.



4. INSTRUCTIONAL RESOURCES REQUIRED FOR THE PROGRAM AND THEIR UTILIZATION COMPARED WITH ANTICIPATED RESOURCES

The PACS BA Program Is Efficient and Cost-Neutral. The PACS BA program is efficient and could well be considered a "free" program. Allow us to elaborate. As seen in Table 4 (on page 10), row 1 shows that the BA courses have an average of 20 students per class, which is right-sized for a program of this nature which has many classes with a Focus designation, which restricts enrollments to 20 students. Rows 2 and 3 show the number of courses taught by *all* (7 total average) versus courses taught only by instructional faculty and specialists (6 total average). Nearly all courses are taught by faculty members. On average, only 4 teachers are providing the *entire* BA program curriculum, which speaks to the commitment of this small but active team. This same group of faculty also provide the historically impactful MA program in Pacific Islands Studies and serve as core faculty for the Center for Pacific Islands Studies, a US Title VI National Resource Center. Note the following which are not reflected in the row 4: 1) Teaching loads that include nearly all faculty teaching at the graduate level; 2) Faculty members taking on the role of Center Director; and 3) Running a program even when the number of faculty members dipped due to sabbatical (2015, 2016, and 2019) and sick leaves (2014 and 2018). Finally, row 5 shows the SSH total average and the SSH total average per teaching member for all (380 and 58 respectively), while row 6 indicates the SSH only for instructional faculty and specialists (300 and 82 respectively). By rough calculation the SSH/faculty ratio of 82 indicates that the BA is indeed a cost-effective unit. Again, note the following which are not reflected in the row 6: 1) The additional SSH for the graduate level, as well as faculty graduate responsibilities; 2) Numerous research and community initiatives by teaching members; and 3) Revenues received by the NRC grant. Here's another way to consider this. Since the same faculty teach BA and MA students, not continuing the BA degree (and its SSH) will not make the department more cost-effective.

Instructional Resources. Currently, there are four G-funded faculty who collaborate with lecturers and GAs under the following program costs and resources (see Table 2, page 8 and Table 3 page 9). Moore hall houses the faculty and staff offices, which are shared by the Center for Pacific Islands Studies and the MA program in Pacific Islands Studies, as well as the instructional classrooms for both academic programs. Faculty include:

1. Lola Quan Bautista, DPIS Chair & Associate Professor; Expertise: Micronesian Diaspora, Pacific Islanders in Higher Education, Social Justice & Advocacy through Film, Gendered Space, Households, and House Forms;

- 2. Alexander Mawyer, CPIS Director and Associate Professor; Expertise: French Polynesia, Language & Culture in Oceania, Coastal and Marine Resource Governance, Biocultural Diversity, Anthropology of Place and Space; Conservation; Environmental Anthropology;
- 3. Tarcisius Kabutaulaka, Former CPIS Director & Associate Professor; Expertise: China in Oceania, Political Developments in Melanesia and Oceania, Land, Natural Resources, and Economic Development;
- 4. Julianne Walsh, Associate Specialist & Undergraduate Advisor; Expertise: Marshall Islands/US Relations; US Affiliated Micronesia; Compacts of Free Association; Educational Resources and Curriculum Development; Community Engagement including Internships and Service-learning.

TABLE 2: PROGRAM COSTS (2014-2023)

RESOURCES/ FUNDING	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022 (current)
Total cost (Projected)	n/a							
Total cost (Actual)	\$502,249.51	\$557,148.50	\$632,486.01	\$640,458.22	\$686,421.97	\$639,109.47	\$632,550.60	\$578,331.79
Faculty FTE (Projected)								
Faculty FTE (Actual)	6.5	6.5	6.5	6.5	5.5	5.5	5	4
Faculty Salaries (\$) (Projected)								
Faculty Salaries (\$) (Actual)	\$470,347.51	\$525,246.50	\$586,886.08	\$574,148.01	\$616,178.93	\$561,793.40	\$580,214.80	\$510,964.17
Lecturers (\$) (Projected)								
Lecturers (\$) (Actual)	\$0.00	\$0.00	\$2,529.87	\$2,534.69	\$15,368.37	\$25,553.47	\$0.00	\$22,597.24
Graduate TAs (Projected)								
Graduate TAs (Actual)	\$17,502.00	\$17,502.00	\$24,115.06	\$35,004.00	\$31,895.38	\$36,927.60	\$37,935.80	\$30,370.38
OPERATIONAL COSTS (Projected)								
OPERATIONAL COSTS (Actual)	\$14,400.00	\$14,400.00	\$18,955.00	\$28,771.52	\$22,979.29	\$14,835.00	\$14,400.00	\$14,400.00

			Tuition	n status						Tuition	n status						
Term	FTE	resident	non- reside	Pac. Islander or non- resident Exempt	WUE exempt	tuition enues	Ter m	FTE	resident	non- resident	Pac. Islander or non- resident Exempt	WUE exempt	Spr tuit rev	0	AY	tuit	iual ion enues
F13	13	7	1	3	2	\$ 78,112	S14	18	11	1	2	4	\$	107,824	AY 13-14	\$	185,936
F14	17	12	2	1	2	\$ 114,372	S15	17	11	3	0	3	\$	126,423	AY 14-15	\$	240,795
F15	11	6	2	0	3	\$ 90,127	S16	17	10	3	1	3	\$	133,795	AY 15-16	\$	223,922
F16	15	8	2	2	3	\$ 118,821	S17	16	10	2	1	3	\$	124,687	AY16 -17	\$	243,508
F17	14	9	1	1	3	\$ 102,110	S18	14	10	1	0	3	\$	102,110	AY 17-18	\$	204,219
F18	17	10	1	1	5	\$ 121,230	S19	16	7	0	2	7	\$	110,214	AY18 -19	\$	231,444
F19	13	2	0	2	9	\$ 98,910	S20	19	3	1	2	13	\$	155,142	AY19 -20	\$	254,052
			1		7					0	1				AY20		,
F20	12	2	1	2		\$ 98,622	S21	8	3	0	1	4	\$	56,520	-21 AY	\$	155,142
F21	9	3	1	1	4	\$ 73,188	S22	9	2	0	2	5	\$	64,998	21-22	\$	138,186

TABLE 3. ESTIMATED TUITION REVENUES BETWEEN AY 2013-14 AND AY 2021-22 (PACS BA).

Data source: The FTE and tuition status data have been retrieved from MIRO on 3/13/22

		F12	F13	F14	F15	F16	F17	F18	F19	F20	F21	TOTAL AVG 2012-21
1	Average num. of students per class	23	21	18	20	23	15	19	18	20	24	20
2	Num. of courses* taught by <i>all</i> instructional faculty, specialists, lecturers, and/or GA's combined	6	7	8	6	7	10	7	6	4	6	7
3	Num. of courses taught <i>only</i> by instructional faculty (F) <i>and</i> specialists (S) combined	4	6	8	6	6	8	6	5	3	3	6
4	Num. of instructional faculty (F) and specialists (S) teaching	4 (2F, 2S)	4 (2F, 2S)	5 (4F, 1S)	4 (3F, 1S)	4 (3F, 1S)	6 (4F, 2S)	4 (3F, 1S)	3 (3F, 0S)	2 (2F, 0S)	2 (2F, 0S)	4
5	SSH total and SSH average in parenthesis for courses taught by <i>all</i> instructional faculty, specialists, lecturers and/or GA's combined	396 (66)	414 (59)	387 (48)	360 (60)	474 (68)	429 (43)	390 (56)	303 (51)	222 (56)	423 (71)	380 (58)
6	SHH total and SSH average in parentheses for courses taught <i>only</i> by instructional faculty and/or specialists	234 (59)	348 (87)	387 (77)	360 (90)	372 (93)	381 (63)	282 (71)	255 (85)	222 (111)	162 (81)	300 (82)

TABLE 4: NUMBER OF STUDENTS, NUMBER OF COURSES, NUMBER OF TEACHING FACULTY & SPECIALISTS, ANDNUMBER OF SSH FOR DPIS UNDERGRADUATE PROGRAM (2012-2021)

*This number does *not include* PACS399 Reading Course which are not regular classes with fixed capacity and often limited to one student and cross-listed courses (namely PACS371 and PACS462) in which the instructor was based in another department.

The PACS BA program supports UH/UHM success in Title VI recognition as a US DOE National Resource Center for Pacific Islands Studies. The new Department of Pacific Islands Studies' output of Pacific-related scholarly works as inherently tied to the Center for Pacific Islands Studies' long-standing community engagements have enabled access to federal grants targeting the rapidly increasing Pacific Islander population in Hawai'i and in the United States more broadly. Given its longstanding global reputation, CPIS remains the only National Resource Center (NRC) for the Pacific Islands region recognized by the US Department of Education. Funding for NRC and Foreign Language and Area Studies (FLAS) scholarships to UH is worth \$460,000 a year in the current 4-year grant cycle. These resources benefit numerous students and diverse programs across the UH system and the state, including Pacific Islander recruitment efforts and outreach, library resources, teaching resources and support for K-12 teachers, and support for state agencies (DOE, DOH) serving Pacific Islanders (see Figure 1). Because the NRC also supports the advancement of study abroad opportunities, the BA is a gateway through which UHM can pursue efforts to expand its scholarly and community engagements with Pacific Islands neighbors via the development and enactment of culturally responsive study abroad programs that are Island-centered, Islander-oriented, and impactful to both UH students and the state of Hawai'i (recent field-schools organized by CPIS/DPIS in the prior five years have been held in Samoa, Tahiti, and Palau). Critically, the BA provides a powerful and competitive rationale for sustaining the status of UHM as the home for the sole National Resource Center. NRC funds enable UH to participate in global activities to serve underrepresented students, to create resources to support education and awareness of the Pacific, and expand capacity to better understand and serve Pacific Islanders. The existence of the BA program, nearly unique in the United States, effectively illuminates and concretely represents our shared commitment to Pacific Areal and Language Studies and enhances CPIS competition in future NRC rounds.

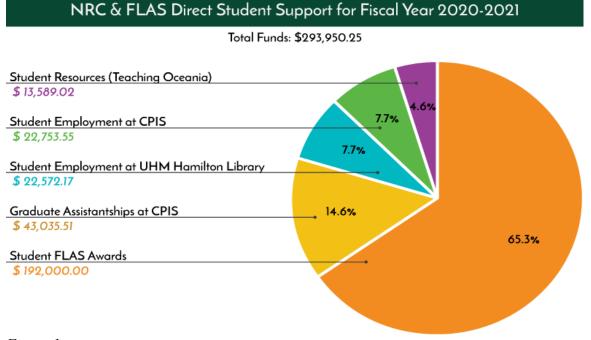


Figure 1

5. IS THE PROGRAM ORGANIZED TO MEET ITS OUTCOMES

The BA program in Pacific Studies is committed to UH Mānoa's mission to strengthen Mānoa as a Hawaiian/Pacific place of learning and we have adapted to meet student needs through collaboration with other units and coveted grant support.

Program Modifications. The provisional BA degree was approved by the Board of Regents in December 2010. It was designed to encourage concurrent degrees and support state needs through three concentration tracks: Public Policy and Community Development, Contemporary Regional Issues, and Arts and Performance. Students would not only complete 21 credit hours of unique Pacific Islands Studies interdisciplinary courses (PACS 108, 201, 202, 301, 302, 303 and 401) but further supplement with 15 credits in Pacific Islands related, discipline-focused work (Anthropology, History, General Pacific Electives and two concentration courses).

Curriculum changes. The original 6 concentration credits are now student-selected PACS elective credits. Further, we reduced requirement credits from 36 to 30 and removed requirements for specific courses to requirements to fulfill broader categories of courses. This shift supports student choice and enhances flexibility, especially for transfer students. The current requirements now include PACS 108, two 200+ level PACS courses, two 300+ level PACS courses and PACS 401. This in addition to one History, one Anthropology, and two Elective courses that are no longer strictly associated with particular concentrations.

Collaboration with other units. Faculty affiliated with the Center for Pacific Islands Studies have added new electives and cross-listed courses that serve PACS majors. Currently we have three cross-listed courses in Geography (333), English (371), and Theater (400). We have close ties to the College of Social Sciences Service Learning program to support students' service learning among Pacific communities. PACS courses also serve on elective lists for professional programs. For example, we have consistent enrollment of Public Health students in Pacific Communities in Hawai'i (PACS 301). In addition, we collaborate closely across UHM and support programs such as the Office of Multicultural Student Services in their recruitment efforts and other advocacy initiatives (tuition policy), by advertising opportunities for PACS student involvement and employment. Further, individual faculty regularly respond to requests by local and state agencies, providing opportunities to demonstrate the value of Pacific Islands Studies to our students and communities. (See letters of support in appendix).

Program Advising. The B.A. program requires students to consult on their curriculum plan every semester in consultation with the undergraduate advisor Dr. Julianne Walsh (Associate Specialist) who brings a nationally and internationally recognized expertise in educational resources, and curricular and pedagogical development, as well as community engagement including internships and service-learning. As noted above and in the accompanying memo, Dr. Walsh's own course in this program, and work in this area was highlighted in the recent WASC accreditation report. Students are able to access a description of the degree requirements through several sources, including via a department website with dedicated pages to undergraduate studies and resources, see https://hwwaii.edu/cpis/hawaii.edu/cpis/student-life.

6. EVIDENCE OF STUDENT LEARNING AND STUDENT AND PROGRAM SUCCESS

Assessment Activities. The BA in Pacific Islands Studies is regularly assessed. It has five student learning outcomes (Appendix 2) introduced, reinforced, mastered and assessed through the curriculum as demonstrated in the BA curriculum map (Appendix 3). Each of the SLOs is assessed in a cycle of approximately four years (Appendix 4) while the critical thinking and analytical writing SLO (4) is assessed every two years (to evaluate the "Write Oceania" program, see below). The program has also established a highly regular assessment framework for progressive improvement. Since the start of the degree program, the BA (and MA) assessment and faculty involvement have radically evolved. The faculty collected student work and actually developed the rubrics used for program assessment. Rather than a small group of faculty, *all* faculty, including the Director and Chair, read and scored *all* samples and changes were proposed when results did not meet expectations. For example, in 2014 because of deficits in SLO4 Critical Thinking & Writing Analytically, the "Write Oceania" Pacific Islands Studies writing program was born! This new program 1) integrated writing instruction across the curriculum through Writing Intensive courses, 2) advanced the rubric for SLO4, 3) solidified resources into an exceptional website to support Pacific Studies student writing, (Appendix 5) created a position for grant-

funded GA since 2015, and 5) recognized as a successful model of how assessment can lead to program improvement after winning awards at the Assessment Office poster session and shared in multiple UH Assessment Institutes and in the online Learning Improvement Community story page (Appendix 5).

Time to Degree. On average, students take 4.5 years to complete the undergraduate program, while transfer students take slightly less at 2.4 years. To support transfer students entering Mānoa with AA degrees and majoring in PACS, degree program requirements were revised to eliminate the requirement for specific 200-level courses. As of fall 2020, transfer students and others could meet requirements by completing two 200-level or higher courses, thus eliminating a barrier of 6 credits of lower division courses that may have delayed academic progress.

The Capstone & Beyond. Every year, students enrolled in the capstone course present their culminating research projects at either a formal student conference or hold a community symposium (Appendix 6). The instructor for this course also mentors and trains students in writing and submitting grants. In fall 2020, five senior students were awarded the Undergraduate Research Opportunity Program (UROP) grant totaling \$8,490.00 to present their capstone research at two conferences in California (table 5). After the completion of the capstone project, some students have found employment in their respective research fields while others have continued onto graduate studies. A small but growing number of BA graduates (7 of 47) have pursued the MA in Pacific Islands Studies. We anticipate more students to pursue this pipeline as we have been approved to offer a 5-year BA/MA (BAM). We welcomed the first BAM student in fall 2021.

TABLE 5. SERVICE CAT STOLE STODERTS UTILIT OROT AWARDS, FALL 2020						
STUDENT	PROJECT TITLE	AMOUNT AWARDED				
Alexander Makamae Kaupu	Supporting Kanaka Maoli Well-Being: Agency and Aloha 'Āina	\$1,698.00				
Kim Partner	Plants As Medicine	\$1,698.00				
Solouta Togiaso	Utilizing Vā to Destigmatize Mental Illness in Pacific Islander Communities	\$1,698.00				
Victoria Wonsowicz	Dancing Queens	\$1,698.00				
Mupopo Savea	Health Issues Affecting the Samoan Community	\$1,698.00				

TABLE 5: SENIOR CAPSTONE STUDENTS UHM UROP AWARDS, FALL 2020

7. CONCLUSION

U.S. Congressman Ed Case noted in 2021, "Over the past decade, the Pacific Islands have boldly pursued regionalism and cooperation to address the most pressing challenges they face, including climate change, sustainable development, public health, maritime security and more ... As a Pacific nation, the United States can and must contribute to regional efforts to address these issues." To offer leadership and advance national priorities and strategic interests in the region, the U.S. requires continuing support and national investment in area expertise. Permanently establishing the Pacific Studies BA provides an anchor for critical expertise, supports UHM's national and international reputation as an institution providing educational pathways not available anywhere else, and advances a wide range of 21st-century workforce needs, including health sciences, STEM, diplomacy, education, defense, economics, and information technology, by complementing and enhancing the work of our students within the traditional disciplines. By granting established status,

UHM meets some of Hawai'i's fastest growing and least-served communities in their desire for critical scholarly recognition and educational equity and further advances strategic missions to develop our university as a Hawaiian place of learning noting traditional and contemporary genealogical, historical, and cultural ties between the Hawaiian Islands and islands and communities across the region.

Appendix 1: Letters of Support

March 11, 2022

To whom it may concern,

I am writing to express my sincere support that the Pacific Islands Studies' undergraduate program become an established and permanent program offered at the University of Hawai'i at Mānoa. I do so as a former student with a strong belief that this program is unique and has benefited my life in profound ways, both professionally and personally.

Between 2011 and 2015, I was among the earliest students who completed the Pacific Islands Studies BA program. I later completed the MA program at CPIS between 2018 and 2019, and shortly after graduation, I secured employment at Honolulu's Bernice Pauahi Bishop Museum, where I continue to work today as the operations manager of the historic Bishop Museum Press.

It has been expressed to me that my degrees gave me a professional advantage and made me an extremely competitive candidate for the Museum. This represented a recognition from the hiring committee that Pacific Islands Studies scholars, in addition to having a broad understanding of the histories, cultures, and contemporary issues of Oceania, are trained to have a keen sensitivity to issues of representation and equity. These are invaluable skills to institutions and organizations that must grapple with these issues daily and this is especially true for Hawai'i museums, where visitors, donors, and stakeholders often are the descendants of the histories and cultures being portrayed.

In addition to my work in the Press, my education granted me the unique invitation to join the curatorial team for an upcoming Bishop Museum original exhibition in June 2022. Over the twoyear planning process for this exhibition, I have experienced many instances where my educational background allowed me to make significant contributions and to raise issues that others may have missed. My former training has given me the insight to recognize when the peoples and struggles of Oceania are insufficiently represented and how to attempt to address them. Importantly, it has given me the confidence and the intellectual foundation to express myself and excel in these collaborative spaces. For this, I owe much to the critical thinking and writing skills I acquired through my BA program.

Considering its legacy, aspirations, and quality of research, I genuinely believe that UH's Center for Pacific Islands Studies is one of the astounding (yet less visible) contributions that the University of Hawai'i makes to the region and the world. Both the Center and the Department are beacons in a field that continues to be more relevant every day. I urge the Board of Regents to expand the impact that Pacific Islands Studies has on Pacific Islander and non-Pacific Islander students that attend UH through the permanent establishment of the BA degree in Pacific.

Thank you for considering my words of support,

Pear Marin

Teoratuuaarii Morris Bishop Museum Press Operations Manager

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STATE OF HAWAII DEPARTMENT OF HEALTH P. O. BOX 3378 HONOLULU, HI 96801-3378

Letter of Support for the Center for Pacific Island Studies Bachelor's Program

March 11, 2022

Alexander Mawyer, PhD, CPIS Director, Acting DPIS Chair and Associate Center for Pacific Islands Studies University of Hawai'i at Mānoa Honolulu, HI 96822

Dear Director Alexander Mawyer:

I am honored to stand together in support of the Center for Pacific Islands Studies (CPIS) Bachelor's program at the University of Hawai'i at Mānoa.

As a graduate of the CPIS BA program I would like to share how the interdisciplinary courses I took as an undergraduate student have assisted, prepared, and guided my professional career. I am an older student and when I returned to school to complete a degree in business management, I did not imagine that two semesters later I would be changing my educational path and professional journey. During my second semester I took a Pacific Island studies course as an elective. I am Samoan and Syrian but as a child I was raised on the continent and was eager to expand my knowledge. As I connected with my Pacific roots, I became enthralled with learning but also, I felt a sense of empowerment as I learned about the greatness of those who came before me and the challenges they experienced. I changed my major and added eighteen months of additional course work.

As CPIS is an interdisciplinary program, I was able to take classes that provided me meaningful engagement and a knowledge base that few others have. My classes focused on history, anthropology, political science, art, language, economics, and health. This is important as it gave me context and understanding to what is happening in the world and why. I did not realize then how important this would be, but I felt an enormous amount of pride in what I had learned.

In March 2020, the world as we know it changed and the COVID-19 pandemic began. I lost my job due to the pandemic and was unsure what I would do moving forward. In August of 2020, then State Epidemiologist Sarah Park in a news conference shared that Native Hawaiians and Pacific Islanders were overly affected by COVID-19. When asked what she could do to address this, she stated that nothing could be done as the state of Hawai'i Department of Health (HDOH) was unable to find or hire qualified Native Hawaiians and Pacific Islanders to work as COVID-19 case investigators. This was upsetting to me and because of this I enrolled at the University of Hawai'i West Oahu Contact Tracing program. As the program was meant for public health professionals and educators there was some question as to if my degree would give me the foundational knowledge necessary to be become a case investigator. I was admitted to the program due to my grade point average and lived-life experience

It soon became apparent that not only did I meet the standard qualifications necessary but that my interdisciplinary education gave me an advantage. I understood and could explain the historical context that led to Native Hawaiians and Pacific Islanders being overly represented in COVID-19 positive cases. Sadly, Native Hawaiians and Pacific Islanders share a colonial history that has created and supported generational trauma. This trauma can be seen in the socio and economic disparities they suffer and the distrust they have of western government agencies, their agents, and western medicine. This means that Native Hawaiians and Pacific Islanders were already suffering prior to the pandemic and that the pandemic further exasperated the already present disparities and inequities. This knowledge gave me a unique perspective, but it also allowed me to create solutions that addressed these issues. I completed the contact tracing program and applied for a position at HDOH. To my surprise I was hired as the Lead Case Investigator for the newly created Native Hawaiian and Pacific Islander Contact Tracing Team (Team 6B).

As I began to build Team 6B, I understood that my team had to be representative of the communities I was being asked to assist. And unlike the now fired Sarah Park, I knew that there were qualified Native Hawaiian and Pacific Islander applicants. I hired 15 team members who represented those Pacific communities who needed them the most. I then worked with community-based organizations (CBOs), faith-based institutions, medical providers, social services, and advocates to create educational outreach that was in-language and culturally appropriate. Engagement had to be innovative, inclusive, and it had to be in partnership with community-led initiatives. When I began in October 2020 Native Hawaiians and Pacific Islanders are approximately 25% of the population. Today Native Hawaiians and Pacific Islanders are approximately 25% of the positive cases statewide. This is an impressive drop and one that could not have been accomplished with the now 32 team member strong Team 6B.

I am very proud of this work and am humbled to report that this work has been documented locally and worldwide. Under the supervision of Sarah Kemble MD, PhD, HDOH State Epidemiologist and Chief of HDOH Disease Outbreak and Control Division, HDOH has documented these innovative practices including the formation of Team 6B and published some of their findings in the "COVID-19 in Hawai'i: Addressing Health Equity in Diverse Populations" article. This article was then chosen by the CDC and was the basis of an MMWR article titled, "Disaggregating Data to Measure Racial Disparities in COVID-19 Outcomes and Guide Community Response – Hawaii, March 1, 2020 – February 28, 2021." The CDC then cited HDOH health equity work to the WHO in their article "Promoting health equity during the COVID-19 pandemic, United States." I am listed as a co-author on each of these and my affiliation is listed as the Center for Pacific Islands Studies.

CPIS provided me Pacific histories in a pedagogy that recognizes, supports, and celebrates Pacific cultures such as the one Epeli Hau'ofa described in his widely quoted and assigned reading by CPIS essay "Our Sea of Islands." As a Pacific student, CPIS provide me culturally grounded knowledge and skills, that I took into my professional career and utilized. CPIS allowed me to proclaim the greatness of Pacific Islanders through their course curriculum, and it created a pathway in which that greatness was attained professionally for me. I would kindly suggest that doing away with a program that has been so instrumental in the saving of lives during the pandemic would be short sighted and detrimental.

Fa'afetai ma le fa'aaloalo lava, Chantelle Eseta Matagi State of Hawaii Department of Health COVID Vaccine Community Outreach Liaison

Appendix 2: Student Learning Outcomes (SLO) and Program Outcomes

	PROGRAM OUTCOMES
BA SLO1	Students can describe the diversity and similarity of issues in Oceania.
BA SLO2	Students can identify major events in the history of the region and analyze processes of change in island societies.
BA SLO3	Students can research and communicate indigenous issues and concerns.
BA SLO4	Students can demonstrate critical thinking and write analytically.
BA SLO5	Students can interact with and advocate for Pacific Island communities at home or abroad.

Appendix 3: Curriculum Map I (Introduced), R (Reinforced), M (Mastered), A (Assessment)

CRN	PACS COURSES	SLO1	SLO2	SLO3	SLO4	SLO5
108	Pacific Worlds	Ι	Ι	Ι	Ι	Ι
201	Islands of Globalization	I/R	I/R	I/R	I/R	Ι
202	Pacific Movement & Migration	I/R	I/R	I/R	I/R	I/R
301	Pacific Communities in Hawai'i	Ι	I/R	R	R	R
302	Contemporary Issues in Oceania	R/M	R	R	R	
303	Pacific Arts Ritual Performance	R	R	R	R	R
401	Senior Capstone			M/A	M/A	M/A
492	Topics: Language & Culture	R		R/A	R/M	R
493	Moving Images	R		R/M		

Academic Year	Program SLOs Assessed
2011-12	3,5
2012-13	3,5
2013-14	2
2014-15	1,4
2015-16	5
2016-17	4,6
2017-18	1
2018-19	3,4
2019-20	2,5

Note: Annual assessment reports for the BA degree are publicly available on the Assessment Office website. The PACS assessment coordinator has been an assessment institute fellow (AIF) for the past two years, after participating in the institute and other related activities since 2015.

Appendix 5: Writing Assistance for PACS Undergraduate Students





Appendix 6: PACS Fall 2021 Capstone Student Presentations



Come listen to UH Mānoa PACS 401 students present their community-guided capstone projects!

SUNDAY, DECEMBER 5, 2021 2pm-4pm HST

http://go.hawaii.edu/ZDV

Taufa's research focuses on how Tongans in the Bay Area maintain anga fakatonga (Tongan identity) in actively participating in Siasi Katolika Komunia (Catholic Church communities). She explains how these Catholic churches become villages where Tongan culture is practiced through teaching the three main values of kainga (community), fai lotu (prayer), and foaki 'ofa (labor of love). Taufa has grown up in Tongan Catholic Church communities since her upbringing in Maui, Hawaii, and presently in the Bay Area. Through talanoa interviews and recordings, she works closely with the Tongan Catholic Chaplaincy and Siasi Katolika Kosilio (council) first established in the East Bay to document the beginnings of these Tongan villages.

For more information, please conta lolab@hawaii.edu



PACS 401 students present their community-guided capstone projects! FRIDAY, DECEMBER 10, 2021 opm-8m HST

LIVE <u>http://go.hawaii.edu/VDu</u>

ISABELA: Belle's research focuses on the participation of Howaiian youth in the "Oldo Howai" indigneous taguage category of the Howai'l Council for the Humanities 'Howai'l Keyley Day. This senester, Balla was able to with with the Howai'l Council for the Humanities, meet with userent and potential judges for the Language Category and connect with sudants and teacher in the "Oldo Howai'l community that are participating in Howai'l History Day. This project centers around the question, "How dates competition promote language envillaction in Howaiia's Natifi' Through further connections and many many meetings, Bella was able to study indigenous types of competition, and how those continue to encourage synchin in Howai't barve for excellence in language from across the Pacilina.

KALE: With the current global pandemic, Hawai'i food supply and food availability has been drastically imported. This semester, Kolei warked with Käkö'a 'Oiwi, a non-profit organization that is working to restore ancestral formiands utilizing cultural practices, agriculture, education, and naturalreacure restoration and management. Kalofi's research focuses on food sustainability and food sovereignty for Hawai'i through the culturation of taro familiands and hishpoids by utilizing ancestral practices.

Remembers and inspanse of ainizing anteetral produces. KAHI: Kahi facuses his research on the valces of the incorcerated and the programs that en influential to their rehabilitation. Kahi works with the Howa'i Humanites program 'Try Think Hubina'' Where he can capture the valces of the incorcerated at Hallowa Correctional Center as well as the generation community, the highlights the issues with historical and generational frauma. As well as modern issues that jumpstant the younger generation into the prison sytem. However, by utilizing Howaian cultural practices and values as a way to head the incorcerated Native Howaians, we can help heal the damages of historical trauma caused by colonization.

Center for Pacific Islands Studies University of Hawai'i at Manoa

heat the incorcerated Native Hawaiians, we can help heat the historical trauma caused by colonization. For more information, please contact: lolabehawaii.edu

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9

PACS 401: COMMUNITY SYMPOSIUM

PACS 401 students present their community-guided capstone projects! THURSDAY, DECEMBER 9, 2021 2pm-4pm HST



KAUTIOUS: I gravitated my research around the lack of access provided for Deaf Poalfs Islanders in the deaf community, whether that may be here on Oalu or other places in the Poalfs. and how they prepare for natural disasters such as tsummit, volcanic aruptions, hurricones, and much more I. University of Howa'i at Mänoa. Together they are looking at the Deaf community in America Samoa and how they prepare their community for disaster preparedness. By doing so, I. hope to find any pulsa, that demond to be addressed and create possible solutions that could apply to all Deaf Deafic landers in Oceana about disaster preparedness.

MIKAELYN: Post, like, share, subscribe are all readily common vertes within this day and age. Since the turn of the 2ht century, social media has expladed into becoming one of the main sources of information, connection, and entertainment. Following the emergence of social media, there have been waves of preferred forms of social media and what its intended use should or can be. The ways in which people consume social media verse heaving depending on their age, gender, cultural group, and more. Chanarres, the indigenous people of Guahan or Guam, are among the length lats of cultural groups in Coemon that utilize and lange new social media variant dama and an multitude of ways. This saxy will arin to address the ways in which. Chanarros in the disapora utilize social media and online spaces as a mean for cultural presentation. Because as a popular disapora group where a majority of the indigenous population here avay frame their homes, it is a crucially important to examine the ways in which they are able to uphold their culture from so far avay. Additionally this piese will acknewledge the heavy influence that COVLD-P his presented fourded Scaner communities and how it has affected Chanoros in online spaces.

For more information, please contact: lolabehawaii.edu





A Demand for Attention in The Lack of Access to Disaster Preparedness for Deaf Pacific Islanders



MIKAELYN MARIE MENO GOGUE Ti Hu Tu go Hayi Guahu: Diasporic CHamoru Culture, Identity, and Community in Online Spaces

KAHI EHIA-SALVADOR Correctional System or Penal System?: Native Hawaiian Values as an Alternative to Rehabilitate Native Hawaiians Incarcerated

KALEI PEMBE Proof is in the Pa'i'ai: I

23



UNIVERSITY OF HAWAII BOARD OF REGENTS College of Arts and Sciences Office of the Dean

22 APR 27 A9:19

March 11, 2022

MEMORANDUM

VIA:

TO:	Randolph G. Moore, Chair Board of Regents
	Ernest Wilson, Chair BOR Committee on Academic and Student Affairs
VIA:	David Lassner

President **Fav** VIA: Debora Halbert

Vice President for Academic Strategy

Bonnie Irwin Chancellor

David Laur

VIA: Kris Roney Vice Chancellor for Academic Affairs

FROM: Michael Bitter Michael Bitter Interim Dean, College of Arts & Sciences

SUBJECT: REQUEST FOR ESTABLISHED STATUS FOR THE MASTER OF ARTS IN HERITAGE MANAGEMENT AT THE UNIVERSITY OF HAWAI'I AT HILO

Thehen Wallant

SPECIFIC ACTION REOUESTED

It is respectfully requested that the Board of Regents grant established status to the Master of Arts in Heritage Management in the College of Arts and Sciences at the University of Hawai'i at Hilo.

RECOMMENDED EFFECTIVE DATE

Effective upon Board approval.

ADDITIONAL COST

There are no additional costs associated with this request.

PURPOSE

The University of Hawai'i at Hilo (UHH) Anthropology Department's MA in Heritage Management (HMMA) was created in response to House Resolution No. 130 of the 24th Legislature (2008) to address a critical shortfall in heritage management professionals in Hawai'i, a shortfall that continues to the present. The program fills a clear need to provide graduate training in the specific issues of Oceanic heritage. Despite challenges in staffing, the HMMA program has managed enrollments and successfully graduated students, who have taken leadership positions in the professions identified in the original House Resolution. In addition, it has generated grants and partnerships that far exceed the expectations for a program of its size.

Randolph G. Moore Ernest Wilson March 11, 2022 Page 2

BACKGROUND

Pursuant to Board of Regents Policy 5.201: instructional programs, "The board shall determine whether [a] program is to be awarded established status or terminated."

The Master of Arts in Heritage Management responds to the severe and continuing shortfall in professionals by providing the academic credentials necessary for its graduates to serve in heritage leadership positions in organizations across the state of Hawai'i. Graduates have successfully sought positions in key agencies and firms that require advanced training in Cultural Resource Management.

Critically, this program empowers descendant community members in the management of their own heritage and prepares its graduates for careers in government agencies, private-sector consulting firms, and education.

Owing to a smaller than projected faculty, the program enrolls fewer students than originally proposed. The Anthropology department, in which HMMA is located, has successfully managed both this smaller graduate enrollment and their undergraduate responsibilities in general education and the Anthropology baccalaureate major by moving to an alternating-year admissions cycle for the MA program, in order to assure that all of their curricular responsibilities can be met.

At the same time, HMMA has cultivated extensive extramural support and partnerships, with nearly \$5 million in external funds through collaborative programming, as well as a \$1.25 million MOU with the Department of Transportation in partnership with Ka Haka 'Ula o Ke'elikolani College of Hawaiian Language, and other externally funded programs that provide support to the students in the HMMA program.

The continuing need for heritage management professionals is documented in the attached proposal and letters demonstrating community and government agency support for this program. As one of UH Hilo's signature programs, the Master of Arts in Heritage Management meets the needs of our community and state by preparing our students for positions of leadership that they could not otherwise attain.

HMMA is central to the identity of the University of Hawai'i at Hilo as an indigenous serving and communityengaged campus. The hands-on experience offered by this program, combined with rigorous research project and thesis requirements, provide its students with a rich educational environment that allows them to develop the leadership skills necessary for success in their future careers in cultural resource management both within the State of Hawai'i and across the Pacific region.

ACTION RECOMMENDED

It is recommended that the Board of Regents grant established status to the Master of Arts in Heritage Management in the College of Arts and Sciences at the University of Hawai'i at Hilo, effective upon Board approval.

Attachment: Proposal for Established Status



Master of Arts in Heritage Management Degree Program

Department of Anthropology



Proposal for Established Status

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1. Program Overview

The University of Hawai'i at Hilo (UHH) Anthropology Department's MA in Heritage Management (HMMA) responded to House Resolution No. 130 of the 24th Legislature (2008) regarding a critical shortfall in heritage professionals in Hawai'i, which continues to the present. The program fills a clear need to produce individuals who are well-trained in the specific issues of Oceanic heritage. The region has unique cultural, historical, social, and environmental characteristics that make localized training more effective. The MA provides affordable and regionally-focused graduate training with specializations in applied archaeology and cultural impact assessment in keeping with the proposed CIP code¹. It empowers descendant community members in the management of their own heritage and prepares students for careers in governmental agencies, private-sector consulting firms, and in education (Appendix A).

The MA program also takes advantage of the strong ties with UHH's College of Hawaiian Language, Ka Haka 'Ula O Ke'elikōlani (KHUOK). Program support is broadly integrated with partner organizations in the community. Although the program focuses on Hawai'i, we address Pacific Islands heritage management in general, and have recently admitted indigenous graduate students working on projects connected to American Samoa, the Marshall Islands, and Yap. UHH, with its diverse Pacific Islander student body, presents one of the best settings for having Pacific Island students trained in Cultural Resource Management (CRM) methods.

The anthropology department currently consists of six tenure-track faculty and two part-time lecturers. The original proposal envisioned eight full-time positions in the department in addition to the lecturers, and an APT to cover graduate and undergraduate teaching loads and administration. Enrollment projections have been adjusted to account for the reduced faculty and staff while we

¹ Current CIP Code 30.1202

Title: Cultural Resource Management and Policy Analysis.

Definition: A program that focuses on the application of cultural studies, public policy analysis, and management skills to planning, promoting, and implementing programs to preserve and protect cultural heritage sites and artifacts. Includes instruction in historical preservation and conservation, business management, policy analysis, applied economics, public relations, applied history, historical archaeology, and environmental impact studies.

continue to work with university administration to address staffing needs. Kamehameha Schools (KS) funded one faculty position for five years through a cooperative agreement, and continues to offer other forms of support and opportunities to our graduate students. Nearly \$5 million in additional external funds have been secured through collaborative programs with Kaloko-Honokohau National Historic Park, Ala Kahakai National Historic Trail, Pu'u Honua o Honaunau National Historic Site (\$479,000), and an MOU with the Hawai'i Department of Transportation (\$1.25 million) as stipulated in a Memorandum of Agreement for the Queen Ka'ahumanu Highway realignment, which is being managed jointly with Ka Haka 'Ula o Ke'elikolani College of Hawaiian Language. Additional funding through the NSF IOA-LSAMP program (\$3.9 million), and the NIH SHARP program have helped fund various aspects of the program. Ongoing plans to construct a heritage collections facility on campus through funding secured by the Hawai'i State Historic Preservation Division (\$32 million) increases opportunities for collaboration with State of Hawai'i preservation goals.

2. Alignment of program with mission and strategic planning of the Campus and University System

Relationship to University mission and development plans

The MA in Heritage Management is aligned with the strategic vision and goals of University of Hawai'i at Hilo and of the University of Hawai'i system as an indigenous serving institution. *A'ohe pau ka 'ike i ka hālau ho'okahi* (One learns from many sources) is the current mission statement for UH Hilo, which is specifically clarified in the UH Hilo online catalog by the statement "to challenge students to reach their highest level of academic achievement by inspiring learning, discovery and creativity inside and outside the classroom. Our kuleana (responsibility) is to improve the quality of life of the people of Hawai'i, the Pacific region and the world." Heritage is at the center of the quality of life for peoples of the Pacific, and investing in programs that increase the ability of graduate students from descendant communities to obtain leadership positions in heritage management is at the core of this mission. UH Hilo is well-positioned to support these unique responsibilities as part of the public university system in Hawai'i, providing an affordable, high-quality education that leads to such opportunities.

The UH Hilo vision statement "*E lawe i ke a'o a mālama, a e 'oi mau ka na'auao*" (Those who take their learnings and apply them increase their knowledge) is also at the heart of the heritage management program, with each student developing a community-based thesis project as the centerpiece of their MA degree, where heritage theory flows directly to Community-based participatory research (CPBR) in an applied learning context. Beyond the thesis itself, six (6) credits of the 36-credit program involve placing students in community internships with a heritage-related organization.

Evidence of continuing need for the program

The ongoing need for heritage management professionals with community-based training is well expressed in the attached letters of community and government agency support. The Hawai'i State Historic Preservation Division continues to have vacancies for positions that it cannot fill without appropriately qualified applicants. Several impacts of global warming are also putting cultural sites at increased risk, and generating a need for increased employment. Rising sea-levels (most important in the Pacific), increased wildfires in the American West, and melting glacial ice are all exposing large numbers of burials and cultural sites that federal and state land managers around the globe are scrambling to address. In a local example, three out of the five seats on the Molokai Burial Council are vacant and the panel has not had enough members to meet for years. One of our MA graduates, Kalena Blakemore, serves on the Hawai'i Island Burial Council where there have been two standing vacancies for several years, and a recent news story published in all the major Hawai'i newspapers (Jan. 19 and Jan 20, 2021) points to the state's failure to provide training to the understaffed councils.

Projections of employment opportunities for graduates, etc.

In Hawai'i, State regulations (Title 13, Subtitle 13, Chapter 281) require Principal Investigators in private consulting firms to have graduate degrees in Heritage Management , and various government organizations also require graduate degrees for historic preservationists on their staff to meet federal and state requirements. For example, principal investigators working for one of the 27 firms licensed to conduct archaeological research must possess "a graduate degree from an accredited institution in archaeology, or anthropology, with a specialization in archaeology, or an equivalent field." Undergraduate students continue to find employment (at lower pay scales than principal investigators) in heritage management across Hawai'i and the Pacific even before they graduate or soon after, but without providing local opportunities to achieve these degrees, many UH Hilo undergraduates hit 'glass ceilings' in their careers. In addition to private consulting firms, federal agencies dealing with the erosion of cultural sites along shorelines are facing increased demands for site identification and stabilization work across the Pacific. The key issue is that without local graduate training, the PIs at the firms and government agencies receive training elsewhere and lack

the strong community connections necessary to the work and as envisioned in the state regulations. Such disconnections only add to the distrust that frequently accompanies governmental evaluation of cultural sites during state or federally-mandated project reviews.

Beyond archaeological site preservation, state and federal laws have placed an increased emphasis on intangible cultural resources. Hawai'i now regularly requests the completion of "Cultural Impact Assessments" under Chapter 343 of HRS to assess the impact of a proposed development on resident communities. These assessments require principal investigators with graduate degree training in traditional languages, conducting oral histories, and doing ethnographic fieldwork, all of which are part of our MA program. Lokelani Brandt (see attached letter), is one example of one of our MA graduates who is now a PI, and who does cultural impact assessment work. Most of the 27 companies operating in the state are looking for additional PIs who could do similar work.

3. Program enrollment and graduation of students: anticipated and actual enrollment figures

Analysis of numbers of majors, graduates, service to non-majors

The Heritage Management MA program has not met enrollment targets (Table 1) due primarily to shortages in projected faculty. The department is operating with the same number of faculty it had before the graduate program, and HMMA graduate students arrived at a time when university-wide undergraduate enrollment (including anthropology) was dropping. Further, only four of the six current anthropology faculty, 4 tenure-line and 2 lecturers, have specialties that allow them to regularly advise students in the graduate program (Appendix B; a fifth faculty member, Dr. Lynn Morrison, has advised one student and a lecturer, Dr. Timothy Scheffler, regularly teaches courses in Qualitative and Quantitative Analysis [ANTH 603] and Human Paleoecology [ANTH 613]). The two tenure-line additional positions that were included in the 2014 BOR proposal that have not been filled as anticipated, so the department made the intentional and strategic decision, with the support of Administration, to keep the cohorts small to better serve both the graduate and undergraduate students. As a result, the existing faculty have successfully managed both the smaller pool of graduate students and the undergraduate program, in part by reducing the incoming cohorts of HMMA and admitting students only in alternating years. As an example, the anthropology FTE undergraduate student-faculty ratio the year before the creation of the MA program was 18.6. In the current year, that ratio remains at 18.4 (Table 3g, Program Review https://hilo.hawaii.edu/uhh/iro/ProgramReview.php). The results of the program review provide the opportunity in the to further evaluate an internal redistribution of effort in order to increase the graduate program enrollments in coming years without adversely affecting the undergraduate programming for majors and non-majors. These efforts will permit the program to accept larger cohorts from the applicant pools that run double the number of acceptances and the potential applicants who have been dissuaded by the present small cohort size.

Table 1: Projected Enrollment

	Year 1 15-16	Year 2 16-17	Year 3 17-18	Year 4 18-19	Year 5 19-20	Year 6 20-21	Current Year 21-22
Projected Enrollment	8	17	18	18	18	18	18
Actual Enrollment	7	7	10	7	11	7	9

Notably, of the first four cohorts of students, 14 are of Hawaiian ancestry (60.8%), three others are from other Pacific Islands (13%), and 19 are women (82.6%).

Each student must complete 36-credit hours, of which 24 credits involve in-class instruction (Appendix C). Six credits involve internships with community-based heritage organizations (ANTH 690), and six more credits are for one-on-one advising with the thesis chair in preparation of the thesis (ANTH 700). Students who do not complete the program in two years continue to enroll in at least one additional credit of ANTH 700 each semester, and this is particularly relevant for students who are maintaining full-time careers (particularly evident in the 2nd and 3rd cohorts). Although the program is designed to be taught to cohorts, we have also admitted non-degree students in 3 class sections for their own career development and training. Since 2017, nine students have completed the program, and 10 (including the newly admitted students) are active, two are on leaves of absence, and two have left the program without completing it. In sum, retention of graduate students remains relatively high (91.3%).

	Year 1 15-16	Year 2 16-17	Year 3 17-18	Year 4 18-19	Year 5 19-20	Year 6 20-21
Projected Program Completion (annual)	0	7	8	8	8	8
Actual Program Completion (annual)	0	5	2	0	2	0

Table 2: Program Completion Projection

Future revisions to programming need to acknowledge the students who are drawn to the program and the complexities of their education as working adults, in order to better facilitate their completion. This will need to balance the preservation of the commitments to the language and spirit of the legislation that underpins the program's start, including the culminating written project, currently designed as a thesis.

Employment of graduates

<u>Table 3</u> summarizes current job placements. In all cases, the receipt of the MA degree facilitated higher upward mobility in the organizations in which they are employed. One employer of two of our graduates is the cultural resources consulting firm, ASM Affiliates, Inc. It has a main office in Pasadena, CA, and 7 branch offices across the American West and in Hawai'i. The Hilo branch office with ten full-time employees and a number of temporary employees is now managed by one of our graduates, and another MA graduate is now a Principal Investigator for the firm.

Table 3: Student Employment Outcomes

Cohort	Hiring Institutions				
1st (2015-2017)	 ASM Affiliates (Cultural Resources consulting firm) (2); Lands Division, Office of Hawaiian Affairs; 				
	 State Historic Preservation Division 				
	County of Hawai'i Dept. of Planning				
	Edith Kanaka'ole Foundation				
2nd (2017-2019)	 Kamehameha Cultural Resources and Planning; 				
	Cultural Surveys Hawai'i (Private Consulting Firm)				
3rd (2019-2021)	National Park Service, Ala Kahakai National Historic Trail				
	Program				
1 1	 Director of Honoka'a Heritage Center (endowed funding 				
	Office of Hawaiian Affairs.				

4. The instructional resources required for the program and how they were utilized compared with anticipated resources

Analysis of number and distribution of faculty

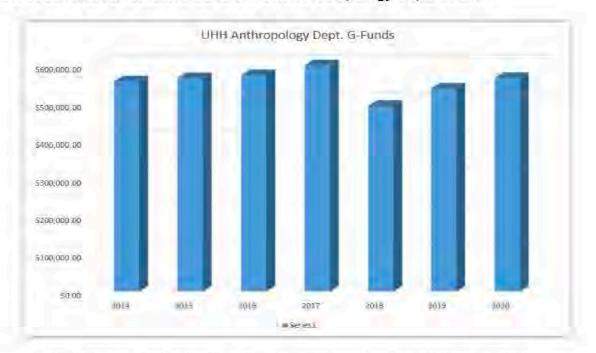
The original BOR proposal called for two additional anthropology faculty and an APT position, but we have created the MA program with a net addition of 0 faculty in the department (in comparison with the year prior to inception [2014]), and with no APT. The program currently operates with five regular full time faculty (Table 4) with periodic support from Dr. Lynn Morrison (SHARP program director), and one lecturer (Appendix B). One new faculty expense is that the program director position (Mills) increased from a 9-month appointment to an 11-month appointment (\$17,254/year). Specializations in the department shifted when Dr. Jack Rossen (a paleoethnobotanist) arrived in 2016 under position #83555. His contract was not renewed at the end of 2017, and his position number was reassigned. In the fall of 2018, a new position was subsequently filled by Dr. Tarisi Vunidilo (a collections specialist, position 86488). Despite this new position (Rossen to Vunidilo), a former department position occupied by Dr. Daniel Brown (a medical anthropologist, position #82556) was reassigned to another department when he retired in 2016, resulting in the zero net growth in anthropology faculty. Also, Dr. Momi Naughton, who operated the UH Heritage Center at the North Hawai'i Education and Research Center (NHERC) in Honoka'a also actively advised graduate students engaged in the program until her retirement in 2020. Without the planned increase in faculty FTE, the program sought to assure that both the undergraduate and graduate programs would remain strong by reducing the size of incoming graduate cohorts and admitting every other year. Applications have remained steady with nearly all students who are accepted subsequently enrolling.

Personnel	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6 20-21	
	15-16	16-17	17-18	18-19	19-20		
Projected Tenured Faculty	6	7	7	7	7	7	
Actual Tenured Faculty	5	5	4.5	4.5	5	5	
Projected Lecturers	1	1	1	1	1	1	
Actual Lecturers	- i	1	1	2	1	1	

Table 4: Personnel

Budget and Sources of Funds

The annual operating budgets (B budgets) for CAS departments at UH Hilo, including anthropology, have fluctuated but have trended downwards since 2015 (<u>Table 6</u>). The current annual operating budget for the entire department is approximately \$3,000 but has been as high as \$8,000. No additional CAS operating budget expenditures have been secured for the graduate program, and, as with the faculty, no distinctions are made between two programs in the department for budget purposes. The primary increase in expenditures is in the salary differential for the HMMA faculty director to serve as 11-month faculty (approximately \$20,000/year). However, even these minimal increases are offset by the operational funding of the program and student fieldwork opportunities that have largely been obtained through community partnerships.





Despite the combined accounting for the graduate and undergraduate programs, a comparison can be made with G-fund expenditures (salaries and fringe) in the department immediately before the program began (Table 5) the five years that the program has been active. In 2014, total G-fund expenditures for faculty, lecturers, and student employees for the anthropology program were \$556,759. In 2015 with inception of the program and UHPA-negotiated raises, the costs rose by less than \$9,000 to \$565,453 (due in large part to KS funding of faculty salary). With the retirement of professor Daniel Brown in 2017 and the receipt of external grants in the department, the 2018 department budget dropped to \$491,646, and has risen with UHPA salary increases to match the budget from 2015.

Projected operating costs reflect the increase to the base that would have resulted from new hires, rather than the total costs, which are reflected in the actuals. Thus, the program has remained virtually flat in the overall personnel expenses while maintaining both programs. HMMA is only a small portion of those costs when considered by percentage of credit hours provided by department faculty from year to year.

	Year 1	Year 2 16-17	Year 3 17-18	Year 4 18-19	Year 5 19-20	Year 6 20-21
	15-16					
Projected Operating Costs (from Provisional proposal)	\$96,000	\$183,054	\$192,672	\$216,922	\$222,633	\$228,314
Actual Operating Costs (entire department)	\$565,453	\$573,148	\$599,511	\$491,646	\$537,660	\$565,662

Table 6: Personnel and Operating Costs

While the general fund expenses have remained flat, external funding continues to minimize G-fund expenses and operating costs. In Kona, Kamehameha Schools (KS) closed the Outrigger Keauhou Beach Resort, demolished the hotel, and established a Native Hawaiian educational center on the property that makes use of cultural sites in the Keauhou region as a long-standing educational program. From 2015 through 2019, they contributed \$230,000 directly to UHH Heritage Management faculty salary through its "Community Investing Program" (Mills, PI). In the original proposal, that had committed to \$180,000. During the first and second summers, Dr. Jack Rossen also conducted two archaeological field school programs in a collaboration with KS on projects in Keauhou-Kahalu'u, in which HMMA graduate students participated. We continue to build a strong partnership in the operation of the education center (with future funding opportunities for students and the program in general). Included in plans for the education center are bunk spaces, collections management facilities, and classroom space.

Dr. Peter Mills (MA program chair) is a co-PI with Dr. Keiki Kawai'ae'a (director of Ka Haka Ula o Ke'elikōlani College of Hawaiian Language) on a memorandum of understanding (MOU) with the Hawai'i Dept. of Transportation (HDOT) which includes \$1.25 million in funds for UH Hilo to work on the collection of oral histories and research on archaeological sites in the North Kona region. The funding is currently providing scholarship money to two incoming HMMA graduate students in the Fall of 2021, and additional funding for undergraduate stipends. Collaborative community projects

involving the College of Hawaiian Language, the Heritage Management Program, the not-for-profit Kohala Center, and community outreach are all built into the MOU.

Four independent cooperative agreements between HMMA faculty (Mills and Kawelu) and the National Park Service for a total of \$479,000 are being directed towards undergraduate and graduate student stipends engaged in archaeological projects on NPS lands.

Dr. Joseph Genz (HMMA faculty) is also the UH Hilo project director for the National Science Foundation's "Islands of Opportunity" Louis Stokes Alliances for Minority Participation Program (IOA-LSAMP) program, which provides funding (\$3.9 million over five years) to undergraduate and graduate students who are Native Hawaiian, Pacific Islanders, African Americans, American Indians, and Alaskan Natives in the development of STEM research. This funding will be supporting two heritage management graduate students in the fall 2021 cohort.

Dr. Lynn Morrison (HMMA faculty) is also the director of the NIH funded SHARP program (\$2.4 million) which assists underrepresented students (Native Hawaiians, Pacific Islanders, Hispanic, African Americans, Native Americans and Alaskans, students with disabilities). The program provides year-round paid research assistantships to undergraduates, and although it has not directly funded HMMA graduate students, it has provided buy-outs to Dr. Morrison for teaching releases, which have in turn funded Dr. Tim Scheffler as a lecturer to cover instruction of several graduate courses.

Facilities and Equipment

No new space was acquired to create the MA program. The NHERC Heritage Center in Honoka'a provided additional space for graduate research. The Center occupied a 750 sq. ft. room at NHERC (now Kō Educational Center), with additional storage space. Even as the center transitions to a not-for-profit, collaboration with the proposed program is consistent with the Center's mission to provide educational and research services to the North Hawai'i community, and a graduate of the HMMA program will most likely be operating the not-for-profit in the near future.

Supporting laboratory space includes existing space in Kanaka'ole Hall as well as the Geoarchaeology Laboratory created in 2004 as a result of NSF grants to Peter Mills and Dr. Steve Lundblad (Geology). The lab is maintained with a RCUH revolving account (raising about \$9,000 per year), and provides opportunities for graduate students to learn and employ non-destructive technologies in the analysis of stone artifacts (with several graduate students obtaining their first peer review publications in the lab). Notably, it was also this laboratory that USGS Hawai'i Volcanoes Observatory turned to for near real-time geochemical analysis of the 2018 Kīlauea eruptions. These rapid results allowed for a 2-day lead-time on predicting the increased speed of the lava flows towards Kapoho (results published in *Science*)².

A significant new addition to the campus infrastructure is a proposed \$32 million collections facility being advanced by Robert Masuda (First Deputy of the Department of Land and Natural Resources) and the Hawai'i State Historic Preservation Division. It proposes to develop a 2.4 acre parcel on the UH Hilo campus into a jointly managed cultural collections facility. Although still in the planning stage, the concept would be to increase interaction between heritage graduate and undergraduate students in the training of Heritage Management through direct research and access to Hawai'i State archaeological collections.

5. How the program is organized to meet its outcomes

Differences in the program from what was approved by the Board of Regents including any changes in curriculum requirements from what was proposed

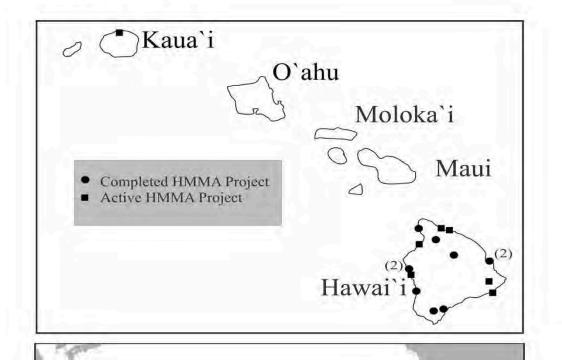
The actual curriculum aligns closely with the original proposed curriculum. No graduation requirements have changed, and no new courses have been added to the curriculum, but there are still two main differences related to the actual number of active graduate students in the program. The first is that fewer courses are being taught simultaneously because we are only admitting new cohorts every other year. The second (related) consequence is that envisioned elective courses within the program are limited. HMMA faculty are attempting to keep students in the first year of the program enrolled in the same core courses with few to no electives within the program. To compensate for this, in some cases, graduate students opt to fulfill one of the program requirements (such as one of the two required "methods" requirements) by enrolling in relevant graduate methods classes offered by Tropical Conservation Biology and Environmental Sciences (TCBES), such as GIS courses or remote sensing courses.

² Gansecki, C., R. Lopaka Lee, T. Shea, S. Lundblad, K. Hon, C. Parcheta 2019. The tangled tale of Kilauea's 2018 eruption as told by geochemical monitoring. *Science* 366(6470).

Assessment of productivity and cost/benefit considerations within the overall context of campus and University "mission" and planning priorities

In summary, he UHH Anthropology Department, although diverse in its faculty specializations, has one of the strongest campus-wide records of serving underrepresented graduates and undergraduates. Empowering underrepresented Pacific Islanders and minority students through higher education is the common theme of two multi-year grants totaling \$6.3 million now being managed by the department faculty (IOA-LSAMP, \$3.9 million; SHARP, \$2.4 million). Empowering underrepresented descendant communities in the management of their own heritage is also the main mission of the department's HMMA program. An additional \$2 million has already been secured by the university that is directly connected to the HMMA program (Kamehameha Schools community collaborations, National Park Service cooperative agreements, and Hawai'i Dept. of Transportation MOU). Another \$32 million for the proposed DLNR cultural collections facility to be built on campus and integrated with the HMMA graduate students demonstrates a continuing flow of revenue to campus infrastructure and programming related to the overall University mission. This has occurred while the anthropology department has received an operating budget between \$3,000- \$8,000 per year for graduate and undergraduate programs combined, and with the increase of a HMMA project director faculty appointment from 9-month to 11-month salary.

These efforts exemplify the vision of the future of UH Hilo's commitments to indigenous, Native Hawaiian, and Pacific Islander education, as well as community engaged learning in Hawai'i and throughout the Pacific Islands. The image below depicts the breadth of coverage by the completed and active HMMA projects.



Quantitative measures

Table 7: Courses, Sections, SSH

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	15-16	16-17	17-18	18-19	19-20	20-21
Projected No. Courses *	8	5	8	8	8	8
No. Actual Courses Offered *	8	2	7	2	3	2
Projected No. Sections *	8	5	8	8	8	8
No. Actual Sections Offered *	8	8	7	2	5	2
Projected Annual SSH	144	306	324	324	324	324
Annual SSH	120	126	144	117	87	56
FTE/enrollment (Tenure track)	1.5	2.5	1.5	2.0	1.5	2.0
FTE/enrollment (Lecturer)	.5	N/A	.25	.5	.25	.5

* Numbers do not include classes/sections that do not count towards FTE faculty teaching loads, such as heritage management internships (ANTH 690), directed studies (ANTH 699), and thesis writing (ANTH 700).

6. Evidence of student learning and student and program success

Summarize the assessment of whether or not students meet the program outcomes and the evidence used to reach this conclusion

The primary instrument used to evaluate graduate students at the completion of the program is their MA thesis. The Heritage Management program requires every student to complete a community-based thesis project. Successful completion of the thesis requires that the graduate student interact with and respond to community needs and concerns, that they successfully write a cogent original thesis (including at a minimum an introduction, methods, results of fieldwork, and conclusions). They publicly present their thesis to at least one professional setting and in a scheduled thesis defense. Thesis committees prepare a rubric in the evaluation of student success at the completion of the thesis defense.

During the program, there are multiple instruments used to assess core competencies, learning outcomes, and program objectives (including written communication, quantitative reasoning, information literacy, and oral communication), beginning with the students' preparation of a written "two-year plan" in the first semester of their graduate program (ANTH 600) to address written communication and information literacy. This is followed by the evaluation of students' preliminary public presentations (ANTH 602) which are later used in conference presentations, and an assessment of progress in a qualitative and quantitative reasoning class (ANTH 603), and faculty discussions/debriefings with community hosts of graduate interns at the completion of a graduate internship (ANTH 690).

Assessment results demonstrate excellent progress on many core competencies, but the most difficult stumbling block has been written communication skills related to the preparation of a substantial thesis. To compensate for this, the initial ANTH 600 class has been designed as a group advising class to introduce students to many aspects of thesis preparation (style guides, organization, common sources of information), but some students still have faced substantial remedial difficulties in being able to organize and write a thesis. Although a non-thesis option could increase graduation rates and admissions, that strategy would undermine the quality of the program, given that virtually all of our graduates are being prepared for fields where writing substantial reports is essential in their professional careers.

Data on time to degree trends, retention and actions to increase retention and on time graduation

The first cohort finished largely on schedule with six out of seven completing their theses in two years (an ambitious and remarkable start), but the second cohort who suffered multiple disruptions (faculty turn-over, loss of access to project sites due to the Kīlauea eruption, floods on Kaua'i, family and health issues), are taking longer to complete the program. Three of the original eight students in the second cohort (beginning in the fall of 2017) are completed at the time of this submission. One student left the program from poor academic performance, and two others are currently on academic leave dealing with family issues. The third cohort is closer to the projected schedule, but are still hampered by Covid-19 restrictions in completing community-based research projects. Several members of the second and third cohort are still on schedule to complete their degrees by the fall of 2022.

Indicators of program quality, e.g. accreditation or other external evaluation, student performance on external exams, student employer satisfaction, alignment with Hawai'i economic demand, employment/graduate school trends of graduates, awards to faculty and students, etc.

The immediate job-placement of our first cohort in multiple heritage-related government agency and private sector positions is a powerful testament to the success of the MA program (<u>Table</u> <u>3</u>). Attached letters of support from many of these agencies and organizations affirm the quality of the training and its appropriateness for reaching desired outcomes in the state.

APPENDICES

APPENDIX A: Catalog Description

The M.A. in Heritage Management is for students who seek careers in a multitude of governmental agencies, private-sector consulting firms, and in education, who work with the interpretation and preservation of cultural heritage. UH Hilo's MA in Heritage Management responds to House Resolution No. 130 of the 24th Legislature (2008).

There are five main objectives:

- apply anthropological concepts to guide a workforce of historic preservationists who are committed to the long-term management of Hawaiian cultural resources;
- b) increase the number of individuals of local ancestry in leadership positions in heritage management;
- provide better assistance to community planners in developing plans that are more sensitive to traditional cultural properties, human burials, sacred sites, ancient habitation sites, agricultural systems, and trails;
- d) provide training to meet the professional qualifications of principal investigators as defined in Hawai'i Administrative Rules (HAR)13-281 for conducting archaeological fieldwork and for conducting cultural impact assessments; and
- e) provide training to meet the federal professional standards for archaeologists as defined in 36 CFR Part 61

Although the program is focused primarily within Hawai'i, we address heritage training across the Pacific Islands. The proposal fills a clear need to produce individuals who are well-trained in the specific issues of Oceanic heritage. Despite dozens of similar MA programs around the globe, none of the major extant programs focus on the Pacific Islands. The region has unique cultural historical, social, and environmental characteristics that would make localized training more effective in creating qualified, culturally sensitive professionals.

APPENDIX B: List of Faculty and Area of Expertise

Cultural impact assessments, oral history, ethnography, Marshall Islands navigation. Anthropological relations with communities; archaeological ethics, Hawaiian ethnohistory; community-based participatory research.
archaeological ethics, Hawaiian ethnohistory;
archaeological ethics, Hawaiian ethnohistory;
community-based participatory research.
Heritage management, Hawaiian archaeology
and ethnohistory, stone tool analysis, historica
archaeology.
Biological anthropology, human osteology.
Environmental Anthropology; Analytical
Methods; Hawaiian Archaeology.
Indigenous museum studies, Fiji, indigenous
epistemologies.

Heritage Management Graduate Faculty, Dept. of Anthropology

APPENDIX C: HMMA Program Curriculum

Program Curriculum

Required Courses (12 credits):

ANTH 600 Thesis Design, Method, Theory (3)

ANTH 601 Ethics of Heritage Management (3)

ANTH 602 Historic Preservation Laws (3)

ANTH 603 Qualitative & Quant. Methods (3)

Topical Courses (3): [choose 1]

ANTH 611 Cultural Impact Assessments (3)

ANTH 612 Indigenous Museum Studies (3)

ANTH 613 Human Paleoecology (3)

ANTH 614 Submerged Cultural Resources (3)

Area Courses (3): [choose 1]

ANTH 623 Archaeology of Oceania (3)

ANTH 624 Archaeology of Hawai'i (3)

ANTH 625 Pacific Heritage Management (3)

Applied Analytical Methods (minimum 6): [choose 2]

ANTH 631 Oral History Research (3)

ANTH 632 Paleobotanical Methods (3)

ANTH 633 Material Conservation (3)

ANTH 634 Lithic Analysis (3)

ANTH 635 Human Osteology (3)

ANTH 682 Archaeological Field Methods (3-5)

Year 2 Internship in Heritage Management: (minimum 6 credits to be determined by student's area of specialization, may be repeated)

ANTH 690 Heritage Management Internship (3)

Year 2 Thesis: (minimum 6 credits)

ANTH 700 Thesis Research (1-6)

Total Minimum Semester Hours Required for the M.A. in Heritage Management: 36 credits.

Appendix D: Letters of Support

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January 12, 2022

Dear President Lassner and BOR Chair Moore,

We are writing today as the archaeology caucus of the Department of Anthropology at the University of Hawai'i at Mānoa (UHM) in full support of the University of Hawai'i at Hilo (UHH) Department of Anthropology's proposal to make permanent the UHH MA program in Heritage Management.

The completion of archaeological research is a federal and state requirement to ensure that important cultural and heritage resources are protected, preserved, and understood prior to and through development projects. These cultural and heritage resources are important tangible and intangible elements of our shared island landscapes and need to be treated with the utmost respect and care. As such, the state of Hawai'i needs well-trained archaeologists and other heritage professionals who are able to critically evaluate of local, regional, and international importance of these cultural and heritage resources. Such training does not simply include the technical details of archaeological practice, but must also include an appreciation for Hawaiian values, place-based knowledge, and contemporary community collaboration.

The Department of Anthropology at UHM does offer such training, but cannot alone meet the demand for heritage professionals across the state. Furthermore, the location of UHM on O'ahu is an impediment to some who need to meet familial and professional responsibilities to their communities. The Heritage Management program at UHH has been a wonderful addition and collaborator within this context. Not only have they been able to expand access to graduate programs to underserved communities, they have endeavored to expand training to heritage practitioners beyond those who wish to pursue a specialty in archaeology. In this way, our program and that of UHH are complementary rather than overlapping. The students who have been trained in the UHH heritage management program are well versed in heritage practice and are well respected in the community. While their number may be small relative to some programs, their impact has been felt broadly; this is a testament to both the need for and the quality of the program.

Since the pandemic began nearly two years ago, the leadership of the university system has made clear their desire to promote programs leading to economic growth and community well-being. What has also been made clear is the desire for the university to become a Hawaiian place of learning that attempts to integrate Hawaiian values and perspectives into the educational experience of students across the system. The UHH program in Heritage Management is a tool to meet both of these long-term and strategic goals. As recent discussions surrounding the State Historic Preservation Diversion (SHPD) make clear, Hawai'i is in desperate need of well-trained archaeologists; making permanent the Heritage Management program at UHH is essential for meeting this need.

Seth Quintus (Associate Professor, Convener)

James Bayman (Professor)

Am M. Lan

Miriam Stark (Professor)

HUNIN DE-

Patrick Kirch (Professor)

Patrick Kirch

Barry Rolett (Professor) Barry Rolett

Christian Peterson (Professor)

Chapleta

2424 Maile Way, Honolulu, Hawai'i 96822-2223 Telephone: (808) 956-8415 Fax: (808) 956-4893

An Equal Opportunity/Affirmative Action Institution

Mitchell D. Roth Mayor

Lee E. Lord Managing Director

West Hawai'i Office 74-5044 Ane Keohokālole Hwy Kailua-Kona, Hawai'i 96740 Phone (808) 323-4770 Fax (808) 327-3563

March 24, 2021



County of Hawai'i PLANNING DEPARTMENT Zendo Kern Director

Jeffrey W. Darrow Deputy Director

East Hawai'i Office 101 Pauahi Street, Suite 3 Hilo, Hawai'i 96720 Phone (808) 961-8288 Fax (808) 961-8742

Dr. Peter Mills University of Hawai'i at Hilo Dept. of Anthropology Social Sciences Division Office 200 W. Kāwili Street Hilo, HI 96720

Dear Dr. Mills:

SUBJECT: <u>Support for Heritage Management MA Program at University of Hawai'i at</u> <u>Hilo</u>

The purpose of this letter is to express our strong support for the MA in Heritage Management Program at the University of Hawai'i at Hilo (UHH).

The Heritage Management Program has provided invaluable research and has produced graduates with the knowledge and skillsets needed to pursue and fulfill our mandates to protect natural and cultural resources on Hawai'i Island. More specifically, our department has benefited directly from the program by employing a graduate as a planner within our Long-Range Planning Division. This employee, Kamuela Plunkett, works directly with our Community Development Plans and has been able to provide knowledge and expertise to assist in the review and development of planning efforts that are more sensitive to traditional cultural properties, human burials, sacred sites, ancient habitation sites, agricultural systems, and trails.

As a county agency with limited resources, it is sometimes difficult to recruit qualified candidates with the unique knowledge and understanding of our local resources that the Heritage Management Program provides. We look forward to furthering our relationship and collaborating with the Heritage Management Program for future research opportunities.

We ask that you continue to prioritize funding and support for the Heritage Management MA Program as a vital public resource. Dr. Peter Mills University of Hawai'i at Hilo Dept. of Anthropology Social Sciences Division Office March 24, 2021 Page 2

Should you have any questions, please feel free to contact Bethany Morrison of this office at 961-8138.

Sincerely, ZENDO **Planning Director**

BJM:kvs P:/wpwin60/Bethany/Grants/Agency Ltr of Support for UHH Heritage Management Program



25 March 2021

Board of Regents University of Hawai'i 2444 Dole Street Bachman Hall Honolulu, HI 96822

Aloha mai U. H. Board of Regents,

I write to you with regard to the Master's program in Heritage Management at the Hilo campus of the University of Hawai'i, which is up for consideration of moving from probationary to permanent status. I strongly believe that the Board of Regents should endorse this change of status, making the Heritage Management program at Hilo a permanent part of the graduate program in Anthropology.

When the Heritage Management program at Hilo was proposed in 2013, this was with the idea that the program would fill a much need niche with respect to cultural and historical sites and resources in Hawai'i. Although some were concerned that the new program would duplicate efforts at U. H. Mānoa, specially the Master's program in Applied Archaeology, in fact the two programs have rather different emphases. Whereas the Applied Archaeology program at Mānoa trains students to be professional archaeologists who can be employed by archaeological consultancies, the program at Hilo is formed around the concept of community-based heritage management, a considerably broader approach that aims to engage a full range of stakeholders. That both programs have attracted students and have flourished simultaneously over the past few years shows that they are complementary rather than being in competition.

The first cohort of seven MA students in the Heritage Management program at Hilo matriculated in 2015 and completed their program in 2017. Of these, two are employed by an archaeological consulting firm, one is working with the Lands Division of OHA, one is a site manager for the Edith Kanaka'ole Foundation, one is a land use planner with Hawai'i County, and another is working for the State Division of Historic Preservation. This is indeed an impressive record of job placement for the Hilo program.

The second and third cohorts now working to complete their programs of study include a number of individuals who were already in or starting careers in such organizations as the National Park Service, Kamehameha Schools, Cultural Surveys Hawai'i, and the North Hawai'i Education and Research Center. The Heritage Management Program is assisting these individuals to advance in these career positions by giving them the requisite professional tools and credentials.

It is noteworthy that the Heritage Management program at Hilo has been implemented without the addition of any new faculty FTE. Although one new faculty member was hired, this was offset by the retirement of another individual whose line was not replaced. Moreover, faculty in this program have brought significant extra-mural funding to the Hilo campus, through grants

2424 Maile Way, Honolulu, Hawai'i 96822-2223 Telephone; (808) 956-8415 Fax: (808) 956-4893 and collaborative agreements with the National Science Foundation, the National Park Service, Kamehameha Schools, and other agencies and partners.

In sum, by any measure the Master's program in Heritage Management has during its initial probationary period proven to be a great success. I strongly believe that the continuation of this program is essential to heritage preservation in the State of Hawai'i, and I urge the Board of Regents to approve the continuation of the program on a permanent basis.

Me ka ha'aha'a,

Patrick V. Kirch Professor of Anthropology Member, U. S. National Academy of Sciences

GOVERNOR



STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION

HAWAII DISTRICT 50 MAKAALA STREET HILO, HI 96720 TELEPHONE: (808) 933-8866 • FAX: (808) 933-8869

April 1, 2021

Board of Regents University of Hawaii 244 Dole Street Bachman Hall, Room 209 Honolulu, Hawaii 96822

Dear Regents:

Subject: Support for Heritage Management Masters of Arts Program at the University of Hawaii at Hilo

I am writing in support of the Heritage Management Master of Arts Program at University of Hawaii at Hilo. As the District Engineer of the Island of Hawaii, I can attest to the benefit of having a program based on our island that has the ability and capacity to perform valuable, time-sensitive research for our community.

In 1999, the Department of Transportation Highways Division (HDOT) began projects to widen the Queen Ka'ahumanu Highway that resulted in adverse effects to native Hawaiian cultural and archaeological resources. The mitigation of the adverse effects culmunated in a Memorandum of Agreement (MOA) between the Advisory Council on Historic Preservation, the Federal Highway Administration and the Hawaii State Historic Preservation Officer. One key component of the MOA was requested by the Native Hawaiian Organizations for native Hawaiian cultural outreach and education.

The MOA is currently being executed jointly by the University of Hawaii at Hilo's Ka Haka 'Ula O Ke'elikōlani College of Hawaiian Language and the Department of Antrhopology. There are five primary programs for outreach and education that includes scholarships and research opportunities for both undergraduate and masters program candidates. While the undergraduate program will provide a foundation for interpretation and preservation of the Hawaiian cultural heritage, the Masters Program is needed to bring education and the understanding of the Kekaha region to the next level.

JADE T. BUTAY DIRECTOR

Deputy Directors LYNN A.S. ARAKI-REGAN DEREK J. CHOW ROSS M. HIGASHI EDWIN H. SNIFFEN

IN REPLY REFER TO: HWY-H 21-2.0058 Board of Regents April 1, 2021 Page 2

As a part of the HDOT project, masters candidates in the Heritage Management Program will prepare theses in native Hawaiian archaeology, anthropology and oral histories. Candidates will work with archaeological collections from the Kekaha region and will interview descendents from the Kekaha region to record valuable histories that will soon be lost.

The key to accessing human resources in the community is to first develop respect and trust. Both Dr. Keiki Kawai'ae'a and Dr. Peter Mills are well respected in the community and have created a unique opportunity for their students to develop their own relationships with the native Hawaiian community. A program like the Heritage Mangement Program, with leadership and students who have nurtured relationships with the local communities, can only be successful if based on the island of its commitment.

As our transportation needs on the island grow, I envision a continued partnership with the University of Hawaii at Hilo to meet the community need to interpret and preserve as much of the Hawaiian culture possible for the island of Hawaii.

Thank you for the opportunity to provide support for the Heritage Management Master of Arts Program at the University of Hawaii at Hilo. Please feel free to contact me at (808) 933-8866 or by email at harry.h.takiue@hawaii.gov should you have any questions.

to

HARRY H. TAKIUE Hawaii District Engineer



United States Department of the Interior



NATIONAL PARK SERVICE Interior Region12 – Pacific Islands 300 Ala Moana Boulevard, Box 50165, Room 6226 Honolulu, Hawai'i 96850

IN REPLY REFER TO:

U.S. Department of the Interior National Park Service, IR 12 – Pacific Islands 300 Ala Moana Boulevard, Room 6226, Box 50165 Honolulu, HI 96850

March 26, 2021

Dr. Peter Mills University of Hawai'i at Hilo

Subject:Support for the move of the UH Hilo Heritage Management Program from probationary
status to permanent program

I am writing this letter in support of the University of Hawai'i at Hilo Heritage Management MA program. Since its inception in 2004, the Hawai'i Pacific Islands Cooperative Ecosystems Studies Unit (HIPI CESU) has worked closely with the University of Hawai'i campuses to develop cooperative sciencebased research projects involving both students and faculty. The Cooperative Ecosystem Studies Units (CESU) Network is a consortium of federal and non-federal partners that work together to protect our nation's natural and cultural heritage. The network makes it easy for experts at universities, museums, research institutes, and other organizations to contribute their knowledge and skills to the preservation of public resources. The CESU engages students at both the undergraduate and graduate level in research and technical assistance. This collaborative effort provides students with real life experiences addressing natural and cultural heritage resource issues and management of our nation's resources.

To date, the National Park Service and UH Hilo's Heritage Management Program have partnered to complete four projects totalling over \$479,000. These projects provide students in the cultural resources field with hands-on experience working alongside Resource Managers. They also provide the agencies with the scientific and technical expertise of University faculty. As the only master's program in Cultural Resources on the Island of Hawai'i, UH Hilo's Heritage Management Program fills an important void for federal agencies such as the National Park Service. As the Research Coordinator and Science Advisor of the HIPI CESU, I strongly support the Heritage Management MA program as a permanent program.

Sincerely,

Jadelyn J. Moniz Nakamura, PhD

Interior Region 12 – Pacific Islands American Samoa, Guam, Hawai'i, Northern Mariana Islands

Date:	March 31, 2021
То:	Peter R. Mills, Ph.D. Professor of Anthropology, UH Hilo
From:	Susan A. Lebo, PhD State Historic Preservation Division (SHPD) Archaeology Branch Chief
Subject:	Letter of Support for UH Hilo Heritage Management Program

Hello,

I strongly support the UH Hilo Heritage Management Program that uniquely offers a critical graduate degree that prepares students seeking careers in preserving, promoting, and interpreting Hawaii's unique and diverse cultural resources and heritage. This cross-disciplinary program emphasizes local classroom and community-based learning and participation. It integrates and promotes core learning in environmental studies, language, ethnic studies, cultural anthropology, archaeology, collections care and management, and public heritage management and interpretation.

Heritage management comprises an essential component of the mission of many federal, state, and county agencies, as well as museums, heritage or cultural centers, and parks, schools, and Hawaii's heritage-based economy. For many agencies and organizations, the demand for qualified heritage management graduates well training in Hawaii-based heritage belies the importance of the UH Hilo Heritage Management Program, including the State Historic Preservation Division, the Department of Hawaiian Home Lands, Kamehameha Schools, the Bishop Museum, to name a few.

For example, the State Historic Preservation Division continually seeks to employ Hawaii-trained cultural heritage staff knowledgeable in architecture, archaeology, cultural history, language, ethnography and oral history, collections management, community consultation and engagement, community-based heritage stewardship and educational outreach. Graduates of the UH Hilo Heritage Management Program include professionals well trained to manage the collections in the Department of Land and Natural Resources (DLNR) facility being built on the UH Hilo campus which will include among its holdings, cultural heritage collections from across the island of Hawaii.

In closing, the UH Hilo Heritage Management Program provides a masters program unique within Hawai'i and one that is fundament to promoting place-based cultural knowledge, expertise, and professional excellence.

Sincerely,

Susan A. Lebo, PhD

April 2, 2021



Peter R. Mills, Ph.D. Professor of Anthropology University of Hawai'i at Hilo 200 W. Kāwili St. Hilo, HI 96720-4091

via email

Re: Letter in Support of the Master of Arts in Heritage Management Program at the University of Hawai'i at Hilo.

Dear Peter:

Thank you for the opportunity to provide a letter of support for the Master of Arts (M.A.) in Heritage Management program at the University of Hawai'i (UH) at Hilo. As a former graduate of the Heritage Management program (in 2017) and the current Director of ASM Affiliates Hawai'i, I have only good things to say—both personally and professionally—about the program and it's benefits to the practice of cultural resource management (CRM), the State of Hawai'i, and our islands' communities. Your hard work and dedication to this program, its students, and the field of heritage management are commendable, and I can't thank you enough for the positive impact that you have had on my life and on the heritage of these islands. I see the Heritage Management program at UH Hilo as playing an important role in shaping the future of our Hawaiian Islands, and I hope that this program, which during its short, six-year tenure has already contributed to a brighter future, is allowed to transition from its current probationary status to a permanent fixture of the university's curriculum.

On a personal level, the Heritage Management program has not only contributed to my economic mobility. allowing me to advance from a Senior Archaeologist to a Director of ASM Affiliates (with a permit to conduct archaeology in the State of Hawai'i), but has enabled me to continue working in a profession that I love, and inspired me to advocate for a shift in how the system of heritage management works in this state. By the time I entered the Heritage Management program at UH Hilo in 2015, I had spent 17 years working as an archaeologist, and I had worked my way from being a part-time Archaeological Field Technician living on the Island of Hawai'i to a full-time Senior Archaeologist with three kids, a mortgage, and very little prospect of advancement in the field of CRM without first receiving a graduate degree. In fact, by 2015, most of my similar-aged colleagues with undergraduate degrees had left the field of CRM to seek more gainful employment in other fields. The idea of moving my family elsewhere to pursue a graduate degree or, even worse, spending an extended period of time away from them, did not appeal to me, which is why I was so thankful for the inception of the Heritage Management program at UH Hilo, and why I jumped at the opportunity to apply. My acceptance into the program not only helped to reaffirm my lifelong love of archaeology and enabled me to advance in the field of CRM, but also taught me the importance of pursuing a more equitable, community-based approaches to heritage management that will ultimately benefit the descendant communities to whom that heritage belongs.

It is the community-based approach to heritage management that I find to be most intriguing and unique aspect of the M.A. program at UH Hilo, an approach that is not duplicated at other graduate programs currently offered in the state. The program highlights the importance of involving community in all aspects of how heritage is studied, perpetuated, and portrayed, and the curriculum reflects that commitment to community-based techniques. As a member of the inaugural cohort of the Heritage Management program

April 2, 2021 M. Clark-UH Hilo Heritage Management Letter of Support Page 2 of 2

at UH Hilo I learned valuable, community-based research skills that I have since brought to the workplace. My participation in the program also enabled me to connect with an amazing group of dedicated individuals who have similar interests in Hawaiian heritage management and since graduation have become leaders in the field, working in the private sector, as well as state and local governmental agencies. Having well-trained, dedicated individuals in these positions, who are from the communities they serve, has already had a positive effect on how heritage management is conducted in the state, and has improved how the regulatory system that is responsible for the management of that heritage operates.

I have also noted the benefits of the Heritage Management program at UH Hilo from the perspective of a professional archaeologist working in the private sector in the State of Hawai'i for more than 20 years. As the Director of ASM Affiliates offices in Honolulu and Hilo, I am responsible for directing and staffing heritage related projects around the State of Hawai'i. It is often difficult to find qualified individuals to manage and staff these projects given the specialized nature of Hawaiian archaeology and the small labor pool of people trained for such work. In recent years, the M.A. program in Heritage Management at UH Hilo has helped alleviate some of those labor shortages. ASM Affiliates currently employs two graduates of the UH Hilo Heritage Management program in senior leadership positions, and another current participant as an associate staff member. We have previously employed other participants in the program as staff members on projects and have brought a few individuals on as interns to help build their professional experience. As an employer I appreciate the skill and dedication of those who participate in the Heritage Management program and wish that more graduates were available to help alleviate our current staffing shortages.

In conclusion, I sincerely hope that this important M.A. program becomes a permanent fixture at UH Hilo and remains a training ground for the next generation of Hawai'i's heritage managers. I truly appreciate the opportunity to have studied with you and the other professors at UH Hilo who have made the program such a success. I look forward to working with more graduates of the program in the coming years, and I cannot express how beneficial having locally trained heritage managers has already been to the communities of our Hawaiian Islands.

Minm

Matthew R. Clark, M.A. Director ASM Hawai'i

March 30, 2021



Subject: Letter of Support for the University of Hawai'i at Hilo, Heritage Management Program

Aloha to the University of Hawai'i Board of Regents:

Over the last four decades, the State of Hawai'i has passed a series of laws affirming the state's commitment to protecting customarily and traditionally exercised rights of Hawaiians and other manifestations of their heritage. Such laws include Article IX and XII, Section 7 of the Hawai'i State Constitution and Hawai'i Revised Statutes, Chapter 6E. However well-intentioned, the efficacy of these laws in fulfilling the state's obligation is contingent upon the work of individuals who are knowledgeable, professional, culturally competent, and committed to serving our island communities.

As a senior staff member at ASM Affiliates, I can attest to the fact that identifying and hiring such individuals is no easy task. Furthermore, Hawai'i Administrative Rules 13-281, which establishes the minimum standards for professional archaeologists (also architectural historians, ethnographers, historians, and physical anthropologists), requires these individuals to have a graduate degree from an accredited institution in archaeology or anthropology. The University of Hawai'i at Hilo (UHH) Heritage Management program is uniquely positioned to fulfill the educational requirements of this field. Whether an individual chooses to work in the contract or academic component of this field, the Heritage Management program offers its students a diverse range of courses. Another program highlight is its community-based orientation, in which throughout the program, students learn about the complexities of communities and are required to work directly with a community organization. This multi-pronged approach is critical to emerging professionals who are faced with navigating a complex set of laws that directly impacts cultural and historical resources valued by their respective communities.

In 2015, after working as a temporary hire in archaeology and earning my undergraduate degree in anthropology from UHH. I applied for the Heritage Management program. I was one of seven students accepted into the first cohort. Since graduating with my Master's degree, I have been fortunate enough to have secured a senior position at ASM Affiliates, where I prepare archaeological inventory studies, cultural impact assessments studies, burial treatment plans, traditional and customary practices analyses, and preservation plans. Having my graduate degree has allowed me to become a state-certified archaeologist and ethnographer. This in turn has allowed me to do the work that I am passionate about, at the same time, having an active role in the perpetuation of my heritage as a Hawaiian, while providing me with a livable wage to support my family and give back to the UH Foundation biannually. Through my work, I have been able to engage with other Hawaiian communities across the state, work with stakeholders and planners to ensure traditional knowledge and information about Hawai'i's cultural resources are considered during the planning process for development projects in Hawai'i. Each of the six other members from my cohort have also gone on to work at various private and government agencies fulfilling important responsibilities associated with the preservation of Hawai'i cultural heritage.

The efforts of the directing professors at the Heritage Management program have yielded impactful results. While the size of the program remains relatively small when compared to other more established graduate programs at UHH, it serves a long-awaited need in our community. The success of any program should not be measured solely on its financial standing. As I have attempted to demonstrate in this letter, the positive impacts of this program have been far-reaching and deeply personal. Ensuring this program receives the proper support is a critical step in developing heritage management professionals.

As a 2017 graduate of the University of Hawai'i at Hilo (UHH) Heritage Management program. I submit this letter urging the Board of Regents to continue funding and supporting the program.

Mahalo,

Jokelani Fran

Lokelani Brandt, M.A. Senior Archaeologist, ASM Affiliates | lbrandt@asmaffiliates.com | (808) 989-2471



To: Whom it may concern

March 24, 2021

From: Kalāhoʻohie Mossman The Edith Kanakaʻole Foundation 1500 Kalanianaʻole St. Hilo, Hawaiʻi 96720

Re: Support for the Heritage Management program at the University of Hawai'i at Hilo

Aloha,

I am writing to express my personal support as well as the support of the Edith Kanaka'ole Foundation for the Heritage Management graduate program at the University of Hawai'i at Hilo. I am a graduate of the first cohort of the program, and it has allowed me to better serve my community by engaging in grassroots preservation efforts. I am currently working on four cultural preservation projects in three districts on the island of Hawai'i. Protecting our natural and cultural resources is very important and the Heritage Management program at UHH has provided me with the tools not only to participate in these preservation initiatives but to engage and work with our vibrant communities in moving these initiatives forward.

The Edith Kanaka'ole Foundation is a well respected Hawaiian cultural organization based in Hilo. EKF's mission is to elevate Hawaiian intellegence through cultural education founded on the teachings and traditional practices of Edith and Luka Kanaka'ole. We have been supporting the perpetuation of Hawaiian cultural practices throughout the State since 1990. EKF manages lo'i kalo (taro fields) in Waipi'o, 'Imakakāloa Heiau in Ka'ū and Haleolono fishpond in Hilo conducting educational programs and community workdays. The Heritage Management program has provided our organization with more opportunities to do research and work in the field of cultural resource management. This program has also increased the percentage of native Hawaiian cultural resource management at the state and county levels as well as in the private sector and non-government organizations. I sincerely hope that this program can transition from probationary status to permanent status and continue providing such a vital service to our community. Thank you for your consideration.

Kalāhoʻohie Mossman Executive Officer Edith Kanakaʻole Foundation 1500 Kalanianaʻole St. Hilo, Hi 96720



KULANUI O HAWAI'I MA HILO

Ka Haka 'Ula O Ke'elikölani College of Hawailan Language

http://www.olelo.hawaii.edu/khuok/

MOKUNA PAPAHANA KĂLAFIKE Academic Studies Division

Muapuka Undergraduate Programs

> Mulipuka Graduate Programs

Kula Mauli Ola Laboratory Schools

Kahuawaiola Indigenous Teacher Education Program

> MOKUNA HALE KUAMO*O Hawaiian Language Center

Ho'oikaika Kumu Hawaiian Medium Teacher Development

Ho'omohala Ha'awina Lawelawe Pāpaho & Keleka'a'ike Curriculum Development, Media and Telecommunication Services

KE²ENA HO²OKELE KOLEKE Administrative Office

200 W. KÄWILI STREET HILO, HAWAI'I 96720-4091 KELEPONA (Phone): (808) 932-7360 KELEPA'I (Fax): (808) 932-7651

KE KULA "O NÄWAHIOKALANI"ÕPU"U Hawaiian Medium Laboratory School

16-120 'ÕPÜKAHA'IA ST, SUITE 1 KEA'AU, HAWAI'I 96749 KELEPONA (Phone): (808) 982-4260 KELEPA'I (Fax): (808) 966-7821

> He Mea Hai Ma Ka Papaha Kaulike Me Ke Pai Laemāuna

> An Equal Opportunity/ Affirmative Action Institution

March 30, 2021

Dr. Peter Mills Professor of Anthropology Program Chair, Heritage Management Program

RE: LETTER OF SUPPORT FOR PERMANENT STATUS OF THE M.A. IN HERITAGE MANAGEMENT

E ke kōmike ē, aloha nui 'oukou;

As one of the most diverse campuses in the U.S., UHH, with its remarkable cultural, historical, social, and environmental location, provides prime opportunities for academic research and study in cultural heritage management. One of the unique qualities of Hawai'i island is the rich traditional and cultural properties such as Native Hawaiian ancient habitation sites, agricultural systems, human burials, sacred sites, and ancient trails. Hawai'i Island has many locations where applied learning experiences on the land and communities provide an edge advantage for students in the Heritage Management program.

As the Director of Ka Haka 'Ula O Ke'elikōlani College, I have personally experienced the connection between Hawaiian Studies graduates who pursue a career in the anthropology and archaeology field that the M.A. in Heritage Management Program offers. For example, two-thirds of the first cohort that graduated in 2017 were Hawaiian speakers. They utilized their Hawaiian language and cultural knowledge skills for advanced study in Heritage Management. These students, many of who are Native Hawaiian, used their B.A. knowledge in Hawaiian Studies to contribute to the interpretation and perpetuation of the Hawaiian cultural heritage through a Hawaiian grounded, academic, and professional lens.

1

In addition, U.H. Hilo currently has an MOU with the State Department of Transportation that Dr. Peter Mills and I currently Co-PI. The over 1.2 million dollar funding will create new anthropologic resources for the field and community. The MOU will also provide funding that offers students an opportunity for scholarship, research support, internship/mentorship, and first hand community projects. Another opportunity for future students will be the SHPD facility that is currently being planned on the UHH campus for remaining Rosendahl collections and other big Island SHPD collections.

It is important that the M.A. in Heritage Management is approved for permanent status. The program is well designed and aligned with the strategic directions of the UH Hilo campus. I ask for your support to approve the program to permanent status.

Me ka ha'aha'a,

Keehe Ulawaiaca

Keiki Kawai'ae'a Director, Ka Haka 'Ula O Ke'elikōlani College of Hawaiian Language

April 1, 2021

Dr. Peter R. Mills Professor of Anthropology Director Heritage Management MA Program Anthropology Department University of Hawai'i At Hilo 200 W. Kāwili Street Hilo, HI 96720

Dear Dr. Peter Mills:

I attended the Heritage Management MA Program at UH Hilo from 2015-2017, earning my degree in 2017. I currently work as a State Historic Preservation Division (SHPD) Archaeologist IV on Hawai'i Island and attribute my experience, qualifications, and skills to being in the first cohort of the Heritage Management program. The program exposed me to experienced archaeologists, involved community members and archaeological knowledge and skills specific to Hawai'i. I strongly feel that the program opened job opportunities for me as a previously unexperienced archaeologist while also teaching me the skills to be able to perform to the standards expected.

Prior to attending the Heritage Management Program at UH Hilo, I had little experience in archaeology aside from receiving my BA in Anthropology with an emphasis in Archaeology at Saint Mary's College of California (2013) and attending an archaeological field school in O'ahu in 2012. While attending St. Mary's, my passion for Hawaiian culture and archaeology was ignited by a lead professor, Dr. Cynthia Van Gilder. As a sophomore in my undergraduate (2011), Dr. Van Gilder informed me that an MA Program at UH Hilo, created by her graduate classmate, would open in 2015. Dr. Van Gilder was confident I would be a good candidate for the program. I waited two years after graduation, in hopes of being accepted into the program, to do Hawaiian archaeology in Hawai'i. You trusted your classmate's recommendation and had confidence that I would make a positive contribution to heritage management in Hawai'i.

My cohort, professors, classes, and thesis work gave me a solid foundation to not only begin my archaeology career but also to be prepared to hold a lead position in it. My thesis was a fully community-based collaborative project that helped me build relationships and prepared me for consulting with community and advocating as well as addressing their concerns. A large part of the program was learning to combine archaeology with community to ensure the community is involved in decisions regarding archaeological sites and Hawaiian heritage. The program was a positive challenge that helped train me to become outspoken, well-spoken, and confident through presenting in class, at the Society for Hawaiian Archaeology conference, and for my thesis defense which contributes to my current position as I consistently engage with the public. The rigorous writing standards expected of us during the program contributes to my ability to write letters for the State Historic Preservation Division and to ensure that archaeological work and reports are up to the current standards. Prior to working for SHPD, I worked in the private sector and as a Cultural Resource Specialist at Põhakuloa Training Area. The program prepared me to write archaeology reports, lead projects, and lead field crews.

The most significant part of the program for me was the way it shaped my perspective regarding community and heritage management. The program focuses on the importance of the community having not only input in their heritage but also in shaping and controlling the way that their heritage is studied, preserved, and portrayed. The program contributes to creating groups of individuals that are passionate, caring, and advocates for communities with our main goal being the preservation of that heritage. This is also the perspective that I have brought to my current position as an SHPD archaeologist.

I fully support the Heritage Management MA Program at UH Hilo and hope to see it become a permanent program. I believe it will be a benefit to Hawai'i, Hawaiian heritage, and communities throughout Hawai'i as more individuals pursue the program.

I would like to thank you, Dr. Peter Mills. You have been dedicated to Hawaiian heritage, to Hawaiian archaeology, to the Heritage Management MA program, to your students and to numerous communities throughout Hawai'i Island. I wouldn't be in the position I am in today without your leadership, guidance and belief in me. Thank you for consistently

pushing me to be better during my time in the Master's program and thank you for always being a positive, energetic light.

A.M.

Nicole A. Mello, M.A. Hawai'i Island Archaeologist IV State Historic Preservation Division-Hawai'i Island Department of Land and Natural Resources 40 Po'okele Street Hilo, HI 96720

Lyman Museum

276 Haili Street ~ Hilo, Hawai'i 96720 20 March 2021

> Professor Peter R. Mills, Ph.D. Department of Anthropology University of Hawai'i at Hilo Hilo, HI 96720

Dear Dr. Mills,

I am writing in strong support of UH-Hilo's M.A. program in Heritage Management, and to acknowledge its excellent reputation among cultural heritage professionals in our community.

As Executive Director of the Lyman Museum—the only general history museum on Hawai'i Island—I have been concerned about where we would be able to find the next generation of museum professionals to provide stewardship and leadership of such institutions in the years to come. I am of the opinion that the best candidates for such positions would be found within the Hawai'i community, especially if their education, training, and experience were to be gained at Hawai'i-based universities and colleges, and through local internship opportunities. Therefore I was delighted some years ago to hear of the establishment of UH-Hilo's graduate program in Heritage Management, the scope and depth of its curriculum offerings, and the inclusion of a secondyear Heritage Management Internship component.

To have this graduate-level educational opportunity available on Hawai'i Island is a tremendous boon, both to local and regional students and to the many Hawai'i-based museums, government agencies, and consulting businesses who need employees grounded in the concepts, issues, and training of cultural heritage and historic preservation—with a Pacific Islands focus. As I have been hearing, the graduates of this M.A. program are now providing these much-needed benefits to the Hawai'i community; they will continue to do so if the program moves from probationary to permanent status at the University.

The program prepares its students for leadership positions and careers in a number of work settings. From my perspective as director of an accredited museum—a significant community resource for preserving and sharing Hawai'i's cultural and historical heritage—I see the development of well-qualified, culturally sensitive museum professionals as of critical importance for the future of our State's museums and historic sites. It just makes sense, from both a practical and an economic standpoint, for UH-Hilo to continue providing this valuable educational opportunity to students from our State and elsewhere in the Pacific region, where its curriculum, regional focus, and program make it unique among Heritage Management graduate programs.

One option in the program's Internship in Heritage Management component is an Internship in Museum Studies. The Lyman Museum looks forward to welcoming such an intern in the near future, and to partnering with UH-Hilo in developing the next generation of HM professionals, for the benefit of our community. Many thanks for all you are doing with this program; we wish you continued success!

Barbara G. Moir, Ph.D. President and Executive Director Curator of Education



NORTH HAWAI'i Heritage Foundation 45-3490 Māmane Street Suite C Honoka'a, Hawai'i 96727

Dr. Peter Mills Anthropology Department University of Hawai'i at Hilo 200 W. Kāwili St. Hilo, Hawai'i 96720-4091 March 21, 2021

Dear Dr. Mills:

I am extremely pleased to submit a letter in support of the Heritage Management MA program in the Anthropology Department of the University of Hawai'i at Hilo. I have been involved with the program since its inception as a thesis committee member and as a resource for research opportunities and internships.

For the past ten years, I was coordinator of the UH Hilo Heritage Center at the Kō Education Center (formerly the North Hawai'i Education and Research Center) in Honoka'a. Students who went through the Heritage Management program and are now employed in the field have used our archives for developing cultural surveys relating to their jobs. I have been impressed with the research abilities and knowledge students display after completing the program.

Too often students on Hawai'i Island who want careers in heritage management have to go to O'ahu or the mainland to aquire the skills required in county, state or federal positions. The professional opportunities on the island are significant on the federal level with Hawai'i Volcanoes National Park, Pu'uhonua o Hōnaunau National Historic Park (City of Refuge) and Pu'ukoholā National Historic all being located here. On the state level Hawai'i Island has the Kealakekua Bay State Historical Park, Kohala Historical Sites State Monument, Lapakahi State Historical Park. All of the above mentioned historic and cultural sites require trained staff and have often recruit employees from the mainland.

The Management MA program is crucial to training people locally to fill positions on our island and throughout Hawai'i. In addition to working for historic parks, students graduate with the knowledge to work for companies doing cultural surveys and environmental impact studies.

This MA program solidly prepares graduates to find employment in Hawai'i. With its emphasis on ethics, national, state and county laws and statutes, and cultural preservation this master's program is a gem in the university system that should be retained and cultivated.

Iman my

Momi Naughton, Ph.D. Director, Honoka'a Heritage Center



E 'ONIPA'A KAKOU, A KAU I KA NU'U Let us move together as one to reach the summit

April 1, 2021

Dr. Peter Mills Professor of Anthropology Program Chair, Heritage Management Program

RE: Support for the Heritage Management Program at the University of Hawai'i at Hilo

This letter is written in support of the continuation and elevation of the Master's program in Heritage Management at the Hilo campus to permanent status.

Kanu o ka 'Āina Learning 'Ohana (KALO is a community-based 501(c)3 providing support for 17 Hawaiian-focused charter schools in the state. We are strong advocates of educational opportunities for Native Hawaiian learners that are grounded in cultural practice and preservation. The Heritage Management Program allows the population we serve to pursue advanced degrees within a cultural context aligned with our value and belief systems within a safe, caring environment. A review of the cohort and employment lists are testimony to the proven success of the program, particularly as its graduates work in occupations giving back to local and native communities.

It is commendable that Dr. Mills has been able to accomplish all that he has with minimal staffing and grant support over the years. I applaud his efforts to develop competent community-based heritage professionals that our organization can tap for employment in the future. I look forward to joining other organizations in this endeavor.

Me ka ha aha a,

atricia Bergin

Patricia Bergin, KALO Grants Director Past Governing Board Member and School Administrator Kanu o ka 'Āina New Century Public Charter School

> 64-1043 Hi'iaka Street Waimea, Hawaii PH: 887-1117 Www.kalo.org HONORING THE PAST, ADDRESSING THE PRESENT, SERVING THE FUTURE

Dr. Billy Bergin

April 1, 2021

Board of Regents University of Hawaii 2444 Dole Street Bachman Hall Honolulu, HI 96822

SUBJECT: Support for the Heritage Management MA Program at University of Hawaii Hilo

This memorandum serves as support for the Heritage Management MA Program moving from probationary status to a permanent program.

There could be no greater opportunity to reaffirm the mission of University of Hawaii Hilo in enlightening the people of Hawaii as to the significance of the cultural heritage than by permanent acknowledgement of the Heritage Management MA program.

There could be no more timely moment than now to focus on the need to further assess and access the vast stronghold of the cultural resources that abounds in the Islands.

There could be no more critical moment than now to explore and report hitherto undescribed cultural and historic features of Mauna Kea for which Peter Mills and his series of three cohorts of graduate students have truly laid the groundwork.

The groundswell is now in the forefront and the Board of Regents is in a position to embrace this commitment.

I urge your positive action and consideration.

Sincerely,

Dr. Billy Bergin

66-1510 PuuHuluhulu Road Kamuela, Hawaii 96743

April 1, 2021

Board of Regents University of Hawaii 2444 Dole Street Bachman Hall Honolulu, HI 96822

RE: Support for Heritage Management Master's Program at University of Hawaii at Hilo

This is a memorandum to the Board of Regents on behalf of Paniolo Preservation Society (PPS) in support of the Heritage Management MA at the University of Hawaii Hilo advancing from its probationary status to a permanent program.

Paniolo Preservation Society is an established resource dedicated to the heritage of Hawaii's rich history in ranching as a major component of land uses in the Islands. The underlying responsibility for the use of these lands is based on understanding and sharing the standards set forth by the native people that demonstrated prudent land use principles. As ranching evolved as a significant feature of land use, these forebears embraced Aloha Aina as the enduring principle.

However, the actual researching, recording and reporting of the details of the heritage longed for a formal academic, cultural and ecological institution of learning. The Heritage Management MA program at UH Hilo has effectively achieved this objective. This established program has been productive, not only via boots on the ground, but by delivering to the communities three cohort sets of graduates of the Heritage Management MA program that further the informational outreach in institutions such as ASM Affiliates, Office of Hawaiian Affairs, State Historic Preservation Division, Edith Kanakaole Foundation, County of Hawaii Planning Department, Kamehameha Schools, National Park Service and North Hawaii Heritage Center.

As founding President of Paniolo Preservation Society, I strongly support Dr. Peter Mills' efforts to move the Heritage Management MA program from probationary to permanent program status.

Sincerely,

William C. Bergin. DVM

Aloha mai kāua e Professor Mills,

This letter is to express my wholehearted support for the University of Hawai'i at Hilo, Heritage Management Master of Arts Program. I am a beneficiary of the first cohort class of 2017 and wish to detail the importance and value of this program.

After attaining my undergraduate degree at U.H.Hilo in 2002, I was employed at Hawai'i Volcanoes National Park in cultural resource management as an archeologist. However, my upward mobility was limited. Consequently, when the Heritage Management Program was a approved in 2015, I applied and was accepted to the program.

The community and personal benefits from this program have provided:

- The oportunity to acquire an advance degree <u>on island</u> while maintaining family, work and homeownership responsibilities.
- Grant funding of \$80K from the Pacific Cooperative Studies Unit/Federal Task Agreement in collaboration with the U.H. Hilo, Anthropology Department and Heritage Management Program supported my research at Pu'uhonua o Honaunau National Historic Park. The Task Agreement supported one full-time graduate student and one part-time undergrad student.
- Producing and publishing a master thesis on oral history's of decendants from Pu'uhonua o Hōnaunau and their relationship to the sacred wahi pana. In addition, after graduation, a final report was produced for the National Park Service on the current archive collection of kalai ki'i (wooden images) and recommendation treatments for future carved images at Pu'uhonua o Hōnaunau National Historic Park.
- Educational support in the 'Ōiwi community population that has culminated in professional collaboration and professional networking with the Hawai'i County Planning Department, State Historic Preservation Division, Edith Kanakaole Foundation, Office of Hawaiian Affairs, private archaeology firms, and Hawaii Island Burial Council (2017 Cohorts).
- The program internship with the Office of Hawaiian Affairs culminated in full-time employment as the legacy land manager of 25,856 acres of Wao Kele o Puna Forest Reserve the week my degree was conferred.

I am grateful to and support the U.H.Hilo, Heritage Management Program. This curriculum is essential to our community's professional advancement which endeavors to produce and contribute valuable research and support on Hawai'i island and the Pacific region.

Mahalo piha, Kalena K. Blakemore <u>Kalenab@oha.org</u>

Wm. D. Māhealani Pai PO Box 251 Kailua Kona, HI 96745

April 1, 2021

Dr. Peter Mills, Director Heritage Management MA Program Anthropology Department University of Hawai'i at Hilo 200 West Kāwili Street Hilo, Hawai'i 96720-4091

Re: Heritage Management Program

Aloha and Greetings,

I am writing in support of the Masters' Heritage Management program. My name is Māhealani Pai, and I am a graduate student at the University of Hawai'i at Hilo enrolled in the program. I am of Native Hawaiian descent and the eldest of five children. I am the only one amongst my siblings to have persevered on to post-secondary education. In 2012, I received my associate's degree from the Hawai'i Community College at Hilo and received my bachelor's degree in Anthropology in 2017 from the University of Hawai'i at Hilo.

I am a Cultural Resource Specialist for Kamehameha Schools (KS) and applied my graduate course work to advance my employment and the KS educational mission. The program's schedule strikes a balance for me to maintain my employment goals and convenient for me to drive to the other side of the island and return home the same day instead of commuting to another island. Another benefit of the program is that the tuition costs are within my reach of being affordable. I was recently promoted to a Cultural Resource Manager because I could apply what I have learned from my graduate coursework to the KS Kahalu'u Ma Kai redevelopment project in Kona. My acquired skill sets from the program and my skills as a Hawaiian cultural practitioner and aid from lineal descendant community members helped guide and assist the redevelopment efforts in being safe, resourceful, and on schedule.

This project is an undertaking that began in 2018 by removing the former Outrigger Keauhou Beach Resort Hotel to make room for a cultural and educational complex for completion in May 2021, an essential part of my graduate thesis. The Heritage Management program has made a difference in my career and become a kīpaepae, or stepping stone towards revealing my potential that would otherwise be just a dream.

Mahalo a nui, Māhealani Pai



Office of the Vice Chancellor for Academic Affairs UNIVERSITY OF HAWAII BOARD OF REGENTS

22 APR 27 A9:22

April 12, 2022

MEMORANDUM

TO:	Randolph G. Moore	
	Chair, Board of Regents	

Ernest Wilson Chair, BOR Committee on Academic and Student Affairs

VIA: David Lassner President David Lassner VIA: Debora J. Halbert Vice President for Academic Strategy Thehene Walkert VIA: Maenette Benham Chancellor

FROM: Jeffrey Moniz Vice Chancellor for Academic Affairs

SUBJECT: Request Approval of a New Provisional Certificate in Labor Studies at University of Hawai'i – West O'ahu.

SPECIFIC ACTION REQUESTED:

It is respectfully requested that the Board of Regents approve a new provisional program, the Certificate in Labor Studies at the Center for Labor Education and Research, University of Hawai'i – West O'ahu.

RECOMMENDED EFFECTIVE DATE:

Upon Board of Regents approval.

ADDITIONAL COST:

No additional costs are associated with this request.

91-1001 Farrington Highway Kapolei, Hawai'i 96707 Telephone: (808) 689-2300 Fax: (808) 689-2301

An Equal Opportunity/Affirmative Action Institution

Randolph G. Moore Ernest Wilson April 12, 2022 Page 2

PURPOSE:

The Center for Labor Education and Research (CLEAR) proposes offering a Certificate in Labor Studies. The distance delivered certificate will provide a convenient opportunity for working adult learners seeking a course of study focused on the conditions of work from a labor perspective. This is particularly apropos in the state with, arguably, the highest percentage of unionized employees. While the value of this certificate may be attractive to non-traditional, working adult students in Hawai'i, it also intentionally offers the same educational opportunity to out-of-state students via its proposed distance delivery. The certificate also offers traditional students an opportunity to enhance their major course of study with knowledge and experience, concerning labor, that may prove helpful to draw upon in their future employment. While there may be uncertainty in the kinds of jobs that our graduates may have in the future, knowledge of labor improves their ability to actively shape their experiences in their job and in their community.

BACKGROUND:

Board of Regents (BOR) Policy, RP 5.201, Section IIIA1, Instructional Programs, states that "The board shall approve the establishment of all new instructional programs granting academic credit leading to a degree or credential, upon recommendation by the president."

Offering a Certificate in Labor Studies duly responds to HRS §304A-1601(4) mandating that the Center for Labor Education and Research, established at the University of Hawai'i – West O'ahu, shall "develop and implement a labor studies degree program or programs in the University of Hawai'i system." The certificate also responds to the call, as voiced by the Labor Education Advisory Council, representing 15 different unions, and the Hawai'i State AFL-CIO, representing 74 local affiliate unions, to develop and implement a program in labor studies. (See the letters of support linked in the footnotes of the attached proposal.)

ACTION RECOMMENDED:

It is respectfully recommended that the Board of Regents approve a new provisional program, the Certificate in Labor Studies, at the Center for Labor Education and Research, University of Hawai'i – West O'ahu.

Attachment: Provisional Program Proposal: Certificate in Labor Studies

c: Executive Administrator and Secretary of the Board Oishi



Provisional Program Proposal

Certificate in Labor Studies

Submitted by the Center for Labor Education and Research

April 12, 2022

1. Executive Summary of the program.

The Center for Labor Education and Research (CLEAR) proposes a Certificate in Labor Studies at the University of Hawai'i – West O'ahu. The implementation of a Certificate in Labor Studies responds to HRS **§304A-1601(4)** calling for CLEAR to "*Develop and implement a labor studies degree program or programs in the University of Hawaii system*". For the past four years, Hawai'i has consistently held the #1 position in union density in the United States¹; however, Hawai'i is the only highly unionized state without a formalized labor studies program.

Given that Hawai'i has over 130,000 unionized workers, this program is especially relevant to the Hawai'i labor community. Distance education delivery supports the demand from the labor community on O'ahu and neighbor islands. This certificate would further strengthen collaborations between UHWO and labor organizations and open pathways for unionized workers in Hawai'i to further their education on labor governance, structure, and leadership, labor economics, labor law, and industrial relations, focusing on the necessary skills for Labor Resources Specialists. The program builds upon traditional Labor Studies programs including workers' rights, labor theory, labor ethics and provides students with a critical placed-based component – direct access and exposure to labor-related organizations as well as the labor community in Hawai'i. In addition, students will explore what labor resources specialists do on the state and federal level. As a result, students will be able to holistically address labor issues as they relate to Hawai'i.

This proposed program would collaborate internally by cross-listing LBST 300 – Labor Theory with Humanities or Social Science programs and offers articulation opportunities with Honolulu Community College to provide labor education orientations to the trade's programs

¹ <u>Hawai'i Union Density, 2020 – 2021</u>, Center for Labor Education & Research, University of Hawai'i – West O'ahu with data compiled from the US Bureau of Labor Statistics<u>, Table 5.</u>, Union affiliation of employed wage and salary workers by state.

For the past nine years CLEAR has been awarding continuing education credits (CEU's) to thousands of union stewards and business agents. Since 2018, CLEAR has offered labor education in the form of over 650 workshops, 75 classes awarding over 400 CEU's to working adults. In collaboration with the labor community, this proposal seeks to extend these education efforts to a credit-bearing course of study that would be accessible via distance learning. The proposed certificate would be similar to the LBST programs offered by higher education institutions in other states (e.g., CA, IL, MA, MI, NY, OH, WA and WI). CLEAR LBST Certificate would provide Hawai'i's only academic credential designed for specializing in labor relations. The program also positions Hawai'i for national and international labor education related grants and collaborations.

The fifteen-credit certificate delivered via distance education will provide traditional students and members of the labor community an opportunity to pursue an interdisciplinary program of study focused on labor education and labor resources from a labor perspective. This delivery would meet the need as expressed by President Lassner in his *Post-Pandemic Hawai'i and the University of Hawai'i* paper, calling for "more of the programs employers and students need in more flexible formats (online, hybrid, evening/weekend) across the state so that those who have become unemployed or underemployed, or unfulfilled can seize the opportunity to obtain the education and training they need for career advancement and change. As an interdisciplinary program, the design is consistent with UHWO's strategic action plan as reflected in its value proposition featuring "integrated, transdisciplinary programs".

In addition to benefitting the labor community, this new program deepens traditional student understandings of their working life including labor law, workers' rights, Hawai'i labor history, collective bargaining, grievance handling, labor leadership skills, and labor theory. Upon completion, students will have gained experience in labor-related apprenticeships or research projects and be prepared to meet the labor relations specialist workforce requirements at government agencies and labor- organizations.

2. Why is the program a priority for the unit; what needs/goals does it meet?

This certificate focuses on the needs of the 130,000 adult learners represented by labor unions in Hawai'i. This figure includes the approximately 110,000 Hawai'i State AFL-CIO members from 73 local affiliate unions and councils from across the state. This includes 37,000 members of HGEA, the state's largest union, and the approximately 18,000 members of the ILWU Local 142 who are employed across all of the state's major industries. As mentioned in the letter of support from Randy Perreira, President of Hawaii State AFL-CIO, "this program would enable students to gain important knowledge in labor resources and collective bargaining in the state with the highest union density in the United States", (see attached letters of support).

According to the Hawaii Industry Sectors Database, employment classifications relevant to the Labor Studies Certificate are projected to remain stable or increase by 2026.

Labor studies related industry occupations	2020	2026	Percent change from 2020 to 2026	Median Salary	Level of Educational Attainment (at least AA degree)
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Table 1. Occupational Outlook - UHWO LBST Certificate

Arbitrators, Mediators, and Conciliators [23-1022]	46	46	0%	\$61,800	88%
Compensation and Benefits Managers [13-1041]	61	60	-1.63%	\$110,614	79%
Compliance Officers [13-041]	1725	1816	+5.27%	\$70,262	75%
Human Resource Specialists	2,153	2,115	-1.76%	\$66,685	71%
Labor Relations Specialists (13-1075)	385	396	+2.85%	\$92,082	71%

Source: University of Hawai'i, Office of the Vice President for Community Colleges, with data compiled from the <u>Hawai'i Career Explorer</u>

In addition, according to the Federal Occupational Outlook Handbook, Labor Relations Specialists held 73,500 jobs in 2020, with the largest employers being labor unions². Although union membership has been declining, and labor relations specialists job outlook is dependent on organized labor, national awareness of collective bargaining corresponds with an increase in organizing in the private sector³ as well as an increase in collective bargaining bills for public workers at the legislative level.

The Occupational Outlook defines eight duties required of Labor Resources Specialists. Below, the skills are aligned with program objectives and specific courses.⁴

Learning Objectives and courses that cover the duties of Labor Specialists.	Labor Relations Duties	
CERT-LBST LO 1 . Explain social, political, and economic issues as they relate to the workplace.	 Advise management on contracts, worker grievances, and disciplinary procedures. 	
LBST 100, LBST 200 and LBST 400 will all carry Oral Communication (OC) Focus Designations. In addition, guest lecturers from the community will discuss scenarios in which these meetings take place.	2. Lead meetings between management and labor.	
CERT-LBST LO 3 . Analyze the role of labor in society by discussing interdisciplinary labor concepts in class discussions.	3. Meet with union representatives.	

² Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook, Labor Relations Specialists, at <u>https://www.bls.gov/ooh/business-and-financial/labor-relations-specialists.htm (</u>visited February 09, 2022).

³ Young workers give unions new hope—Hawaii Tribune-Herald. (n.d.). Retrieved February 21, 2022, from <u>https://www.hawaiitribune-herald.com/2022/02/14/nation-world-news/young-workers-give-unions-new-hope/</u>

⁴ Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook*, Labor Relations Specialists, *What Labor Relations Specialists Do*, at <u>https://www.bls.gov/ooh/business-and-financial/labor-relations-specialists.htm</u> (visited February 09, 2022).

LBST 300 includes State and Federal Labor Law and Labor Theory; LBST will include sunshine law requirements for state labor organizations.

In **LBST 100**, students review a sample union contract. In addition, **CERT-LBST LO 4**: provides that students will demonstrate the ability to connect labor studies themes and content with local, national and international issues.

Students will learn to critically analyze and read text and media through the following course and learning objective:

LBST 200 includes a media literacy component; and, **CERT-LBST 5**. Students will critique media for bias and identify reliable sources as it relates to labor information.

LBST 400 will include grievance handling. In addition, the learning objective below addresses issues of bias and cross cultural issues in Hawai'i in the workplace.

CERT-LBST LO 2. Summarize the cultural components of Labor Studies including the crosscultural themes in the labor movement in Hawaii, and the impact of cross-cultural labor values on local language and culture.

Every course in the program incorporates structured peer feedback enabling students to critically review each other's work, provide structured feedback. At the end of the program, students will create media presentations of their projects to share with the Labor Education Advisory Council and/or the labor organization who hosted their practicum.

- 4. Draft proposals and rules or regulations.
- Ensure that human resources policies are consistent with union agreements.
- 6. Interpret formal communications between management and labor.
- 7. Investigate validity of labor grievances.

8. Train management on labor relations.

As the most unionized state, Hawai'i working people are especially vulnerable to a lack of formalized labor education, particularly during a public crisis such as a pandemic. During the pandemic lockdown, Hawaii had the highest unemployment rate in the United States with over 140,000 unemployed in May of 2020.⁵ As a result, many Hawai'i state workers answered the call to assist the Department of Labor and Industrial Relations (DLIR) to process thousands of unemployment claims. However, knowledge in labor resources, including labor laws and workers' rights were required in order to properly adjudicate claims. Most held management perspectives which resulted in claims being incorrectly denied or delayed.

⁵ How Bad? Labor Underutilization in Hawaii During the Pandemic · UHERO. (2021, April 27). UHERO. https://uhero.hawaii.edu/how-bad-labor-underutilization-in-hawaii-during-the-pandemic/

Further, labor education is important because the pandemic revealed that a unionized civil service is critical to the health and public good of the state. Because the majority of Hawaii's unionized workforce is in the public sector, the state had the public infrastructure, qualified public workers with the proper training, sick leave, health insurance and job security to provide meals for all public-school children during the lockdown.

It is critical that future generations understand what previous generations built for them, and that they understand the importance of preserving the economic and welfare benefits of collective bargaining.

3. What are the expected enrollments in the program? From what sources?

In 2017, 11 students enrolled in LBST 100. Currently 19 students are enrolled and course evaluations are higher than the UHWO mean.

Enrollment Projections: Provisional Years (2 years for certificate)

	Year 1	Year 2	Current
	2022/23	2023/24	Year
Projected Enrollment	10	10	0

The projected enrollment considers that students enrolled in LBST 100 and 200 F2022, will enroll in LBST 300 and 400 in S2023, and complete practicum over the summer. A minimum of 20 students will enroll in the certificate program every fall over the next four years.

Program Completion Projection

	Year 1	Year 2	Current
	2022/23	2023/24	Year
Projected Program Completion (annual)	0	5	0

4. What operating and instructional resources will the program need and where will they come from? What are the program's facility's needs?

No additional instructional resources will be required, as the CLEAR is home to the only publicly available labor archive in the state. This program would most effectively utilize existing UHWO CLEAR resources: CLEAR Rice & Roses programs are being digitized in by the 'Ulu'Ulu Archive, the official state archive for moving images, which received a grant to digitize over 3,000 hours of film documenting Hawai'i's labor movement; the CLEAR Labor Archive (winner 2016 of the American Library Association RUSA award) houses materials in labor law, arbitration records, rare manuscripts and Hawai'i labor publications, as well as CLEAR publications on Hawai'i Labor History. As a result of the use of these materials, the program will provide zero-textbook cost to students taking courses.

CLEAR maintains two separate labor curriculum resources at UHWO:

- 1) CLEAR films at the 'Ulu'Ulu Archive; and,
- 2) the Center for Education and Labor Archive.

CLEAR Faculty/Staff has included four faculty lines (including the director) and one administrative assistant. The new LBST certificate program will be supported by existing employee lines at CLEAR. CLEAR faculty currently teach, primarily, non-credit continuing education classes. Faculty workload will be recalibrated between non-credit and credit teaching assignments to meet the needs of the certificate program without incurring new personnel and operating costs.

Anticipated NEW Personnel and Operating Costs

Personnel	Year 1 2022	Year 2 2023	Current Year
New Tenured Faculty	0	0	0
New Lecturers	0	0	0
Other	0	0	0

Anticipated NEW Operating Costs

	Year 1	Year 2	Current Year
New	0	0	0
Operating			
Costs			

5. What impact will developing this program have on resource (re)allocation in the unit?

The new LBST certificate program will be supported by existing resources and employee lines at CLEAR.

6. Has there been consultation at the program level between campuses and within the originating campus? Please provide documentation about who was consulted, in what capacity, and when did it happen? What is the summary of the results of this consultation?

Consultations have taken place internally, within the originating campus, and externally in the labor community.

Since the Labor Studies Certificate was presented to the Council of Chief Academic Officers (CCAO) on 08/18/2021⁶ and approved to move forward by President Lassner⁷, the Labor Studies certificate and revisions to LBST 100, 200, and 300, 400, 486 and 490 have been reviewed and approved at multiple levels. Internally, the LBST Certificate has been approved by UHWO Executives⁸, the UHWO Faculty Senate⁹, and the UHWO Curriculum Committee¹⁰; the program has also been approved by the UHWO Distance Education Committee distance education¹¹. The certificate has already been screened by WSCUC, and was approved for implementation on February 28, 2022.

Regarding internal consultations, the certificate had been previously presented to both the Humanities and Social Science Divisions at UHWO. On November 12, 2017, the certificate for LBST was presented to the Social Sciences Division at a faculty meeting.¹² The Division was not receptive to incorporating the certificate into their existing program, as subordinate to their degree program, mainly due to the interdisciplinary nature of the certificate. The following year, the certificate was presented to the Humanities Division¹³ who shared the same concerns and also decided not to add the certificate as subordinate to their degree program.¹⁴ In 2019, however, UHWO Executives approved CLEAR to pursue BOR approval for a stand-alone certificate, which is more akin to how other labor centers across the country offer their own academic programs.

Externally, the Center and the program itself are advised by the Labor Education Advisory Council (LEAC) created by HRS **§304A-1603** which consists of representatives of the trade union movement in Hawai'i - truly representative of community collaboration. LEAC has submitted letters of support in 2016, and in 2021¹⁵ as has the Hawai'i AFL-CIO¹⁶

7. What risks are associated with the program?

For the final course in the program, students may select a student project (LBST 486) or from a list of appropriate placements for a practicum (LBST 490). Students participating in LBST 490 (LBST Practicum) must sign the <u>UHWO Assumption of Risk and Release Form</u>.

8. Program details (curriculum, staffing, assessment, accreditation, etc.)

WSCUC determined that the LBST Certificate does not require a full substantive change review; the UHWO Faculty Senate approved the proposal and courses. Two courses carry Oral

⁶ <u>CCAO Agenda – August 18, 2021</u>

⁷ UHWO ATP Certificate in Labor Studies 8.18.21 CCAO

⁸ 2018.ExecSigned LBST ATP

⁹ UH West Oahu Curriculum Committee Report 2.4.22

¹⁰ University of Hawaii Mail – LBST curriculum modification

¹¹ University of Hawaii Mail – Workflow UpdateDE

¹² SSCI LBST 11.2.2017

¹³ Email re presentation to HUM

¹⁴ 4.13.2018-UH email-response from HUM Chair

¹⁵ LEAC Letters of Support 2016, 2021

¹⁶ Hawaii State AFL-CIO Letter of Support, 2021

Communication (OC) Focus Designations, and one course (Labor Theory) carries an Ethical (ETH) Focus Designation.

	Year 1 2022/2023	Year 2 2023/2024	Current Year
No. New Courses Offered	3	3	0
No. New Sections Offered	3	3	0
Annual SSH	180	180	0

Anticipated Courses, Sections, SSH

The certificate in Labor Studies enables traditional UHWO students as well as unionized members access to quality labor education delivered via distance education. The 15-credit program is comprised of the following credits:

LBST 100: Introduction to Labor Studies

This is a survey course providing the basic concepts, theories, and skills for analyzing labor in society, and the conditions of work from a labor perspective.

LBST 200: Hawaii Labor Media & Film

This course examines the social, political, economic, historical and cultural effects of labor media in Hawai'i are critically examined to understand their impact on labor perspectives locally and globally.

LBST 300: Labor Theory

(ETH – Ethical Focus Designation) This course provides an introduction to current research in labor, labor law and labor theory.

LBST 400: Seminar in Labor Topics

Seminar of guest speakers on topics such as labor economics, wage theft, medical insurance, income inequality, and labor-related skills trainings including grievance handling, introduction to collective bargaining, parliamentary procedure, introduction to arbitration and mediation and internal/external organizing.

LBST 486: Labor Studies Research Project or LBST 490: Labor Studies Practicum

LBST 100 and 200 carry Oral Communication (OC) focus designations. In addition, by integrating media literacy fand identifying media bias as it relates to organized labor, LBST 200 meets the WSCUC information literacy standard. LBST 300: Labor Theory carries an Ethical (ETH) focus designation.

Program effectiveness will be through an alignment of achievement with course, program and institutional standards. The program matrix below provides an overview when standards will be introduced, when students will be expected to demonstrate and apply concepts, and the courses where students will submit portfolio artifacts.

CLEAR Program Learning Outcomes	LBST 100 Intro to Labor Studies OC	LBST 200 Hawai'i Labor Media OC	LBST 300 Labor Theory ETH	LBST 400 Seminar in Labor Topics OC	LBST 486 (W) Applied Project; or, LBST 490 (W) Practicum in LBST
LBST CLO 1. Explain social, political, and economic issues as they relate to the workplace.	I	D	D	A	А, Р
LBST CLO 2. Summarize the cultural components of Labor Studies including the cross-cultural themes in the labor movement in Hawaii, and the impact of cross-cultural labor values on local language and culture.	I	D, A, P			A
LBST CLO 3. Analyze the role of labor in society by discussing interdisciplinary labor concepts in class discussions.	I	D	A,P		A
LBST CLO. 4. Engage in interdisciplinary concepts by applying multiple perspectives to labor concepts.	I		D	A, P	A
LBST CLO 5. Demonstrate the ability to connect labor studies themes and content with local, national, and international issues.	I	D			A
LBST CLO 6. WSCUC Competency: Information Literacy: Critique media for bias and identify reliable resources as it relates to labor information.	I, P			D,	A
University of Hawaiʻi - West Oʻahu Institutional Learning Outcomes	ILO1: Effective Communication: Use relevant information to communicate clearly and effectively to an intended audience through written and spoken language.	ILO2 Cultural Awareness: Demonstrate knowledge of different cultures, sub-cultures or cultural phenomena through the study of art, music, history, literature, ideas, language or cross-cultural research.	LU3: Critical Thinking: Demonstrate critical thinking skills by applying information to make well- reasoned arguments or solve a problem.	ILO4: Disciplinary Knowledge: Demonstrate knowledge of the purview. processes, and contributions associated with an academic discipline.	LOS: COMMUNITY ENGAGEMENT: Demonstrate engagement with campus life, the broader community or service to others through the use of co-curricular resources, participation in extra-curricular activities or service learning.

University of Hawai'i - West Oʻahu Hawaiʻi Labor Studies Certificate Program Matrix

Key = I: Introduce; D: Demonstrate; A: Apply; P: Project Artifact

No additional resources will be required as courses will be taught by CLEAR faculty labor specialists.



UNIVERSITY OF HATTICA of the Vice President for Research and Innovation BOARD OF REGENTS

22 MAY 12 A8:47

UH DTS #22460

May 10, 2022

MEMORANDUM

UNIVERSITY

of HAWAI'I'

SYSTEM

TO:	Randolph G. Moore Chairperson, Board of Regents
VIA:	David Lassner President
VIA:	Kalbert K. Young
VIA:	Carrie K. S. Okinaga
FROM:	Vassilis L. Syrmos
SUBJECT:	Request Approval of Indemnification Provision to Allow the Hawai'i ("University") to Accept National Aeronautics

SUBJECT: Request Approval of Indemnification Provision to Allow the University of Hawai'i ("University") to Accept National Aeronautics and Space Administration ("NASA") Subawards from the Space Telescope Science Institute ("STScI")

SPECIFIC ACTION REQUESTED:

It is respectfully requested that the University of Hawai'i ("University") Board of Regents ("Board") approve a template hold harmless provision in favor of Space Telescope Science Institute ("STScI") to allow the University to accept National Aeronautics and Space Administration ("NASA") research subawards issued by STScI during calendar years 2021 and 2022. This approval will retroactively apply to approximately seven (7) subawards that were processed in calendar year 2021, one (1) subaward currently pending for 2022, and to other subawards from STSci with similar template indemnity provisions that may be issued to the University during for the remainder of 2022. The request is made pursuant to Hawai'i Revised Statutes Section 304A-110 ("Indemnification"), appended as "Attachment 1" to this memorandum.

RECOMMENDED EFFECTIVE DATE:

The recommended effective date is upon Board approval. The indemnity obligation is retroactively approved for STScI subawards issued during calendar years 2021, and prospectively approved for subawards to be processed during 2022.

ADDITIONAL COST:

There are no additional costs associated with this request.

PURPOSE:

The purpose of this request is to ratify the acceptance of the indemnity for the 2021 STScl subawards and to authorize the University to accept the indemnity obligation for current year 2022 STScl research subawards.

BACKGROUND:

STScI is one of three (3) facilities operated by the Association of Universities for Research in Astronomy ("AURA"), a consortium of 47 U.S. institutions and three (3) international affiliate members. Since 1990 STScI has been the science operations center for the Hubble Space Telescope. STScI also leads the science and mission operations for the James Webb Space Telescope and for the Wide Field Infrared Survey Telescope.

STScI holds prime contracts from NASA. The University has successfully collaborated with STScI for the past 26 years, and between 2011 through 2021, the University has received \$4,207,460 in initial awards and supplements to initial awards.

Under prior subawards UH researchers at the Institute for Astronomy ("IfA") created models of star clusters and the area between the stars, analyzed data received by the Hubble Space Telescope, calculated distances between stars, and engaged in other similar fields of study. On occasion as required, University researchers may be asked to visit STScI facilities located in Baltimore, Maryland, or other venues.

Hold Harmless Obligation

The subawards incorporate STScl's general grant provisions including the following obligations (bold faced added for emphasis):

Section 28 - Grantee Liability and Insurance

A. Liability

The grantee is considered an independent researcher and not an employee of STScl. The grantee is responsible for all actions taken or not taken in the performance of the activity under a grant funded by STScl, including actions taken at the Institute, and STScl expressly disclaims any responsibility to any third party therefor. Further, to the extent allowable by State law, the grantee agrees to hold STScl harmless from, and to accept all responsibility for any harm

suffered by anyone arising out the actions of the grantee or its employees, agents, and representatives while visiting STSci.

Risk Analysis

The "Grantee Liability and Insurance" clause requires the University to hold STScI harmless from any damages arising from the actions of University personnel <u>while visiting STScI</u>. Since most University researchers will not visit STScI during their projects, it is not expected that the hold harmless clause will be frequently invoked during the course of the subaward.

If the researcher does intend to visit STScI, the risk of the visiting researcher causing injury to third parties is assessed as remote, and can be mitigated by ensuring that the visiting researcher fully understand and abide by all visitor protocols of the hosting STScI.

Since STScI research activity involves analysis of astronomical data, the risk exposure of this research is inherently not as large as, for example, research involving human participants or research requiring use of toxic chemicals.

With respect to the retroactive application to the subawards processed during 2021, we apologize for the oversight, and have addressed the situation. It appears that most of the principal investigators did not visit STScl. We are not otherwise aware that any incident occurred during 2021 or the current year 2022 that would require indemnification.

The benefits of possible site visits to STScI facilities for face-to-face interaction on a research project outweigh the risks of the "hold harmless" protection provide to the host.

The Chief Financial Officer has determined that sufficient insurance and retention exist to cover the liability of the University that may be reasonably anticipated to arise under the indemnity provision, and that no additional insurance is needed.

ACTION RECOMMENDED:

It is requested that the Board approve the hold harmless provision as set forth in STScI's General Grant Provisions, to retroactively apply to the STScI subawards processed during calendar 2021, as well as apply prospectively to the subawards that will be processed during calendar year 2022.

Attachment (HRS § 304A-110)

c: Executive Administrator and Secretary to the Board of Regents

[§304A-110] Indemnification.

- (a) Notwithstanding any other law to the contrary, the board of regents may agree in writing to an indemnity provision by which the university agrees to indemnify, defend, and hold harmless any person, corporation, or entity that sponsors research at the university when all of the following conditions are satisfied:
 - (1) The person, corporation, or entity requires an indemnity in writing as a condition for providing a grant, benefit, service, or interest in or right to use property;
 - (2) The president, or the president's designee, following a favorable review by the university general counsel or the counsel's designee, approves the proposed indemnification; and
 - (3) The chief financial officer, pursuant to section 304A-108, has obtained an insurance policy or policies in an amount sufficient to cover the liability of the university that may be reasonably anticipated to arise under the indemnity provision or has determined that it is not in the best interest of the university to obtain insurance.
- (b) Nothing in this section shall be construed to expand the scope of liability of the university beyond that set forth in chapters 661 and 662.
- (c) Nothing in this section shall be construed to waive the immunity of the university from suit in federal courts guaranteed by the Eleventh Amendment to the United States Constitution. An indemnity provision not in strict compliance with this section shall not give rise to a claim against the university under this chapter or chapter 661 or otherwise waive the university's sovereign immunity.

UNIVERSITY OF HAWAII BOARD OF ORESE the Sec President for Research and Innovation





22 MAY 12 A8:46

UH DTS #22461

May 10, 2022

MEMORANDUM

SUBJECT:	Request Approval of	Indemnification Provision in an Agree
FROM:	Vassilis L. Syrmos Vice President for Rese	earch and innovation
VIA:	Carrie K. S. Okinaga(Vice President for Lega	Affairs and University General Counsel
VIA:	Kalbert K. Young Sale Vice President for Budg	get and Finance/Chief Financial Officer
VIA:	David Lassner President	Dowel Kassa
TO :	Randolph G. Moore Chairperson, Board of I	Regents

SUBJECT: Request Approval of Indemnification Provision in an Agreement Between Curtin University, East Metropolitan Health Service, Purdue University and the University of Hawai'i

SPECIFIC ACTION REQUESTED:

It is respectfully requested that the University's Board of Regents ("Board") authorize the University of Hawai'i ("UH") to accept an indemnification provision in a Multi-Institutional Agreement for the Commonwealth of Australia Medical Research Future Fund (MRFF) for Research Activities ("Agreement") between Curtin University, East Metropolitan Health Service, Purdue University and UH for a research project funded by the Commonwealth of Australia. This request is made pursuant to Hawai'i Revised Statutes Section 304A-110, appended as "Attachment 1" to this memorandum.

RECOMMENDED EFFECTIVE DATE:

The recommended effective date is upon Board approval.

ADDITIONAL COST:

There are no additional costs associated with this request.

PURPOSE:

The purpose of this request is to obtain Board approval so that UH may enter into the Agreement with Curtin University, East Metropolitan Health Service, and Purdue University.

BACKGROUND:

The Project

The Medical Research Future Fund ("MRFF") in Australia, established under the Medical Research Future Fund Act 2015 ("MRFF Act"), provides grants of financial assistance to support health and medical research and innovation in improving the health and wellbeing of Australians. In accordance with the MRFF Act, the Commonwealth of Australia entered into an agreement with Curtin University to act as the Administering Institution to do, among other things, the following:

- To manage and be accountable for the funds received from the Commonwealth of Australia;
- To conduct the research activities in an ethical manner in accordance with all applicable Commonwealth, State and Territory laws in Australia; and
- To ensure that participating institutions perform the research activities and administer the funds in accordance with the agreement between the Commonwealth of Australia and Curtin University.

Curtin University proposes to enter into the Agreement with East Metropolitan Health Service, Purdue University and UH as the three (3) participating institutions. The Agreement will utilize the MRFF for a project entitled "Improving diet quality of patients living with obesity: A randomised controlled trial to build effective dietetic service delivery in a primary health care setting." This project seeks to address a gap in weight management care for the delivery of dietetic services to improve patient outcomes for people living with obesity. This project will develop and trial a digital platform for dietary assessment and feedback to ensure timely, evidence-based high-quality dietetic care. The randomised controlled trial will compare a 1-year digital tailored feedback dietary intervention with control (standard care). If successful, this model of care will build capacity for general practitioners (GPs) and dietitians to deliver effective evidence-based weight management advice using new technologies, increasing reach and improving patient outcomes.

The Nutrition Support Shared Resource (NSSR) at the UH Cancer Center, led by PI Dr. Carol Boushey, will work with Purdue University engineers on the mobile food record (mFR) system. The NSSR has directed and developed the food composition databases used for the analysis of images and will be the bridge for translation of the US food databases to Australian food databases and dietary patterns. This work (not available in Australia) is critical for the development of a diet quality score from the mFR.

UH's work will not involve human subjects, individually identifiable health information or protected health information.

The total amount of the Agreement is \$1,060,354.10 AUD, of which \$45,000 AUD will be paid to UH for its work to be performed over a period of three (3) years.

The Indemnification Provision

The Agreement includes the following indemnification provision:

- 9. INDEMNITY AND INSURANCE
- 9.1. Each Participating Institution indemnifies (and agrees to keep indemnified) the Administering Institution and the Administering Institution's personnel ("those indemnified") from and against any:
 - (a) cost or liability incurred by those indemnified;
 - (b) loss of or damage to property of those indemnified;
 - (c) loss or expense incurred by those indemnified in dealing with any claim against them, including legal costs and expenses on a solicitor/own client basis and the cost of time spent, resources used, or disbursement paid by those indemnified;

arising from any claim made against the Administering Institution under clause 19 of the Funding Agreement,^[1] to the extent such loss or damage was contributed to by the Participating Institution.

¹ Clause 19 of the Funding Agreement, which is incorporated by reference in the Agreement, reads:

^{19.} Indemnity

^{19.1.} The Administering institution indemnifies (and agrees to keep indemnified) Health, Health's Personnel, NHMRC and NHMRC's Personnel (in this clause 19 referred to as 'those indemnified') from and against any:

a. cost or liability incurred by those indemnified;

b. loss of or damage to property of those indemnified; or

c. loss or expense incurred by those indemnified in dealing with any claim against them, including legal costs and expenses on a solicitor/own client basis and the cost of time spent, resources used, or disbursements paid by those indemnified, arising from;

d. any act or omission by the Administering institution, its Personnel or a subcontractor (including a Participating institution) in connection with this Agreement, where there was fault on the part of the person whose conduct gave rise to that cost; ilability, loss, damage, or expense;

e. any breach by the Administering institution of the Agreement;

f. any breach of a Formal Agreement by a Participating Institution;

g. use or disposal of any Asset by the Administering Institution, its Personnel or a subcontractor (including a Participating institution);

h. the infringement of a person's intellectual Property rights or Moral Rights by the Administering institution, its Personnel or a Participating Institution in the performance, or as a result, of a Research Activity; or

- 9.2. In this clause 9 'fault' means any negligent or unlawful act or omission or wilful misconduct.
- 9.3. The Participating Institutions liability to indemnify those indemnified under this clause 9 will reduce proportionately to the extent that any act or omission involving fault on the part of those indemnified contributed to the relevant, liability, loss or damage or loss or expense.
- 9.4. The right of those indemnified to be indemnified under this clause 9 is in addition to and not exclusive of, any other right, power or remedy provided by law, but those indemnified are not entitled to be compensated in excess of the amount of the relevant cost, liability, loss, damage or expense.
- 9.5. The Parties will have the equivalent insurance required of the Administering Institution under clause 20 of the Funding Agreement.
- 9.6. Participating Institution disclaims any and all warranties both express and implied with respect to any deliverable's merchantability or fitness for a particular use or purpose, and the cumulative liability of Participating Institution for any claim, demand, or action arising out of or relating to this Agreement, the Project, and the deliverables shall not exceed the total amount paid to Participating Institution hereunder.
- 9.7. The limitation of liability under clause 9.6 does not apply in respect of any liability or indemnity arising from or in connection with clause 9.1.

UH staff attempted to negotiate a deletion or substitution of clause 9 in the Agreement with alternative language that did not impose any indemnification obligations on UH. Unfortunately, Curtin University declined to delete or modify this clause.

I. the use of the Research Material or Incorporated Material, and the doing of any of the Specified Acts in clause 13.6, for the Commonwealth Purposes, including a claim in respect of:

I. Moral Rights relating to the use of the Research Material or Incorporated Material for the Commonwealth Purposes; or

ii. the ownership of intellectual Property in the Research Material or incorporated Material or any right or license to use the Research Material or incorporated Material for the Commonwealth Purposes.

^{19.2.} In this clause 19 Yault' means any negligent or unlawful act or omission or wiliful misconduct.

^{19.3.} The Administering Institution's liability to indemnify those indemnified under this clause 19 will reduce proportionately to the extent that any act or omission involving fault on the part of those indemnified contributed to the relevant liability, cost, damage, loss or expense.

^{19.4.} The right of those indemnified to be indemnified under this clause 19 is in addition to, and not exclusive of, any other right, power or remedy provided by law, but those indemnified are not entitled to be compensated in excess of the amount of the relevant cost, liability, loss, damage or expense.

Risk Analysis:

Based on the limited scope of UH's work with Purdue University engineers on a digital platform for dietary assessment, the risks of indemnifying Curtin University, as the Administering Institution, and its personnel are acceptable. The NSSR at UH has a long history of coordinating nutrition-related studies, such as interventions, cross-sectional studies, and validation studies. Unique to the NSSR is the maintenance of an extensive food and supplement composition database with an emphasis on foods unique to Hawai'i and the Pacific. The staff has provided education and training, as well as quality control, for multiple studies involving adults, children, and infants. Based on the foregoing, the benefits to the community and UH outweigh the indemnification risks which are being evaluated, miltigated and managed.

The Chief Financial Officer has determined that sufficient insurance and retention exist to cover the liability of the University that may be reasonably anticipated to arise under the indemnity provision, and that no additional insurance is needed.

ACTION RECOMMENDED:

It is recommended that the Board approve UH's acceptance of the Multi-Institutional Agreement for the Commonwealth of Australia Medical Research Future Fund (MRFF) for Research Activities between Curtin University, East Metropolitan Health Service, Purdue University and UH which includes an indemnification in favor of Curtin University and its personnel.

Attachment (HRS § 304A-110)

c: Executive Administrator and Secretary to the Board of Regents

[§304A-110] Indemnification.

- (a) Notwithstanding any other law to the contrary, the board of regents may agree in writing to an indemnity provision by which the university agrees to indemnify, defend, and hold harmless any person, corporation, or entity that sponsors research at the university when all of the following conditions are satisfied:
 - (1) The person, corporation, or entity requires an indemnity in writing as a condition for providing a grant, benefit, service, or interest in or right to use property;
 - (2) The president, or the president's designee, following a favorable review by the university general counsel or the counsel's designee, approves the proposed indemnification; and
 - (3) The chief financial officer, pursuant to section 304A-108, has obtained an insurance policy or policies in an amount sufficient to cover the liability of the university that may be reasonably anticipated to arise under the indemnity provision or has determined that it is not in the best interest of the university to obtain insurance.
- (b) Nothing in this section shall be construed to expand the scope of liability of the university beyond that set forth in chapters 661 and 662.
- (c) Nothing in this section shall be construed to waive the immunity of the university from suit in federal courts guaranteed by the Eleventh Amendment to the United States Constitution. An indemnity provision not in strict compliance with this section shall not give rise to a claim against the university under this chapter or chapter 661 or otherwise waive the university's sovereign immunity.



UNIVERSITY of HAWAI'I SYSTEM UNIVERSITY Dominant Vice President for Research and Innovation BOARD OF REGENTS

22 MAY 12 A8:46

UH DTS #22462

May 10, 2022

MEMORANDUM

TO:	Randolph G. Moore Chairperson, Board of Regents	
VIA:	David Lassner David Laur	
VIA:	Kalbert K. Young Sand Finance/Chief Financial Officer	
VIA:	Carrie K. S. Okinaga	
FROM:	Vassilis L. Syrmos	

SUBJECT: Request Approval of Indemnification Provision in a Non-Exclusive Research and Materials License Agreement with Pioneer HI-Bred International, Inc.

SPECIFIC ACTION REQUESTED:

It is respectfully requested that the Board of Regents ("BOR") authorize the University of Hawai'i ("University") to accept certain indemnification obligations set forth in a Non-Exclusive Research and Materials License Agreement ("License") with Pioneer Hi-Bred International Inc. ("Pioneer"). The License will allow University researchers to receive research materials from Pioneer to be used to engineer tropical com varieties to expand the genetic diversity available for breeding com in temperate regions. This request is made pursuant to Hawai'i Revised Statutes, § 304A-111 (indemnifying collaborating institutions for material transfers).

RECOMMENDED EFFECTIVE DATE:

The recommended effective date is upon the Board's approval.

ADDITIONAL COST:

There are no additional costs associated with this request.

PURPOSE:

This request seeks Board authorization to allow the University to indemnify Pioneer as set forth in the License, pursuant to which Pioneer will transfer certain biological specimens or other tangible property to the University. Under this proposed License, University researchers will receive plasmids owned by Pioneer to help create new temperate corn varieties with improved agronomic traits. The license allows University researchers to perform a cooperative agreement sponsored by the National Science Foundation ("NSF") Established Program to Stimulate Competitive Research (EPSCoR) RII Track-2 FEC: Genome Engineering to Sustain Crop Improvement (GETSCI).

BACKGROUND:

The NSF's EPSCoR program was authorized by Congress in 1978 to support states that had historically received lesser amounts of federal R&D funding and have demonstrated a commitment to developing their research capacity and improving the quality of STEM research conducted at their universities and colleges. The EPSCoR RII Track-2 program supports multi-state teams of EPSCoR investigators to perform research in emerging industries, with the goal of promoting economic growth in their jurisdictions.

In FY2021, the Track-2 program supported proposals that sought to "advance research towards industries of tomorrow to ensure economic growth for EPSCoR jurisdictions", including the bioeconomy. Successful proposals described a comprehensive and integrated vision to drive discovery and build sustainable STEM capacity that exemplifies diversity of all types (individual, institutional, geographic, and disciplinary), and emphasized the development of early-career faculty that are underrepresented in the chosen STEM field

Specific Research Project

The Genome Engineering to Sustain Crop Improvement (GETSCI) is a collaboration between the University of Hawai'i at Mānoa's expertise in tropical crop and molecular biology with the Iowa State University's complementary expertise of maize breeding and maize bioengineering. The project's goal is to improve crop breeding tools by developing an efficient, robust genome engineering toolkit that can be used to speed the generation of resilient crops adapted to a changing environment and thus meet the increasing demands of a growing global population.

The materials obtained from Pioneer will enable the efficient modification of any tropical maize variety to allow its use to improve maize breeding in temperate, tropical, and subtropical growing environments. The University will gain a valuable new capability in genetic transformation and genome engineering which will expand the types of crop research possible in the state

Indemnification Requested:

The License contains a mutual indemnification provision, which in pertinent part requires the University to "hold harmless" (indemnify) Pioneer:

Section 9.2 of the License (emphasis added):

9.2 Mutual hold harmless. Each Party shall hold the other Party, and its Affiliates, officers, employees, and consultants harmless from and against and shall be solely responsible for any and all claims, suits, obligations, causes of action, liability, costs and damages, injuries to persons (including death) or property (including, without limitation, loss of use), product liability claims, claims for damage to the environment, or from the use, handling, containment, or storage of material, noncompliance with stewardship, laws, or regulations, and any other claim, whatever the cause may be, based upon, arising out of, or related to the acts or omissions of a Party and/or its Affiliates and/or any of their employees, officers, and consultants or other persons acting on their behalf or under their control, in connection with that Party's execution, delivery, performance of, or failure to perform, or practice of its rights granted under this Agreement, except to the extent that such liabilities are established in a court of law to have been caused solely and directly by the gross negligence or willful misconduct on the part of the other Party.

Attempts were made to negotiate alternative language, but Pioneer is not willing to modify its standard mutual hold harmless language in these licenses.

Indemnification Authorized Under Applicable Hawai'i law:

Section 304A-111, HRS, allows the Board to indemnify a collaborating institution that provides research materials for use by University researchers. For your convenience, Section 304A-111 is attached to this memorandum.

Risk Analysis

The University understands the risk exposure created by the receipt of the research materials from Pioneer and will take precautions to manage those risks effectively. As required by the License, the University will use and dispose of the materials in compliance with all applicable EPA, FDA, USDA and NIH Guidelines for work with recombinant DNA and/or plant material. Furthermore, the License requires that the University maintain the materials and anything derived from the materials within laboratory or greenhouse contained environments.

The protocols to handle the transferred materials are being vetted by the University's Biosafety Program. The individual researchers are aware and will comply with all applicable biosafety standards required by the Biosafety Program.

The University will carefully manage and supervise the activities of its researchers to assure full compliance with all regulations applicable to the biosafety level of the received materials.

The Chief Financial Officer has determined that sufficient insurance and retention exist to cover the liability of the University that may be reasonably anticipated to arise under the indemnity provision, and that no additional insurance is needed.

ACTION RECOMMENDED:

It is recommended that pursuant to HRS § 304A-111 the Board approve and authorize the University to provide the indemnification required by the Non-exclusive Research and Materials License Agreement with Pioneer Hi-Bred International, Inc.

Attachment (HRS § 304A-111)

c: Executive Administrator and Secretary to the Board of Regents

[§304A-111] Indemnification of collaborating institutions.

- (a) The board of regents may indemnify collaborating institutions from claims arising against them for the gross negligence or wilful misconduct of the university's officers, employees, and agents in the course of their employment, in connection with the university's use, storage, or disposal of materials owned or licensed by a collaborating institution that are purchased by the university from or transferred to the university by the collaborating institution for research or training purposes.
- (b) The university shall use the materials transfer agreements recommended and approved by the Association of University Technology Managers to confer the indemnification authorized by this section.
- (c) Indemnification claims authorized by this section shall be payable solely from the moneys and property of the university and shall not constitute a general obligation of the State or be secured directly or indirectly by the full faith and credit of the State or the general credit of the State or by any revenues or taxes of the State. The board of regents may obtain loss insurance to cover the liability of the university that may arise under this section; provided that loss insurance for the university shall be at the university's expense.



May 13, 2022

DTS-1420

MEMORANDUM

- TO: Randolph Moore Chair, Board of Regents
- FROM: Kendra T. Oishi Kluck Executive Administrator and Secretary of the Board of Regents
- SUBJECT: Recommend Board Approval of Amendments to Regents Policy (RP) 5.201, Instructional Programs

SPECIFIC ACTION REQUESTED:

It is requested that the Board of Regents (Board) approve the proposed changes to RP 5.201, Instructional Programs.

BACKGROUND:

During the meeting of the Committee on Academic and Student Affairs (ASA Committee) held on May 5, 2022, the Administration presented a proposal to amend RP 5.201, Instructional Programs, in an effort to streamline the approval of new minors, concentrations, and certificates. During the discussion on this item, questions were raised regarding the definition of "minor"; the meaning of "significant resources"; the Board's role in approving programs and delegating authority; and clarification of the meaning of the term "credentials". With the understanding that additional changes would be made to reflect the discussion that occurred during the ASA Committee meeting, the committee voted to recommend Board approval of the proposed changes to RP 5.201.

The proposed amendments to RP 5.201 to reflect the additional amendments requested by the ASA Committee include:

- (1) The addition of a definition for the term "Academic Minor";
- (2) The addition of language clarifying the term "significant resources"; and
- (3) Clarifying language on the requirement for the board to approve the establishment of new programs.

Board Chairperson Moore May 13, 2022 Page 2 of 2

These changes have been highlighted in the attached redline copy of RP 5.201. Additionally, the administration will be amending Executive Policy 5.201 to reflect requested changes that mirror those contained within RP 5.201 as well as changes to clarify the term "credentials" and delegation of approval.

ACTION RECOMMENDED:

The Board is requested to approve the proposed changes to RP 5.201, inclusive of the aforementioned revisions.

Attachments: Board Action Memo to ASA Committee RP 5.201 original RP 5.201 original redline w/highlighted changes RP 5.201 clean

Office of the Vice President for Academic Strategy

UNIVERSITY OF HAWAH BOARD OF REGENTS

22 APR 27 P4:27

April 20, 2022

MEMORANDUM

TO: Randolph G. Moore Chair, Board of Regents

SYSTEM

Ernest Wilson Chair, Committee on Academic and Student Affairs **Board of Regents**

VIA: **David Lassner** President

Dovid Laur

- Vice President for Academic Strategy Tulana Walkint FROM:
- REQUEST FOR REVISIONS TO BOARD OF REGENTS POLICY (RP) SUBJECT: 5.201 INSTRUCTIONAL PROGRAMS

SPECIFIC ACTION REQUESTED:

It is requested that the Board of Regents approve the revision of RP 5.201 Instructional Programs to reflect the administration's proposed policy changes.

RECOMMENDED EFFECTIVE DATE:

Upon Board of Regents approval.

ADDITIONAL COST:

There are no additional costs associated with this request.

PURPOSE:

RP 5.201 describes procedures for the review and approvals of new provisional programs, the review and approval of moving a provisional program to an established one, and describes the conditions under which termination and stop-out of programs will occur. The process for establishing a new program is time intensive, often taking well



Board Chair Moore Committee Chair Wilson April 20, 2022 Page 2 of 4

over a year to go from the authorization to plan (ATP) stage to a Board-approved provisional program.

In an effort to streamline approval of new minors, concentrations, and certificates, changes are needed to both EP 5.201 and RP 5.201. The intent of the policy revisions is to provide clarity around delegation of approval to the President and/or Chancellor/Provost for these types of enhancements to existing board-approved programs that do not require significant resources.

BACKGROUND:

Executive Policy EP 2.201, Section III.C., states that Regents policies shall be reviewed every three years and amended policies may be drafted, vetted and adopted at any time as may be needed. RP 5.201 was last amended on January 28, 2016. The proposed policy revisions attached have been prepared in consultation with the UH Officers, Chancellors/Provost, Council of Chief Academic Officers, Council of Senior Student Affairs Officers, Faculty Senates, UH Student Caucus and the University of Hawai'i Professional Assembly. They have also been reviewed by the Office of General Counsel

Offering a wide range of degrees at the Associates, Bachelors, Masters, and Doctoral level is fundamental to the operation of the University System. However, curricular innovation and interdisciplinary options do not fit easily within the conventional program approval process, and there has been an expressed need to develop a more flexible and responsive process. The revisions suggested for RP 5.201 are intended to facilitate such responsiveness.

The proposed revisions to RP 5.201 are designed with several goals in mind:

- To make the program proposal and approval process less lengthy and formalistic for programs that do not require significant resources.
- To help create a more flexible and responsive process for programs not requiring significant resources.
- To provide additional management of certificates that can proliferate without adequate oversight.
- To increase the provisional status time for programs of shorter duration (like certificates) so that they can adequately collect data on the success of their programs.

The intent is to delegate approval for degrees not requiring significant resources and/or programs smaller than an associate, bachelor, or graduate degree to the President or campus. The policy now includes two new and critical definitions:

Board Chair Moore Committee Chair Wilson April 20, 2022 Page 3 of 4

Significant resources: Includes one or more of the following-new faculty or staff positions, new facilities including lab or office space, and/or new operating costs beyond those that can be reallocated from other units in the college, department, division, or school.

Stand-alone: A minor or certificate program that is not housed under an existing major or degree program. These could include interdisciplinary minors or minors in an area of study where the corresponding major cannot be supported.

The following program approval will be delegated to the president or the president's designee if creation does not require significant resources:

- 1. New minors, concentrations, or certificates consisting of courses solely within or among board-approved, authorized instructional programs.
- 2. An established program which desires to change to or add a new type of degree (e.g., BA to BS, AS in xx to AS in zz) with minimal change to degree requirements may be approved by the president.
- 3. A stand-alone minor where the existing board-approved major is being terminated.
- 4. A stand-alone certificate or minor where the existing board-approved associate degree or certificate of achievement is being terminated.
- 5. New stand-alone certificates of competence, or academic subject certificates.

While the Board of Regents (BOR) retains approval over all new instructional programs granting academic credit leading to a degree or credential and approval for all instructional programs requiring significant resources as defined in RP 5. 201, EP 5.201 will further delegate program approval as provided in the chart below. The BOR will continue to be notified annually of the full scope of new program actions, and the Master List of Courses Offered will continue to reflect all changes to the programs that are offered at each campus.

Board Chair Moore Committee Chair Wilson April 20, 2022 Page 4 of 4

To Vice President for Community Colleges/Vice President for Academic Strategy:	To Campus Chancellor/Provost:
 All new stand-alone certificates of	 New minors, concentrations or
competence or academic subject	certificates consisting of courses within or
certificates. A stand-alone certificate where the	among existing Board-approved
existing Board-approved associate	instructional programs. A stand-alone minor where the existing
degree or certificate of achievement is	Board-approved major is being
being terminated.	terminated.

ACTION RECOMMENDED:

It is recommended that the Board of Regents approve the revision of RP 5.201 Instructional Programs to reflect the administration's proposed policy changes.

Attachments: RP 5.201 original RP 5.201 redline RP 5.201 clean

c: Kendra Oishi, Executive Administrator and Secretary of the Board of Regents

CURRENT





Board of Regents Policy, RP 5.201 Instructional Programs

Page 1 of 4

Regents Policy Chapter 5, Academic Affairs Regents Policy RP 5.201, Instructional Programs Effective Date: Apr. 21, 2016 Prior Dates Amended: Oct. 18, 2002; Jan. 13, 1966; Feb. 8, 1973; Oct. 20, 1978; May 21, 1982; March 18, 1983; Nov. 22, 1991; Oct. 31, 2014 (recodified); J Review Date: August 2018

I. <u>Purpose</u>

To set forth policy on instructional programs that are new, provisional, under review, and on the naming of programs.

II. Definitions

No policy specific or unique definitions apply.

III. Policy

A. New Programs

1. The board shall approve:

a. The establishment of all new instructional programs granting academic credit leading to a degree or credential, upon recommendation by the president.

b. All new certificates that are the sole credential of an instructional program or require significant resources except for the following:

(1) A Certificate of Achievement in which an associate degree in the program is already board-approved.

(2) Certificates of completion and competence.

2. The president is delegated the authority to approve new certificates consisting of courses within or among board-authorized instructional programs.

3. All new program proposals shall be consistent with the institution's mission.

B. Provisional Programs

1. New programs, once approved, shall be considered provisional during the period of their first full cycle, defined as 150% of the proposed length of the degree for baccalaureate and graduate degrees (e.g., 6 years for bachelor degrees, 3 years for master's degrees, and 5 years for doctoral degrees) and 200% for certificates and associate degrees (e.g., 2 years for certificates, 4 years for associate degrees).

2. Each provisional program shall be reviewed at the end of its first full cycle. The request to the board for "established" program status shall be submitted in the academic year following the end of the program's first full cycle. Campuses may request and the president or designee may grant an extension for one year for provisional programs. Additional extensions may be requested.

3. The recommendation by the president for approval by the board shall include the results of a program review. Following its review, the board shall determine whether the program is to be awarded established status or terminated.

4. All provisional programs that have not applied for established status or extension in the year following the completion of the first cycle may be recommended for termination by the president.

5. In confirmation and clarification of existing practice and policy, no tenure appointments or tenure commitments shall be made in the programs during this provisional period.

C. Any significant change to a program once granted established status or deviations from the original intent, purpose, or design of the program shall be approved by the board.

D. The president is responsible for maintaining and making public an official inventory of all approved degrees and certificates of achievement, undergraduate certificates and graduate certificates.

E. Review of Established Programs

1. Instructional programs are systematically assessed to assure currency, improve teaching and learning, and enhance achievement of student learning outcomes.

2. Each campus shall develop its own program review schedule, subject to the following guidelines:

a. All established programs at the University of Hawaii at Manoa, the University of Hawaii at Hilo, and the University of Hawaii West Oahu shall receive a

comprehensive review at a minimum of every seventh year unless otherwise stipulated by the board.

b. Established programs at the community colleges shall receive a comprehensive review at a minimum of every fifth year unless otherwise stipulated by the board.c. Should it be determined that a program has undergone significant changes since its establishment, a shorter review cycle may be invoked. In such cases, the program shall be subject to a comprehensive review.

d. Reviews of particular programs may be undertaken at any time as deemed necessary by the faculty, administration, or board.

e. A program with a low number of degree/certificates of achievement conferred will undergo a campus level review.

3. A report will be provided to the Board annually on programs with a low number of degrees/certificates of achievement, and on program reviews conducted in the last year, in accordance with professional and regional (WASC) accreditation standards.

F. Termination of Programs

1. Provisional and established programs deemed out-of-date or nonproductive based on a program review or other internal assessments may be terminated by the president.

2. Commitments to students already officially enrolled in such programs shall be met and limited for up to two years for associate degrees at community college programs and four years for baccalaureate degrees. No new program admissions shall take place.

3. The board shall be provided an annual report on all programs terminated.

G. Naming of Programs (Cross reference RP 11.204)

1. Programs are given a name at the time they are approved by the board. Thereafter, the president may approve changes in the functional names of academic programs and credentials as may become necessary to remain current with the terminology and focus of their fields and which involve no significant change in the program requirements.

2. No program shall be given a name to honor a person without approval of the board.

IV. Delegation of Authority

The president is delegated the authority to approve new certificates consisting of courses within or among board-authorized instructional programs. See RP 5.201A.2.

Provisional and established programs deemed out-of-date or nonproductive based on a program review or other internal assessments may be terminated by the president. See RP 5.201 F.1.

V. Contact Information

Office of the Vice President for Academic Affairs, 956-7075, risad@hawaii.edu

VI. <u>References</u>

A. http://www.hawaii.edu/offices/bor/ B. http://www.acswasc.org C. RP 11.204

Approved

Approved as to Form:

/S/

04/21/2016

Date

Cynthia Quinn Executive Administrator and Secretary of the Board of Regents REDLINE Changes recommended by the BOR Committee on Academic and Student Affairs on 5/5/2022 highlighted in yellow (Section II and III.A).





Board of Regents Policy, RP 5.201 Instructional Programs

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Regents Policy Chapter 5, Academic Affairs Regents Policy RP 5.201, Instructional Programs Effective Date: Apr. 21, 2016XXX XX, 2022 Prior Dates Amended: Oct. 18, 2002; Jan. 13, 1966; Feb. 8, 1973; Oct. 20, 1978; May 21, 1982; March 18, 1983; Nov. 22, 1991; Oct. 31, 2014 (recodified); Jan. 28, 2016; April 21, 2016 Review Date: August 2018XXX XX, 2025

I. <u>Purpose</u>

To set forth policy on instructional programs that are new, provisional, under review, and on the naming of programs.

II. Definitions

No policy specific or unique definitions apply.

"Academic Minor" means recognition of work completed in select credit courses as a student's secondary declared academic field of study. Minors generally contain fifteen to eighteen hours of coursework with at least nine hours of upper-division coursework within a specific academic major.

"Significant resources" includes one or more of the following: new faculty or staff positions, new facilities including lab or office space, and/or new operating costs that must be requested through a new budget request to the board and/or Legislature. This would not include situations in which resources can be internally reallocated from other units in the college, department, division, or school in the context of reprioritizing programs and services.

<u>"Stand-alone" means an academic minor or certificate program that is not housed under an existing major or degree program. These could include interdisciplinary minors or minors in an area of study where the corresponding major cannot be supported.</u>

III. <u>Policy</u>

A. New Programs

1. The board shall approve:

a. The <u>Approval of the board is required for the</u> establishment of all new instructional programs granting academic credit leading to a degree or credential, upon recommendation by the president, <u>except as set forth herein</u>.

<u>2.b.</u> The president or the president's designee may approve the following as long as significant resources are not required All new certificates that are the sole credential of an instructional program or require significant resources except for the following:

a. New minors, concentrations, or certificates consisting of courses solely within or among board-approved, authorized instructional programs.

b. New or changed type of degree (e.g., BA to BS, AS in xx to AS in zz) within board-approved, established program(s) with minimal change to degree requirements.

(1) A Certificate of Achievement in which an associate degree in the program is already board-approved.

(2) Certificates of completion and competence. c. A stand-alone minor where the existing board-approved major is being terminated.

d. A stand-alone certificate or minor where the existing board-approved associate degree or certificate of achievement is being terminated.

e. New stand-alone certificates, certificates of competence, or academic subject certificates.

2. The president is delegated the authority to approve new certificates consisting of courses within or among board-authorized instructional programs.

3. All new program proposals shall be consistent with the institution's mission and principles as described in RP 4.201, RP 4.202, and RP 4.203. Aligning proposals with existing board policy will help to ensure appropriate placement of programs, reduction of duplication, and increased curricular pathways across the system. The proposals should include evidence of demand and the resource requirements and implications to better focus overall resource use and allocation within the proposing academic unit.

4. The instructional program approved by the board shall include the program name, which shall be the Official Program Name, and degree type.

B. Provisional Programs

1. New programs, once approved, shall be considered provisional during the period of their first full cycle, defined as 150% of the proposed length of the degree for baccalaureate and graduate degrees (e.g., 6 years for <u>baccalaureatebachelor</u> degrees, 3 years for master's degrees, and 5 years for doctoral degrees) and <u>up to 300% 200%</u> for certificates and associate degrees (e.g., <u>3 2</u>-years for certificates, <u>6</u> 4-years for associate degrees).

2. Each provisional program shall be reviewed at the end of its first full cycle. The request to the board for "established" program status shall be submitted in the academic year following the end of the program's first full cycle. Campuses may request and the president or designee may grant an extension for one year for provisional programs. After the one-year extension, the program should be approved for established status or terminated. Additional extensions may be requested.

3. The recommendation by the president for approval by the board shall include the results of a program review. Following its review, the board shall determine whether the program is to be awarded established status or terminated.

4. All provisional programs that have not applied for established status or extension in the year following the completion of the first cycle <u>willmay</u> be recommended for termination by the president <u>after all current students have exited the program either through graduation, attrition, or transfer</u>.

5. In confirmation and clarification of existing practice and policy, no tenure appointments or tenure commitments shall be made in the programs during this provisional period.

C. Any significant change to <u>the intent, purpose, design, or structure of</u> a program once granted established status or deviations from the original intent, purpose, or design of the program shall be approved by the board.

D. The president is responsible for maintaining and making public an official inventory of all approved degrees and certificates of achievement, undergraduate certificates and graduate certificates.

E. Review of Established Programs

1. Instructional programs are systematically assessed to assure currency, improve teaching and learning, and enhance achievement of student learning outcomes.

2. Each campus shall develop its own program review schedule, subject to the following guidelines:

a. All established programs at the University of Hawai^ci at M<u>ā</u>anoa, the University of Hawai^ci at Hilo, and the University of Hawai^ci West O^cahu shall receive a comprehensive review at a minimum of every seventh year unless otherwise stipulated by the board.

b. Established programs at the community colleges shall receive a comprehensive review at a minimum of every fifth year unless otherwise stipulated by the board.

c. Should it be determined that a program has undergone significant changes since its establishment, a shorter review cycle may be invoked. In such cases, the program shall be subject to a comprehensive review.

d. Reviews of particular programs may be undertaken at any time as deemed necessary by the faculty, administration, or board.

e. A program with a low number of degree/certificates of achievement conferred will undergo a campus level review.

3. A report will be provided to the <u>b</u>Board annually on programs with a low number of degrees/certificates of achievement, and on program reviews conducted in the last year, in accordance with professional and regional (WASC) accreditation standards.

F. Termination of Programs

1. Provisional and established programs deemed out-of-date or nonproductive based on a program review or other internal assessments may be terminated by the president.

2. Commitments to students already officially enrolled in such programs shall be met and limited for up to two years for associate degrees at community college programs and four years for baccalaureate degrees. No new program admissions shall take place.

3. The board shall be provided an annual report on all programs terminated.

G. Naming of Programs (Cross reference RP 11.204)

1. Programs are given a name at the time they are approved by the board, which is the Official Program Name. Thereafter, the president may approve changes in the functional names of academic programs and credentials as may become necessary

to remain current with the terminology and focus of their fields and which involve no <u>substantial</u>significant change in the program requirements.

2. No program shall be given a name to honor a person without approval of the board.

IV. Delegation of Authority

The president is delegated the authority to approve new certificates consisting of courses within or among board-authorized instructional programs. See RP 5.201_A.2.

Provisional and established programs deemed out-of-date or nonproductive based on a program review or other internal assessments may be terminated by the president. See RP 5.201 F.1.

V. Contact Information

Office of the Vice President for Academic <u>StrategyAffairs</u>, <u>(808)</u> 956-<u>68977075</u>, <u>ovpas@hawaii.edu</u>

VI. <u>References</u>

A. http://www.hawaii.edu/offices/bor/ B. http://www.acswasc.org C. RP 11.204

Approved

Approved as to Form:

04/21/2016

Date

<u>Kendra Oishi</u>Cynthia Quinn Executive Administrator and Secretary of the Board of Regents CLEAN Changes recommended by the BOR Committee on Academic and Student Affairs on 5/5/2022 highlighted in yellow (Section II and III.A).





Board of Regents Policy, RP 5.201 Instructional Programs

Page 1 of 5

Regents Policy Chapter 5, Academic Affairs Regents Policy RP 5.201, Instructional Programs Effective Date: XXX XX, 2022 Prior Dates Amended: Oct. 18, 2002; Jan. 13, 1966; Feb. 8, 1973; Oct. 20, 1978; May 21, 1982; March 18, 1983; Nov. 22, 1991; Oct. 31, 2014 (recodified); Jan. 28, 2016; April 21, 2016 Review Date: XXX XX, 2025

I. <u>Purpose</u>

To set forth policy on instructional programs that are new, provisional, under review, and on the naming of programs.

II. Definitions

"Academic Minor" means recognition of work completed in select credit courses as a student's secondary declared academic field of study. Minors generally contain fifteen to eighteen hours of coursework with at least nine hours of upper-division coursework within a specific academic major.

"Significant resources" includes one or more of the following: new faculty or staff positions, new facilities including lab or office space, and/or new operating costs that must be requested through a new budget request to the board and/or Legislature. This would not include situations in which resources can be internally reallocated from other units in the college, department, division, or school in the context of reprioritizing programs and services.

"Stand-alone" means an academic minor or certificate program that is not housed under an existing major or degree program. These could include interdisciplinary minors or minors in an area of study where the corresponding major cannot be supported.

III. <u>Policy</u>

A. New Programs

1. Approval of the board is required for the establishment of all new instructional programs granting academic credit leading to a degree or credential, upon recommendation by the president, except as set forth herein.

2. The president or the president's designee may approve the following as long as significant resources are not required:

a. New minors, concentrations, or certificates consisting of courses solely within or among board-approved, authorized instructional programs.

b. New or changed type of degree (e.g., BA to BS, AS in xx to AS in zz) within board-approved, established program(s) with minimal change to degree requirements.

c. A stand-alone minor where the existing board-approved major is being terminated.

d. A stand-alone certificate or minor where the existing board-approved associate degree or certificate of achievement is being terminated.

e. New stand-alone certificates, certificates of competence, or academic subject certificates.

3. All new program proposals shall be consistent with the institution's mission and principles as described in RP 4.201, RP 4.202, and RP 4.203. Aligning proposals with existing board policy will help to ensure appropriate placement of programs, reduction of duplication, and increased curricular pathways across the system. The proposals should include evidence of demand and the resource requirements and implications to better focus overall resource use and allocation within the proposing academic unit.

4. The instructional program approved by the board shall include the program name, which shall be the Official Program Name, and degree type.

B. Provisional Programs

1. New programs, once approved, shall be considered provisional during the period of their first full cycle, defined as 150% of the proposed length of the degree for baccalaureate and graduate degrees (e.g., 6 years for baccalaureate degrees, 3 years for master's degrees, and 5 years for doctoral degrees) and up to 300% for certificates and associate degrees (e.g., 3 years for certificates, 6 years for associate degrees).

2. Each provisional program shall be reviewed at the end of its first full cycle. The request to the board for "established" program status shall be submitted in the academic year following the end of the program's first full cycle. Campuses may request and the president or designee may grant an extension for one year for provisional programs. After the one-year extension, the program should be approved for established status or terminated.

3. The recommendation by the president for approval by the board shall include the results of a program review. Following its review, the board shall determine whether the program is to be awarded established status or terminated.

4. All provisional programs that have not applied for established status or extension in the year following the completion of the first cycle will be recommended for termination by the president after all current students have exited the program either through graduation, attrition, or transfer.

5. In confirmation and clarification of existing practice and policy, no tenure appointments shall be made in the programs during this provisional period.

C. Any significant change to the intent, purpose, design, or structure of a program once granted established status shall be approved by the board.

D. The president is responsible for maintaining and making public an official inventory of all approved degrees and certificates of achievement, undergraduate certificates and graduate certificates.

E. Review of Established Programs

1. Instructional programs are systematically assessed to assure currency, improve teaching and learning, and enhance achievement of student learning outcomes.

2. Each campus shall develop its own program review schedule, subject to the following guidelines:

a. All established programs at the University of Hawai'i at Mānoa, the University of Hawai'i at Hilo, and the University of Hawai'i West O'ahu shall receive a comprehensive review at a minimum of every seventh year unless otherwise stipulated by the board.

b. Established programs at the community colleges shall receive a comprehensive review at a minimum of every fifth year unless otherwise stipulated by the board.

c. Should it be determined that a program has undergone significant changes since its establishment, a shorter review cycle may be invoked. In such cases, the program shall be subject to a comprehensive review.

d. Reviews of particular programs may be undertaken at any time as deemed necessary by the faculty, administration, or board.

e. A program with a low number of degree/certificates of achievement conferred will undergo a campus level review.

3. A report will be provided to the board annually on programs with a low number of degrees/certificates of achievement, and on program reviews conducted in the last year, in accordance with professional and regional (WASC) accreditation standards.

F. Termination of Programs

1. Provisional and established programs deemed out-of-date or nonproductive based on a program review or other internal assessments may be terminated by the president.

2. Commitments to students already officially enrolled in such programs shall be met and limited for up to two years for associate degrees at community college programs and four years for baccalaureate degrees. No new program admissions shall take place.

3. The board shall be provided an annual report on all programs terminated.

G. Naming of Programs (Cross reference RP 11.204)

1. Programs are given a name at the time they are approved by the board, which is the Official Program Name. Thereafter, the president may approve changes as may become necessary to remain current with the terminology and focus of their fields and which involve no substantial change in the program requirements.

2. No program shall be given a name to honor a person without approval of the board.

IV. Delegation of Authority

The president is delegated the authority to approve new certificates consisting of courses within or among board-authorized instructional programs. See RP 5.201 A.2.

Provisional and established programs deemed out-of-date or nonproductive based on a program review or other internal assessments may be terminated by the president. See RP 5.201 F.1.

V. Contact Information

Office of the Vice President for Academic Strategy, (808) 956-6897, ovpas@hawaii.edu

VI. <u>References</u>

A. http://www.hawaii.edu/offices/bor/ B. http://www.acswasc.org C. RP 11.204

Approved

Approved as to Form:

Kendra Oishi
Executive Administrator and
Secretary of the Board of Regents

Date





Office of the Vice President for Research and Innovation UNIVERSITY OF HAWAII BOARD OF REGENTS

22 MAY 12 P4:13

UH DTS #22473

May 12, 2022

MEMORANDUM

- TO: Randolph G. Moore Chairperson, Board of Regents
- VIA: David Lassner President

David Laur

- FROM: Vassilis L. Syrmos
- SUBJECT: Request for Exception to the Regents Policy RP 5.219, Emeritus/Emerita Title, for Christopher P. Lee, Director, Academy for Creative Media, University of Hawai'i

SPECIFIC ACTION REQUESTED:

We respectfully request that the Board of Regents approve an exception to Regents Policy RP 5.219 Section IV. B. for Christopher P. Lee (Director, Academy for Creative Media, University of Hawai'i System) to be awarded the title of Director Emeritus, System ACM effective as of June 1, 2022.

RECOMMENDED EFFECTIVE DATE:

The recommended effective date is June 1, 2022.

ADDITIONAL COST:

There are no additional costs associated with this request.

PURPOSE:

The purpose of this exception request is to seek approval of emeritus status for Christopher P. Lee in recognition of his contributions, including the establishment, of the University of Hawai'i System (UH System) Academy for Creative Media (ACM) BACKGROUND:

Pursuant to Regents Policy RP 5.219 Section IV. B., the President may recommend to the Board for consideration, individuals deserving of honor who do not meet the stated criteria.

Chairperson Randolph G. Moore May 12, 2022 Page 2

The emeritus title is an honor bestowed upon retiring or retired faculty members in recognition of dedicated and honorable academic service rendered to the university and to vice presidents and chancellors who have made exceptional contributions to the university and who are recognized as distinguished leaders in their field. Although Mr. Christopher P. Lee is not a faculty member, vice president or chancellor, we are requesting this exception to appropriately bestow such an honor that we believe he has rightfully earned. Mr. Lee will be retiring effective May 31, 2022.

Mr. Lee is the Founder and Director of the UH System ACM the first "film school" in the state. Recognizing the necessity of developing 21st century jobs in the global creative marketplace for our students, ACM is designed as a digital content industry catalyst to restructure the islands' economy away from its overwhelming dependence on tourism and as a system-wide platform for the indigenous and immigrant stories of Hawai'i to be told through film, video games, computer animation and transmedia.

In 2003, Mr. Lee originally secured 14 FTE and \$1 million in legislative funding plus \$679,791 in private donations, \$632,017 in federal grants, \$150,000 from the Kellogg Foundation, and another \$49,000 from the legislature to start the ACM Mānoa/Shanghai University Student Fillmmaker Exchange. In 2013, the legislature awarded UH System ACM with 10 new positions and \$2.1 million to realize the expansion of the program to UH West O'ahu (UHWO), Kapi'olani Community College, Leeward Community College and Honolulu Community College. This expansion leverages existing resources and facilities and offers a new, 2+2 articulation between the centers of excellence in creative media at the various community colleges in a seamless pathway for students to a higher education degree at UHWO. Additionally, since 2008 Mr. Lee has been the Principal Investigator for 'Ulu'ulu: the Henry Ku'ualoha Giugni Moving Image Archive of Hawai'i, the state's official digital archive and the only state of the art facility for the preservation of Hawai'i's moving image history.

Mr. Lee not only has many outstanding contributions to the UH System ACM, but also has many great achievements for his pioneer work in the production industry throughout his illustrious career. As noted in his curriculum vitae (CV), Mr. Lee has held executive positions in large production companies, and has been involved in many Hollywood box office hits.

The first Asian-American and minority to be named President of Production at a Hollywood studio, Mr. Lee executive produced Bryan Singer's *Valkyrie* for United Artists starring Tom Cruise and was a Founding Partner and President of Legendary Pictures. In addition to *Valkyrie*, Mr. Lee executive produced *Superman Returns* for Warner Brothers and produced both Columbia Pictures *SWAT*, the ground-breaking CGI feature *Final Fantasy* and Warner Brothers' *Ballistic*, the independent feature *White Frog* and executive produced the documentary *State of Aloha*.

Mr. Lee was the President of Production at TriStar Pictures and Columbia Pictures, where as an executive he oversaw such Academy Award-winning films as *Jerry Maguire*, *Philadelphia*, and As *Good As it Gets*. He also worked on numerous other hits such as *My Best Friend's Wedding*, *Legends of the Fall*, *The Fisher King*, *The Mask of Zorro*, *Godzilla*, and *The Patriot*.

Chairperson Randolph G. Moore May 12, 2022 Page 3

Also known internationally for his production work, Mr. Lee produced and edited his first Chinese language feature, *One Foot Off The Ground* for China's Hua Yi Brothers, and served as a consultant to Beijing based Chengtian Entertainment. In Korea, Mr. Lee consulted for Interpark's Digital Idea VFX studio. In television, he executive produced the animated television series *Heavy Gear* and, with director Joseph Kahn, produced music videos for artists including Janet Jackson, The Backstreet Boys, Faith Hill, Elton John and Destiny's Child.

Mr. Lee has been on the President's Board of Advisors for the Academy of Art in San Francisco and the Board of Advisors for Honolulu Community College's Music and Entertainment Learning Experience (MELE). He also served as President of the Jury for the 2009 Pucheon Network of Asian Fantastic Films, the 2009 First Asian Films Festival in Singapore, Cinema Italiano 2009 and 2008, the 2008 Tribeca Film Festival All Access Program, the 2007 San Francisco International Asian American Film festival and the 2002 Hawai'i International Film Festival. Mr. Lee is a founding member of the Coalition of Asian Pacifics in Entertainment (CAPE) and a Founding Board Member of EuroCinema Hawai'i. Named one of *A Magazine's* most influential Asian Americans, Mr. Lee served on the board of the National Asian Pacific American Legal Consortium in Washington D.C. and as a member of the Committee of 100. He has received numerous honors including the Justice in Action Award from the New York Asian American Legal Defense and Education Fund, the Visionary Award from East-West Players in Los Angeles, and the Museum of Chinese in America's Role Model Award.

Mr. Lee has brought a wealth of knowledge, expertise and prestige to the establishment and operations of the UH System ACM. As Director Emeritus Mr. Lee will continue to provide strategic advice and guidance, particular with regard to opportunities for UH external engagements with creative arts and entertainment industries. Therefore, I strongly support this request, and we believe that Mr. Lee's tremendous contributions to the University of Hawai'i have earned him the honor of an emeritus title by the Board of Regents. His CV and ACM Development Milestones are attached.

ACTION RECOMMENDED:

It is recommended that the Board of Regents approve an exception to Regents Policy RP 5.219 Section IV. B. for Christopher P. Lee (Director, Academy for Creative Media, University of Hawai'i System) to be awarded the title of Director Emeritus, System ACM.

Attachments

- C. Lee curriculum vitae
- ACM System Development Milestones

c: Executive Administrator and Secretary to the Board of Regents

Christopher P. Lee Curriculum Vitae

Education

1980 B.A. in Political Science, Yale University, New Haven, Connecticut

Professional Experience

2002 – present	Founder and Director, Academy for Creative Media 2016 – 2022, Administrative Program Officer, OVPRI, UH System 2009 – 2016, Specialist, OVPR, UH System 2005 – 2009, Specialist, UH Mānoa 2004 – 2005, Professor, UH Mānoa 2002 – 2004, Visiting Professor and Co-Director, UH Mānoa
1999 – 2001	President of Production, Columbia/TriStar Productions
1985 – 1999	TriStar Pictures Executive Vice President of Production Senior Vice President of Production Vice President of Production Director of Creative Affairs Assistant Story Editor Script Analyst
1983 – 1985	Assistant Director and Apprentice Editor, CIM Productions/Dim Sum: A Little Bit of Heart
1980 – 1983	Entertainment Segment Producer, Good Morning America

Awards and Honors

A Magazine Most Influential Asian Americans

Justice in Action Award from the New York Asian American Legal Defense and Education Fund

Visionary Award from the East-West Players in Los Angeles

Museum of Chinese in America's Role Model Award

Asian Business League's Business Man of the Year, Southern California

Professional Boards/Committees

Co-Founder, Coalition of Asian Pacifics in Entertainment (CAPE) – largest film and television networking and mentoring AAPI organization

Co-Founder Hawai'i European Cinema Film Festival

Member, Committee of 100, Chinese American Advocacy

Board Member, National Asian Pacific American Legal Consortium in Washington D.C.

President's Board of Advisors, Academy of Art in San Francisco

Board of Advisors, Honolulu Community College, Music and Entertainment Learning Experience (MELE)

Presentations and Speaking Engagements

"Hollywood and Asia – What a Difference a Decade Makes", Speaker at Hong Kong Film Mart (2009)

Digital Taiwan 2009 Keynote Speaker (2009)

Korean National Film Commission Motion Picture Producer's Business Bootcamp Speaker (2008)

"Global Economic Opportunities Through Digital Entertainment", Thai Government Animation and Multi-Media Conference (2007)

"The Rise of Creative Media in Hawai'i: A New Intellectual Property Industry", N.H. Paul Chung Memorial Lecture (2003)

Beijing Film Academy Guest Lecture

Shanghai International Film Festival Guest Lecture

Korea Fantastic Film School Guest Lecture

Grants and Fundraising

Grants and Special Funds

State of Hawaii Cable Television Division, Department of Commerce and Consumer Affairs, Cable Franchise Fees Decision and Order# = 364 Amount = \$175,000 Project Period = 1/01/2018 - 12/31/2018

State of Hawai'i Cable Television Division, Department of Commerce and Consumer Affairs, Cable Franchise Fees Decision and Order# = 364 Amount = \$200,000 Project Period = 1/01/2017 – 12/31/2017 Hawaiian Legacy Foundation Award # = 34590Amount = \$15,000 Project Period = 3/01/2016 - 3/01/2017

State of Hawai'i Cable Television Division, Department of Commerce and Consumer Affairs, Cable Franchise Fees Decision and Order# = 364 Amount = \$250,000 Project Period = 1/01/2016 - 12/31/2016

Office of Hawaiian Affairs Contract # = 3021Amount = \$20,000 Project Period = 3/19/2015 - 01/31/2016

State of Hawai'i Cable Television Division, Department of Commerce and Consumer Affairs, Cable Franchise Fees Decision and Order# = 364 Amount = \$500,000 Project Period = 1/01/2015 - 12/31/2015

Office of Hawaiian Affairs Award # = 31331Amount = \$150,000 Project Period = 3/01/2013 - 10/31/2014

Daniel K. Inouye Institute Fund Award # = 32312Amount = \$50,000 Project Period = 12/11/2013 - 12/10/2014

U.S. Department of Education, Office of Postsecondary Education Award # = S362K100001 Amount = \$500,000 Project Period = 9/01/2010 - 8/31/2012

U.S. Department of Education, Office of Postsecondary Education Award # = P116Z090020 Amount = \$238,000 Project Period = 8/01/2009 - 7/31/2011

U.S. Department of Education, Office of Postsecondary Education Award # = P116Z080328 Amount = \$191,593 Project Period = 10/01/2008 - 9/30/2010

Private Donations Raised for ACM (UH Foundation)

Henry Ku'ualoha & Muriel Roselani Giugni Fund (2015 – 2018) Hawaiian Native Corporation (2014) Omidyar 'Ohana Fund (2012) Grossman Charitable Foundation (2012) Roy and Hilda Takeyama Roland Emmerich	\$9,000 \$1,000 \$50,000 \$46,637 \$1,400,000 \$150,000
Jay Shidler Anonymous Couple	\$100,000 \$82,271
Kosasa Foundation	\$50,000
Servco	\$50,000
Campbell Family	\$25,000
Ko Olina Foundation Others Miscellaneous	\$10,000 \$42,520
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ACM System Development Milestones 2002-2022 Under Founding Director, Chris Lee

September, 2002, Chris Lee hired to "build a film school" at UH

This led Chris to almost a year of meetings and consultations on all ten campuses throughout the islands with faculty, administrators, students and staff of both the university and local high schools as well as the Governor, Legislature, business community, members of the motion picture and television industry based in Hawai'i and the public.

What became apparent in these discussions was a larger question:

"How do we make this an opportunity to move Hawai'i's economy away from our over reliance on the service industry and keep our talented students in the islands with living wage jobs?"

The result was a proposal to start with a traditional single campus program and grow into a system-wide endeavor designed as a catalyst for developing 21st century jobs in the global creative marketplace right here in Hawai'i and as a platform for our indigenous stories to be told through cinema, video games, computer animation and transmedia to the broadest possible audience.

In December 2003, the University of Hawai'i Board of Regents officially approved the Academy for Creative Media (ACM) noting, "the ACM will engage all of the campuses within the University of Hawai'i system and will work collaboratively across the system, drawing upon programs, faculty, and students system-wide. Because of the challenges associated with building a media school from the ground up in the 21st century, ACM's initial strategy is to leverage existing resources and faculty assets across the ten-campus University of Hawai'i system." (Collaborative Minutes of the Regents' Committee on Academic Affairs January 15, 2004 Page 3)

December, 2003: BOR Establishes the UH Academy for Creative Media program as a system-wide program, beginning with UHM

Academy for Creative Media Funding 2003-2008 raised by Chris Lee

The Legislature and Executive Branch

2003 14.00 new FTE for faculty and staff at \$1,000,000 annually.

Reallocation of existing resources by the Manoa Chancellor's Office

Start up funds: \$353,252.

Programmatic Funds

Private donations to UH Foundation:

Roy and Hilda Takeyama (\$250,000) Roland Emmerich (\$150,000) Jay Shidler (\$100,000)

Anonymous Couple (\$82,271) Servco (\$50,000) Campbell Family (\$25,000) Kosasa Foundation (\$20,000)

Ko Olina Foundation (\$10,000) Others (\$42,520)

Federal Grants

Statehood GSA Grant via RCUH (\$472,017) Economic Development Agency to Master Plan the Media Center (\$160,0000--to be matched by \$160,000 from Chris Lee Salary Savings).

Private Foundations

Kellogg Foundation Digital Halau (\$150,000)

Legislative Proviso

Shanghai Smart Exchange (\$49,000)

2007 Successful passage of ACT 11

Enacted via the Legislature's Special Session of 2007 (over ridden veto) authorizing a minimum of \$10,000,000 based on \$5,000,000+ from PBS to renovate their building and turn over 40% of the new space to create a Media Center for ACM and \$4,870,000 from the Legislature to equip the facility. Negotiated deal on behalf of UHM Chancellor, PBS and Legislature to extend lease and fund renovated bld. The legislature's money was tied specifically to the matching deal with PBS and a long term lease for PBS. UH System cancelled the agreement with PBS and the money expired in 2009.

2004-2006 Selected highlights for UHM ACM Program

- Over 200 students -- 90% of them from diverse Asian-Pacific heritages -enrolled in some 27 courses in film production, screenwriting, indigenous filmmaking, computer animation and video game design.
- Over 300 original short films and video games written, directed and produced reflecting the unique diversity and backgrounds of our students.
- 14 films screened at the Hawai'i International Film Festival, three films accepted by national and international film festivals, one film acquired by National Geographic for global distribution.
- Three television commercials written, directed, and produced entirely by students for Toyota/Scion of Hawai'i ..
- Co-sponsored the 2005 Hawai'inuikea Film festival with the Center for Hawaiian Studies at UH Manoa.
- Our computer game production m1d JD character animation program's positive impact on Hawai'i's economy was featured in a March, 2005 article in The Wall Street Journal Online.
- Extensive outreach and collaboration with local public school media programs.
- Four students worked as production interns on Superman Returns.
- System-wide implementation initiated with the opening of the privately funded \$200,000 ACM Computer Animation RenderFarm at Leeward Community College.
- In post-production on a \$500,000 federally funded documentary on Hawai'i Statehood.
- Developing our first all Hawaiian language films written and directed by graduates of Hawaiian immersion schools.

<u>2007 – 2016 Developed and established 'Ulu'ulu, The Henry Ku'ualoha Giugni</u> Moving Image Archives – the State's Official Moving Image Archive – with Federal, State and private funds.

2008 Public Law 110-315 signed by Senators Daniel Akaka and Daniel K. Inouye created the Henry Ku'ualoha Giugni Kupuna Memorial Archives and authorized Congressionally-directed grants for its support to the Academy for Creative Media System and administered by the University of Hawai'i.

2008 – 2010 Phase 1 resulted in the hiring of a Project Consultant who wrote a 100-page Report on the state of moving image preservation in Hawai'i and created an implementation plan for establishing an archival facility. The report is available at hkgarchives.org/consultants-report-2009.

2009 – 2011 Phase II saw the completion of the Beta Pilot Program, a collaborative effort between 'Ulu'ulu and local institutions, filmmakers and educators to develop, test and implement standard procedures for the cataloging, preservation, and access of archival moving images and create a representative online digital collection of Hawaiian film and video.

2010 – 2012 Phase III saw the establishment of a permanent location at the University of Hawai'i West O'ahu campus library with 11,000 square feet of state-of-the-art digital archiving facilities including public exhibition space, guest offices, quarantine intake room, digitization studio, cataloguing, cleaning and archiving area, a dedicated, temperature controlled vault with fire suppression system, best practices hardware and software and redundant data storage.

April 2012 SB2110 signed by Governor Neil Abercrombie designated 'Ulu'ulu the official state archive for moving images and established a special fund for its support.

Oct 2012 Public website launched at uluulu.hawaii.edu where users can search the catalog, watch streaming video clips, browse collection content within staff-curated theme pages, and interact with the archive through social media links. The site receives an average of 2,000 page views per month.

April 2013 HB1392 approved by the Hawaii State Legislature appropriated \$400,000 funds annually to support the activities of 'Ulu'ulu and **created five new FTE** permanent positions at the University of Hawai'i – West O'ahu.

<u>'Ulu'ulu funding history 2008 – 2018</u>

Congressionally Directed Grants \$929,593

- U.S. Department of Education, Office of Postsecondary Education Award # = P116Z080328 Amount = \$191,593 Project Period = 10/01/2008 – 9/30/2010
- U.S. Department of Education, Office of Postsecondary Education Award # = P116Z090020 Amount = \$238,000

Project Period = 8/01/2009 - 7/31/2011

 U.S. Department of Education, Office of Postsecondary Education Award # = S362K100001 Amount = \$500,000 Project Period = 9/01/2010 – 8/31/2012

Extramural Grants

\$235,000

- Office of Hawaiian Affairs Award # = 31331 Amount = \$150,000 Project Period = 3/01/2013 - 10/31/2014
- Daniel K. Inouye Institute Fund Award # = 32312 Amount = \$50,000 Project Period = 12/11/2013 – 12/10/2014
- Office of Hawaiian Affairs Contract # = 3021 Amount = \$20,000 Project Period = 3/19/2015 - 01/31/2016
- Hawaiian Legacy Foundation Award # = 34590 Amount = \$15,000 Project Period = 3/01/2016 - 3/01/2017

Private donations through UH Foundation \$106,637

UHF Account # 126-0470-4

1. Grossman Charitable Foundation (2012)	\$46,637
2. Omidyar Ohana Fund (2012)	\$50,000
3. Hawaiian Native Corporation (2014)	\$1,000
4. Henry Ku'ualoha & Muriel Roselani Giugni Fund (2015 – 2018)	\$9,000

University of Hawaii Special Fund (WO 2301123) \$1,125,000

 State of Hawaii Cable Television Division, Department of Commerce and Consumer Affairs, Cable Franchise Fees Decision and Order# = 364 Amount = \$500,000 Project Period = 1/01/2015 – 12/31/2015

- State of Hawaii Cable Television Division, Department of Commerce and Consumer Affairs, Cable Franchise Fees Decision and Order# = 364 Amount = \$250,000 Project Period = 1/01/2016 – 12/31/2016
- State of Hawaii Cable Television Division, Department of Commerce and Consumer Affairs, Cable Franchise Fees Decision and Order# = 364 Amount = \$200,000 Project Period = 1/01/2017 – 12/31/2017
- State of Hawaii Cable Television Division, Department of Commerce and Consumer Affairs, Cable Franchise Fees Decision and Order# = 364 Amount = \$175,000 Project Period = 1/01/2018 – 12/31/2018

University of Hawaii TFSF Account (WO 2288212) 5 FTE, \$400,000

 Hawaii State Legislature appropriated funds Amount = \$400,000 Period = Beginning 7/01/2013 and renewed each Fiscal Year

Academy for Creative Media System funds for 'Ulu'ulu support \$395,976

- 1. RTRF Support for ACM System Account = SW 3800049 Amount = \$24,000 Period = 2012 - 2013
- Purchase of Spacesaver High Density Vault Shelving Account = SW 2301586 Amount = \$371,976 Period = 2015

<u>2013 – 2016 Established the UH West O'ahu Academy for Creative Media</u> program as well as added faculty positions and funding for all eleven UH campuses and crafted new articulation pipelines from all of the Community Colleges and UH Maui College to UHWO's BA and BAS degrees.

2013 successful passage of ACT 134 with 10 new FTE and \$2,086,371 in General Funds

4 FTE and programmatic funds are used to establish the new Creative Media program at UHWO which, in its third year, Fall, 2016, has 110 majors, 67 of them transfers from community colleges thanks to new articulation pipelines between all of the community colleges and UH Maui to UHWO for a BA or BAS in Creative Media.

1 FTE is sent to LCC to enhance their Digital Media Program adding Transmedia Production for the first time to the program along with programmatic funding

1 FTE is sent to KCC to enhance their New Media Arts program adding Motion Graphics for the first time to the program along with programmatic funding

1FTE is sent to HCC to enhance their MELE Program adding audio post production for the first time to the program along with programmatic funding

1 FTE is sent to UHM's College of Engineering to enhance their Computer Engineering adding Video Game Design and the Internet of Things to their program along with programmatic funding.

2 FTE are kept at ACM System, reporting to the VPRI, 1 for Director, 1 for Administrative Officer.

Additional funds for faculty are sent to UH Maui, UH Hilo, and Windward Community College.

Programmatic funding is sent to all eleven campuses (including establishing Palamanui' new creative media program which is administered through UH Hawaii Hilo CC's Digital Media Arts)

2016 UHWO ACM Highlights since funding from Act 134:

2014: \$2 million dollars approved by Legislature for planning a dedicated Creative Media Building.

2015: \$1 million Gift from the Roy and Hilda Takeyama Family Foundation given for UHWO ACM program and to support the new building. Largest single gift in the history of UHWO.

2016: Governor releases planning funds.

2016: \$35 million in CIP funding approved by State legislature to design/build a dedicated Creative Media Building on the UHWO campus. This follows on

April, 2016, Regal Theaters gives \$25,000 for student scholarships and programmatic assistance to UHWO ACM. Establishes on going corporate support for UHWO ACM program.

September, 2016, The MacNaughton Group agrees to underwrite ACM classes at UHWO.

2014 -16 Enrollment Metrics ACM program at UHWO:

Creative Media majors for the start of Fall 2014: 11 majors Creative Media course enrollment in Fall 2014: 130 students

Creative Media majors for the start of Spring 2015: 49 majors Creative Media course enrollment in Spring 2015: 181 students Creative Media majors for the start of Fall 2016: 55 majors Creative Media course enrollment in Fall 2015: 205 students

Creative Media majors for the start of Spring 2016: 69 majors Creative Media course enrollment in Spring 2016: 251 students Creative Media majors for the start of Fall 2016: 105 majors Creative Media course enrollment in Fall 2016: 263 students

2016 Selected highlights for UHWO ACM program

- December 2015: Soft opening and naming of the new Roy and Hilda Takeyama Creative Media Lab
- Kapolei Commons Regal Theater Community Trailer Project
- Hironobu Sakaguchi (Final Fantasy Creator) gives a Master Class to the Creative Media students
- Governor David Ige and First Lady Dawn Ige visits the UHWO ACM (They tour the ACM facilities and have lunch)
- Title IX (Loco Moco) animation completed by Creative Media student to be used campus wide by the Title IX office.
- Grand opening of the Regal Theater Kapolei. Students participate in a media storm from (Hawaii News Now, KITV and KHON as well as the Honolulu Star Bulletin)
- April: Regal Theater donates \$25,000 to UHWO ACM
- Graduation 2 Creative Media graduates (transfer students from Leeward CC and Kapiolani CC)

- Creative Media students were asked to produce, direct and create the new UHWO commercial. Student completed the :30 spot.
- Commissioned by the Hawaii Dept. of Labor to produce a multimedia campaign about farming as an occupation. DLIR gave \$14,000 for the students work which consisted of a website, 4 videos, playing cards and print advertisements.
- Sat down with the Kroc center to work on a partnership with interns and creative media projects.
- Visited the Legislature, presented a thank you video to area Legislators.
- UHWO commercial airs during the Olympics on KHNL.
- Met with Colleen Hanabusa
- One Creative Media intern received the opportunity to go to New York to be an intern on the Tonight Show with Jimmy Fallon.

2017 Selected highlights for UHWO ACM program

- Completion of UH community college's BAS and BA in CM articulation agreements with respective creative media programs. (UH Maui College, Kauai CC, Hawaii CC, Honolulu CC, Kapiolani CC, Leeward CC, Windward CC)
- Completed the first class in the early college program with Waianae High's Searider Production students. (Fall 2016) Michael Connors taught ART 112: Intro to Digital Art.
- Implemented the second class in the early college program with Waianae High's Seariders Production students (Spring 2017) Michael Connors taught ART 107D: Intro to Digital Photography.
- Began communications with Waipahu High School's Mark Silliman to begin working on an early college pathway for Waipahu High.
- Master Classes (Randall Kleiser)
- Relocation of the Creative Media computer lab to E139.
- Early College Summer Scholars Program (Waianae and Nanakuli High) 2017
- Early College Signing Ceremony with Waianae and Waipahu High (MOA)

- First Lady Dawn Amano Ige visits the Creative Media Lab
- Conducted new and transfer student ACM orientation
- Sponsored the ART/COMM HI-DOE faculty conference
- Produced UH John Burns School of Medicine Dean Hedges Christmas Video Message
- Produced Regal Trailer 2nd premier & Popcorn for a Cause (raised \$10,000
- Early College Promotion at Kaimuki High School
- Early College Promotion at Leilehua High School
- Moana Hawaiian Translation Project
- Produced UH West Oahu Christmas Tree Challenge at Kapolei Commons
- Produced UHWO 2nd commercial
- Developed and created Washington Place App release Beta version for Washington Place

2018 Selected highlights for UHWO ACM program

- Completion of the Moana Translation Project. 4,000 voiceover files created. Disney Animation created 3,250 DVDs which were distributed to all 320 Hawaii public, private, and charter schools, 15 Hawaii university libraries, all 51 Hawaii public library branches
- Had International Student Interns (Korea and Japan) through Summer 2018
- Participated in the AANHPI (Asian American, Native Hawaii & Pacific Islander) Heritage in the Hawaiian island Community Forum. CM students supervised and mentored Searider Production students on their video production and presentation.
- CM student won the West is Best T-shirt contest on the UH-West Oahu campus
- CM student travels to Japan to learn about the Anime and blog culture.

- Master Classes: Tom Skerritt, Leo Chu and Eric Garcia
- Recognition of Early College students Kureha Pambid (SPWHS) and Amber Viernes (WHS) as they completed their AA degree while in high school. Kureha is now a student at UH West O'ahu creative media program
- Largest graduating class: 9 (Spring 2018)
- Won several PELE awards through our early college program
- 2 PELE scholarship winners from UH West O'ahu Creative Media program
- 2nd annual Early college summer scholars program
- Master Classes: Barry Sabath, Leo Chu, Eric Garcia, Amy Hill

2019 Selected highlights for ACM programs

- 1/11/19 Formal Groundbreaking for UHWO Creative Media Facility; Construction started 3/22/19
- 2/28/19 UH Board of Regents approves Bachelor of Arts in Creative Media at UH-West Oahu
- \$70,000 Workforce Development donation from Netflix. \$17,500 each (Manoa-ACM, Manoa-Communications, UHWO-ACM, Ulu,ulu)
- ACM-System transferred \$237,328 to UHWO Creative Media Facility contingency fund for change orders
- Master Classes: Amy Hill (Actor), Patrick Lee (Writer, Filmmaker)

2020 Selected highlights for ACM programs

- Hawai'i Legislature and Governor Ige approved \$1,200,000 of Act 228 2019 Supplemental Funding for ACM programs; after 10% governor's restriction, ACM-System distributed \$1,080,000 to campuses in January 2021; Covid-19 pandemic restricted spending so campuses purchased \$824,000 of equipment and software through June 2020
- ACM-System transferred \$100,000 to UHWO Creative Media Facility contingency fund for change orders

- ACM-System borrowed \$450,000 from Vice-President for Research and Innovation for UHWO Creative Media Facility contingency fund change orders; repayment over four fiscal years (FY 2020-2023)
- Kosasa Foundation donated unrestricted \$50,000 gift for Academy for Creative Media programs
- Hawai'i European Cinema donated unrestricted \$50,000 gift for UHWO creative media program; received naming rights to Writers' Room in UHWO Creative Media Facility
- UH-West Oahu establishes BA in Creative Media and offers degree program completely online
- COVID-19 pandemic caused UH campuses to move to online class delivery after Spring Break 2021 in late March; campuses offered virtual creative media showcases and graduations; ACM-System collected responses from campus coordinators on how the pandemic had affected their creative media programs and best practices for online classes
- UHWO Creative Media Facility scheduled to open on September 21, 2020. Delayed due to COVID-19 pandemic.
- Master Classes: Stevi Carter (Animator), David Hardin (Animator), Dan Lin (Producer, Film Maker), Leo Chu (Producer, Writer) by Zoom, Eric Garcia (Producer, Writer) by Zoom

2021 Selected highlights for ACM programs

- UH campuses remained closed to the public due to the COVID-19 pandemic through June 2021. Classes were taught online or in a hybrid model and most faculty, staff, and administrators teleworked from home at least part of the time through June 2021. All UH offices reopened in July 2021 and employees started working again on campus in August 2021.
- Marian Hattori donated \$1,500 for seat in UHWO Creative Media Facility Screen Room
- Master Classes: Hosted by Manoa-ACM: Courtney Chun (3D Surfacing Artist) by Zoom, Roy Yamaguch (Visual Effects Artist) by Zoom, Yvette Kaplan (Animation Director, Producer) by Zoom, Mike Jones (Screenwriter) by Zoom, Stephen Neary (Animator) by Zoom, Connie Li Chan (Animator) by Zoom, Matt Sheridan (Installation Artist) by Zoom; Hosted by ACM-System: Karen Gaviola (Director) by Zoom

- Takeyama Foundation donated \$95,000 for Early College Program at UH-West Oahu
- Don Ho Trust donated \$5,000 to the Ulu'ulu Archive since the Don Ho collection is housed in the archive

2022 Selected highlights for ACM programs

- The first AMPAS X ACM Craft Conversation with the writer-director, producer, editor and costume designer from Netflix's *Passing*
- 'Ulu'ulu was awarded a 3 year, \$350,000 grant from the National Endowment for the Humanities. The project, titled "20th Century Hawai'i: Moving Images from Territory to Statehood," will digitize 890 audiovisual assets spanning eight collections that document Hawaiian history and culture from the 1920s to 2000s.
- UHWO ACM received a \$ 34,000 workforce development contribution from Sony Pictures / Mesquite Productions
- Maui College received \$ 35,537 from 20th TV and Paradise City
- UHM ACM received \$ 5,088 in anonymous donations
- ACM System received a \$ 2,000 workforce development contribution from Tunnel Digital / Jamojaya Productions
- UHWO graduates their largest class of 32 ACM students during Spring commencement
- Kaua'i Community College Creative Media program receives 15 video projection mapping licenses for their Event Technology classes from Entertainment Technology Partners; value: \$57,750
- June, 2022 ACM and Chris Lee receive the national LEAP (Leadership Education for Asian Pacifics) Community Award.

2022 University of Hawai'i Legislative Update

For Presentation

UH Board of Regents May 19, 2022





2022 Legislative Session

<u>Contents</u>

- 2022 Supplemental Budget
- 2022 Select Bills of Interest
 - Board of Regents
 - UH Operations
- Legislative Calendar

Post-Session Stats

2505 Bills Introduced

- 637 Total number of bills tracked by UH
- 96 Total Number of bills tracked by UH passed the Legislature
- 343 Total Number of Bills passed the Legislature (overall)

2022 Supplemental Budget Operating

HB 1600 HD1 SD2 CD1 (Saiki) RELATING TO THE STATE BUDGET

Adjusts and requests appropriations for fiscal biennium 2021-2023 funding requirements for operations and capital improvement projects of executive branch agencies and programs. (SD2)

Position: Support

Update: Transmitted to Governor

Prog ID	Base FY23	HD1 FY23	SD2 FY23	CD1 FY23	CD1-Base
UOH100	\$ 213,723,099	\$ 270,230,737	\$ 258,364,881	\$ 252,527,463	\$ 38,804,364
UOH110	\$ 20,006,565	\$ 23,086,565	\$ 24,546,565	\$ 22,876,565	\$ 2,870,000
UOH210	\$ 37,299,226	\$ 47,156,993	\$ 56,142,819	\$ 44,695,912	\$ 7,396,686
UOH700	\$ 18,422,365	\$ 24,909,728	\$ 18,230,904	\$ 19,502,365	\$ 1,080,000
UOH800	\$ 153,488,519	\$ 164,324,327	\$ 253,848,371	\$ 161,790,840	\$ 8,302,321
UOH900	\$ 55,875,998	\$ 98,464,948	\$ 162,556,484	\$ 60,812,190	\$ 4,936,192
Total	\$ 498,815,772	\$ 628,173,298	\$ 773,690,024	\$ 562,205,335	\$ 63,389,563

Budget Bill – Capital Improvement Projects

Description	Board FY23	Gov FY23	House FY23	Senate FY23	CD1 FY23
Hamilton Library	\$ 6,000,000				
Central Admin Facility w/ Parking	\$ 4,000,000				
Leeward CC Fascias	\$ 6,500,000	\$ 6,500,000	\$ 6,500,000	\$ 6,500,000	\$ 6,500,000
Waikīkī Aquarium Discharge System Upgrade	\$ 11,500,000	\$ 11,500,000	\$ 11,500,000	\$ 5,750,000	\$ 11,500,000
RIM - Systemwide	\$ 33,500,000	\$ 32,000,000		\$ 31,360,000	\$ 2,360,000
RIM - UHWO	\$ 2,500,000	\$ 2,500,000		\$ 2,500,000	
Capital Renewal & Deferred Maintenance - CCs	\$ 25,000,000	\$ 24,000,000	\$ 25,000,000	\$ 24,000,000	\$ 25,000,000
UHWO Campus Expansion & University Village		\$ 10,000,000	\$ 10,000,000	\$ 10,000,000	
Hawai'i CC - Redevelopment of Manono Campus			\$ 2,000,000		
Minor CIP - CCs				\$ 4,000,000	
Maui College - Vocational Technology Center				\$ 4,000,000	\$ 4,000,000
Makai Research Pier				\$ 750,000	\$ 750,000
Waiakea Research Station				\$ 6,890,000	\$ 6,900,000
Clarence TC Ching Athletics Complex				\$ 18,400,000	
Les Murakami Baseball Stadium Turf Replacement				\$ 2,000,000	
Mānoa Athletics - New Facilities at Lower Campus				\$ 750,000	\$ 750,000
Total	\$ 89,000,000	\$ 86,500,000	\$ 55,000,000	\$ 116,900,000	\$ 57,760,000

2022 Appropriation Bills

BILL	TITLE & DESCRIPTION	APPROPRIATION	CAMPUS	PURPOSE
<u>HB1147</u> <u>SD1 CD1</u>	RELATING TO THE STATE BUDGET. Appropriates funds for fiscal biennium 2021–2023. (CD1)	\$100,000	UH Manoa	
HB2024 HD1 SD2 CD1	RELATING TO MAUNA KEA. Establishes the Mauna Kea Stewardship and Oversight Authority as the sole authority for the management of Mauna Kea lands. Requires the Authority to manage land uses; human activities, other uses, and access; stewardship; education; research; disposition; and overall operations on its respective lands. (CD1)	\$350,000	UH Hilo	K-12 public education programs in astronomy- related fields of learning at the University of Hawaii at Hilo, Imiloa astronomy center
<u>SB2076</u> <u>SD2 HD3</u> <u>CD1</u>	RELATING TO BROADBAND SERVICE INFRASTRUCTURE. Requires University of Hawaii and the Hawaii Broadband and Digital Equity Office (Office) to convene a working group to determine the appropriate governance structure to operate, maintain, and oversee broadband assets. Appropriates funds for three full-time positions for the Office and a statewide broadband initiative to be administered by the University of Hawaii. (CD1)	\$200,000,000 (ARPA)		Planning and implementation of a statewide broadband initiative
<u>SB2142</u> <u>SD1 HD1</u> <u>CD1</u>	RELATING TO COMPUTER SCIENCE. Allows DOE students to fulfill graduation requirements by taking world language, fine arts, career and technical education, or computer science courses. Establishes a scholarship at the University of Hawaii to encourage students majoring in education to take a computer science course. Requires the University of Hawaii to establish computer science pathways for students majoring in education. Appropriates funds. (CD1)	\$1,000,000	UH Manoa	Computer science in teaching scholarship program
<u>SB2510</u> <u>SD2 HD1</u> <u>CD1</u>	RELATING TO RENEWABLE ENERGY. Establishes a state energy policy that requires at least 33.33 per cent of renewable energy to be generated by firm renewable energy. Establishes requirements for the State to maintain a diversified renewable energy portfolio. Amends statutory provisions to achieve firm renewable energy generation for each island. Excepts geothermal energy production from limitations on energy production from a single renewable energy source. (CD1)	\$200,000 (out of the energy systems development special fund, 304A-2169.1)	HNEI	For the Hawaii natural energy institute to conduct the study as required by this Act.
<u>SB2597</u> <u>SD1 HD1</u> <u>CD1</u>	RELATING TO LOAN REPAYMENT FOR HEALTH CARE PROFESSIONALS. Appropriates funds for the Hawaii State Loan Repayment Program administered through the John A. Burns School of Medicine, subject to a matching funds requirement. (CD1)	\$500,000	Dept of Health in coordination w/ JABSOM	JABSOM Hawaii state loan repayment program (requires matching funds)
<u>SB2657</u> <u>SD2 HD1</u> <u>CD1</u>	RELATING TO MEDICAL EDUCATION AND TRAINING. Appropriates funds to the John A. Burns School of Medicine to create further medical residency and training opportunities through a partnership between the John A. Burns School of Medicine and the United States Department of Veterans Affairs. (CD1)	\$2,700,000/ \$4,000,000	UH Manoa JABSOM	Residency training

2022 Select Bills of Interest Board of Regents

HB 2026 HD2 SD1 (Nakashima) RELATING TO CHAPTER 92, HAWAII REVISED STATUTES

Defines "board business" and "informal gatherings." Allows a board to prepare and circulate amongst members a statement on a position previously adopted for purposes of submission to the legislature, under certain circumstances. Outlines when board packets must be available to interested persons. (SD1) Position: No position

Update: Transmitted to Governor

SB 3172 SD1 HD2 CD1 (Ihara) RELATING TO PUBLIC AGENCY MEETINGS

Requires that any electronic audio or video recording of a board meeting be maintained as a public record, regardless of whether the written minutes of the board meeting have been posted. Amends the information that must be included as part of the written minutes of board meetings. Repeals the option for boards to provide recorded minutes accompanied by written summaries as an alternative to written minutes of board meetings. Effective 10/1/2022. (CD1) Position: No position



2022 Select Bills of Interest Board of Regents

SB 3219 HD1 CD1 (Keohokalole) RELATING TO THE SUNSHINE LAW

Provides that the mandatory disclosure of the names of persons who are physically with a board member attending a remote board meeting applies only to the disclosure of the names of adults, and not minors, who are physically with the board member at a nonpublic location, unless the minor has a personal business, property, or financial interest with any issue before the board. Takes effect 7/1/2022. (CD1) Position: No position



2022 Select Bills of Interest Healthcare

SB 2597 SD1 HD1 CD1 (Keohokalole) RELATING TO LOAN REPAYMENT FOR HEALTH CARE PROFESSIONALS

Appropriates funds for the Hawaii State Loan Repayment Program administered through the John A. Burns School of Medicine, subject to a matching funds requirement. (CD1) Position: Support

Update: Transmitted to Governor

SB 2657 SD2 HD1 CD1 (Keohokalole) RELATING TO MEDICAL EDUCATION AND TRAINING

Appropriates funds to the John A. Burns School of Medicine to create further medical residency and training opportunities through a partnership between the John A. Burns School of Medicine and the United States Department of Veterans Affairs. (CD1) Position: Support



2022 Select Bills of Interest Mauna Kea

HB 2024 HD1 SD2 CD1 (Nakashima) RELATING TO MAUNA KEA

Establishes the Mauna Kea Stewardship and Oversight Authority as the sole authority for the management of Mauna Kea lands. Requires the Authority to manage land uses; human activities, other uses, and access; stewardship; education; research; disposition; and overall operations on its respective lands. Authorizes the Authority to develop a framework to allow astronomy development on Mauna Kea. Declares astronomy as a state policy. Requires the Authority to establish advisory groups. Allows the Authority to limit certain commercial use and activities on Mauna Kea on its respective jurisdictional lands. Provides certain restrictions on leases and a moratorium on new leases. Requires the timely decommissioning of certain telescopes. Allows the Authority to require an application and fee for all recreational users of Mauna Kea. Establishes the Mauna Kea management special fund. Transfers rights, duties, and positions from the University of Hawaii to the Authority. Exempts positions under the Authority from civil service requirements. Requires an audit of the Mauna Kea Stewardship and Oversight Authority. Appropriates funds. (CD1) Position: Oppose Update: Transmitted to Governor

2022 Select Bills of Interest OHA/Pro Rata

SB 2021 SD1 HD2 CD1 (Keohokalole) RELATING TO INCREASING THE PAYMENT AMOUNT FOR THE OFFICE OF HAWAIIAN AFFAIRS' PRO RATA SHARE OF THE PUBLIC LAND TRUST

Establishes the annual share of income and proceeds from the public land trust for fiscal year 2022-2023 due to the Office of Hawaiian Affairs. Establishes and appropriates amounts to the Office of Hawaiian Affairs. Establishes a working group to determine pro rata share of income and proceeds from the public land trust due annually to Office of Hawaiian Affairs. (CD1)

Position: Comments



2022 Select Bills of Interest

Procurement

SB 2384 SD2 HD2 CD1 (Moriwaki) RELATING TO HAWAII PRODUCTS PREFERENCE

Amends the procurement preference for Hawaii products to only apply to agricultural goods, value-added products, and commodities. (CD1)

Position: Support

Update: Transmitted to Governor

HB 1568 HD2 SD2 CD1 (Matayoshi) RELATING TO AGRICULTURE

Requires the department of education, department of health, department of public safety, department of defense, and University of Hawaii system to ensure that a certain percentage of food purchased for public schools, youth campuses, public hospitals, public prisons, and University of Hawaii system academic programs consists of fresh, local agricultural products or local value-added, processed, agricultural, or food products. Requires each of those departments and the University of Hawaii system to annually report to the legislature on progress made toward meeting these benchmarks and clarifies the information to be reported. (CD1)

Position: Comments Update: Transmitted to Governor



2022 Select Bills of Interest UH Assets

HB 1579 HD2 SD2 (Yamane) RELATING TO THE DEPARTMENT OF HEALTH

Sets the manner by which the Oahu Regional Health Care System should request operational funding during the transitional period of the Oahu Regional Health Care System from the Hawaii Health Systems Corporation to the Department of Health. Extends the deadline by which the transfer shall take place. Requires a report to the Legislature prior to the Regular Session of 2025. Clarifies the procedure for the working group to discuss matters concerning patient privacy and prospective bidders. (SD2) Position: Support

Update: Transmitted to Governor

HB 2288 HD2 SD2 CD1 (Branco) RELATING TO LAND

Authorizes the negotiation of the transfer of certain land to the Department of Hawaiian Home Lands. (CD1)

Position: Oppose



2022 Select Bills of Interest Tax Implications

SB 3201 SD1 HD1 CD1 (Moriwaki) RELATING TO NONPROFIT ORGANIZATIONS

Clarifies the application of the general excise tax law with regard to gross income derived from unrelated trade or business activities of nonprofit organizations. Effective 1/1/2023. Sunsets 12/31/2027. (CD1)

Position:



2022 Select GMs of Interest BOR Nominees



GM 806

Submitting for consideration and confirmation to the Board of Regents of the University of Hawai'i, Gubernatorial Nominee, LAURIE TOCHIKI, for a term to expire 06-30-2027. Update: Confirmed on 5/5/2022



GM 807

Submitting for consideration and confirmation to the Board of Regents of the University of Hawai'i, Gubernatorial Nominee, GABRIEL LEE, for a term to expire 06-30-2027. Update: Confirmed on 5/5/2022



HCR 17 REQUESTING THE DEPARTMENT OF LAND AND NATURAL RESOURCES TO CONVENE A TASK FORCE TO DEVELOP A FERAL UNGULATE MANAGEMENT PLAN FOR WEST HAWAII. *Lead: UH Hilo*

HCR 36 REQUESTING THE UNIVERSITY OF HAWAII TO WORK WITH THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION AND DEPARTMENT OF EDUCATION TO CREATE A CORAL REEF ADVISORY TEAM OF YOUTH. *Lead: UH Hilo*

SCR 35 SD1 HD1 REQUESTING THE UNIVERSITY OF HAWAII - WEST OAHU TO RE-ESTABLISH A PRE-NURSING PATHWAY OR CREATE A PERMANENT NURSING PROGRAM FOR STUDENTS. *Lead: UH Hilo/UH West O'ahu*

SCR 132 REQUESTING THE UNIVERSITY OF HAWAII TO REPORT ON THE PAMANTASAN COUNCIL'S SYSTEMWIDE EFFORTS TO IMPROVE THE STATUS OF FILIPINOS AT THE UNIVERSITY OF HAWAII. *Lead: UH Mānoa*

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UNIVERSITY OF HAWAI'I

Some Legislative Task Forces/ Working Groups

HB 1885 HD1 SD1 CD1 Establishes a data task force to assist the chief data officer in developing the State's data policies, procedures, and standards, which includes the UH President, or the President's designee. *Lead: CIO*

SB 2695 SD2 HD1 CD1 Establishes within the Department of Commerce and Consumer Affairs, the blockchain and cryptocurrency task force, which includes a professor from the University of Hawai'i who specializes in digital currency, who shall be appointed by the president of the University of Hawai'i. *Lead: UH Mānoa*

SB 3367 SD2 HD1 CD1 Establishes within the comprehensive cancer control program in the Department of Health chronic disease prevention and health promotion division an early lung cancer screening task force, which includes a representative from the University of Hawai'i John A. Burns School of Medicine and a representative from the University of Hawai'i Cancer Center. *Lead: UH Cancer Center*

VIVERSITY OF HAWAI'I



Some Legislative Task Forces/ Working Groups

SB 2076 SD2 HD3 CD1 Convenes a working group to determine the appropriate governance structure to implement, operate, and maintain broadband infrastructure development in the State, which includes the UH President, who shall serve as co-chair. *Lead: CIO*

HCR 17 Convening a task force to develop a feral ungulate management plan for West Hawai'i, which includes one member appointed by the Chancellor of the UH Hilo. *Lead: UH Hilo*

SCR 118 SD1 Requests the creative resurgence task force (created by SCR 242 (2021)) continue to examine and establish policies to build and foster creativity and innovation through the arts, culture, and humanities in the State. The task force includes faculty members from UHM, UHH, and UHWO and is requested to be dissolved on June 30, 2023. *Lead: VPAS*

NIVERSITY OF HAWAI'I

Legislative/Elections Calendar

- May 5 Adjournment Sine Die
- June 7 Candidate Filing Deadline
- June 27 (35th day after Sine Die) Governor must notify legislature his

"intent" to veto any bills pending his approval.

July 12 (45th day after Sine Die) – Last day for governor to sign, veto, or allow bill to become law without signature.

August 13 – Primary Election

November 8 – General Election



Conclusion



REPORT OF THE MAUNAKEA PLAN REVIEW PERMITTED INTERACTION GROUP (Part 2) April 14, 2022

The purpose of this report is to share the findings and recommendations of the Maunakea Plan Review Permitted Interaction Group ("**Task Group**") with the full Board of Regents ("**Board**") and to receive additional public input regarding updates to the *Mauna Kea Comprehensive Management Plan UH Management Areas* ("**CMP**").¹

This report is the second of two reports under the scope of this Task Group. This report covers findings and recommendations regarding updates to the CMP adopted by the Board of Land and Natural Resources ("**BLNR**") in 2009. The first report covered the *Master Plan for the University of Hawai'i Maunakea Lands; E* \overline{O} *I* N \overline{a} *Leo (Listen to the Voices)* ("**Master Plan**"), which was approved by the Board on January 20, 2022.

Deliberation and decision making regarding this report will take place during a subsequent meeting, planned for May 2022, pursuant to the statute on permitted interactions under the Sunshine Law, Section 92-2.5(b), Hawai'i Revised Statutes ("HRS").

I. PURPOSE AND SUMMARY OF TASK GROUP MEETINGS

- A. On May 20, 2021, the Board met to consider creating a permitted interaction group to review and investigate proposed changes to the Master Plan and CMP; seek input from community stakeholders; and make related findings and recommendations to the Board by January 2022.²
- B. The Task Group submitted a partial report of its findings and recommendations regarding the Master Plan for information only at the Board's <u>December 16</u>, <u>2021</u> meeting. The partial report and Master Plan, with some minor amendments, were presented at the Board's <u>January 20, 2022</u> meeting, at which the Board took action to approve the Master Plan.
- C. The Task Group included the following Regents:
 - 1. Ben Kudo, Oahu Island Regent and then-Board Chair
 - 2. Alapaki Nahale-a, Board Vice-Chair, Hawai'i Island Regent, and Regentmember of the Mauna Kea Management Board ("**MKMB**")
 - 3. Eugene Bal III, Maui Island Regent
 - 4. Wayne Higaki, Hawai'i Island Regent, and Regent-member of MKMB

¹ CMP, April 2009, available at <u>https://hilo.hawaii.edu/maunakea/stewardship/documents/management/comprehensive-plan/CMP_2009.PDF</u> (prepared by Ho'akea, LLC dba Ku'iwalu for University of Hawai'i).

² Minutes of May 20, 2021 Board of Regents Meeting, *available at* <u>https://www.hawaii.edu/offices/bor/regular/minute/202105200830.regular.pdf</u>.

5. Ernest Wilson Jr., Maui Island Regent

Regent Nahale-a served as Chair of the Task Group.

President David Lassner, Vice President for Legal Affairs and University General Counsel Carrie Okinaga, Chancellor of the University of Hawai'i ("**University**") at Hilo Bonnie Irwin, Executive Director of the Center for Maunakea Stewardship Greg Chun, Director of Stewardship Nahua Guilloz, and Associate General Counsel Jesse Souki participated in the Task Group process. Kendra Oishi, Executive Administrator and Secretary of the Board, provided administrative support to the Task Group.

Guest participants included: Jim Hayes, Julia Ham Tashima, and Perry White of Planning Solutions, Inc.; and Peter Young of Ho'okuleana LLC.

D. The Task Group met on the following dates to complete the second part of its charge: February 14, 2022; April 1, 2022; and April 8, 2022.

The Task Group met to, among other things:

- Receive updates on the progress of updates to the CMP.
- Review management actions in the current CMP related to cultural resources, natural resources, and education and outreach; and the current state of each of these as identified in the *Maunakea Comprehensive Management Plan Outcome Analysis Report*, dated August 2021 ("OAR"), which was completed by the University administration, submitted to the Department of Land and Natural Resources ("DLNR"), and posted by DLNR on its website in November 2021.³
- Review and discuss outreach conducted in drafting the Draft Comprehensive Management Plan 2022 Supplement: Management Action Updates ("CMP Supplement")⁴, input received, comments received during the formal comment period, and responses to comments received, including plan revisions.

II. FINDINGS

A. Comprehensive Management Plan

The purpose of the CMP is to provide a plan for the management of cultural and natural resources within Maunakea, as well as activities related to education and research, recreational activities, and commercial activities. The CMP is required by BLNR to satisfy the need for a "comprehensive

³ See Table 1: Management plans and annual reports, *at* <u>https://dlnr.hawaii.gov/occl/maunakea-management/</u>.

⁴ See CMP Supplement, March 1, 2022, available at <u>https://maunakea.konveio.com/sites/maunakea.konveio.com/files/u2/2022-03-</u> <u>01%20DraftCMPsupplement.pdf</u> (prepared by Planning Solutions, Inc. & Ho'okuleana, LLC for the University of Hawai'i).

management plan" as required by Chapter 13-5, Hawai'i Administrative Rules ("**HAR**"), which regulates land uses in the conservation district. HAR §13-5-2 defines "comprehensive management plan" as "a comprehensive plan to manage multiple uses and activities in order to protect and conserve natural and cultural resources."

As noted above, the CMP was adopted by the BLNR in 2009. The CMP and its updates are prepared by the University, presented to the Board for review and approval, and subsequently provided to the BLNR for final approval and adoption. The updates that are being presented alongside this report are <u>supplemental</u> to the 2009 CMP, and not a replacement. The CMP Supplement was unanimously supported by MKMB at its March 15, 2022 meeting.

The resources that are presently required and will be required to properly steward Maunakea are considerable. Any entity charged with responsibility for stewardship of Maunakea must have the capacity to meet the responsibilities called for in the 2009 CMP, as amended by the CMP Supplement.

B. Master Plan, Master Lease, and the University of Hawai'i as Steward

Task Group activities related to the Master Plan were previously concluded and reported as mentioned above. Issues pertaining to the general lease issued by BLNR to the University and the University's stewardship of Maunakea were also discussed in the previous report and will not be reiterated in this report.

While various perspectives on who should steward Maunakea are explored, the University must continue to exercise its responsibility imposed by the conservation district use permits it holds for all astronomy facilities on Maunakea and the terms of the general lease and other agreements setting aside lands on Maunakea to the University. The University must put its best efforts forward in serving as a model of stewardship if and until such time that another replacement entity is designated to be responsible for performing these duties. Criticisms expressed in the oft-cited 1998 State audit have long been addressed by subsequent audits.⁵ In addition, the 2020 DLNR Independent Evaluation of the University's management of Maunakea concluded that lands managed by the University on Maunakea are "among the best managed state lands in Hawai'i," and the "public's assessment of how effectively UH has implemented the CMP has primarily varied depending on whether they are in favor or opposition of telescope development on Mauna Kea."6 UH believes that proper stewardship of Maunakea can include astronomy and telescopes. The Task Group believes that astronomy on Maunakea is an important part of Hawai'i's future and that UH is currently the

⁵ See Table 3: Reports from the State Office of the Auditor, at <u>https://dlnr.hawaii.gov/occl/maunakea-management/</u>.

⁶ See Table 2: Independent evaluation of the implementation of the Comprehensive Management Plan by Ku'iwalu, at <u>https://dlnr.hawaii.gov/occl/maunakea-management/</u>.

best entity to support astronomy while also managing the other important aspects of stewardship.

The management of Maunakea is a monumental responsibility. While the Task Group believes that UH is currently the best entity to support astronomy and has been a good steward since earlier criticisms, it acknowledges the discussions occurring around other entities – possibly a newly-established authority – as possible managers of Maunakea, either alone or with other entities. Regardless of whether the governance is left to UH, given to another entity, or shared among several entities, the Task Group emphasizes the enormity of this responsibility and that care of Maunakea needs to be a collaborative effort.

C. Evaluation of the University's Maunakea Management Structure

In the Task Group's partial report submitted to the Board and posted for information on its December 16, 2021 meeting agenda, a recommendation was made to "encourage the Independent Audit Committee of the Board to include in the Internal Audit Work Plan a management audit of the University's Maunakea management structure." A supplement to the Work Plan to conduct an evaluation of the Maunakea restructuring plan was presented to the Independent Audit Committee at its <u>April 7, 2022</u>, meeting and subsequently adopted.

D. Community Engagement

The Task Group continues to recognize public criticism regarding community engagement and remains engaged in ensuring a high level of public outreach on the CMP Supplement. In response, the University administration and consultants conducted extensive outreach efforts in preparing the CMP Supplement, which is recorded in Volume 2 of the CMP Supplement. Additionally, the community will continue to have opportunities to comment on the CMP Supplement at Board meetings which include the CMP Supplement as an agenda item, and subsequently at BLNR meetings if the Board approves the CMP Supplement.

The Task Group recognizes that there were external factors that may have contributed to stakeholders refraining from providing input and opting for a "wait and see" approach, particularly due to legislation being considered by the Legislature in the 2022 Regular Session. Nevertheless, the University administration and consultants were responsive to the comments that were received and used them to inform the CMP Supplement. Others who did not comment may be satisfied with the plan and may not have felt the need to provide input.

The Task Group acknowledges there are a wide range of opinions. However, there are also areas in which the various stakeholders can agree. As such, the

University administration was urged to look for points of common ground which could be included in the CMP Supplement.

III. <u>RECOMMENDATIONS</u>

Based upon the foregoing, the Task Group hereby recommends:

- Recommending that the Board of Regents review and approve, and that BLNR approve, the 2022 CMP Supplement amending the 2009 CMP. Please note that the Board will not be able to discuss or consider action on this report or the CMP Supplement until a meeting subsequent to the April 21, 2022 Board meeting.
- **Collaborative governance and stewardship.** As noted in the Task Group's partial report issued in December 2021, the University's stewardship has significantly improved over time, and the Task Group believes that the University should continue to work toward collaborative governance of Maunakea that allows for coexistence and balance of culture, science, recreation, and preservation, and whereby the University could manage Hale Pōhaku and the astronomy precincts in a collaborative manner. The Task Group acknowledges that other governance and management models are being considered, including legislation pending at the time of the writing of this report, and is respectful of those ongoing discussions.
- Dissolution of the Task Group.

IV. CONCLUSION

The Task Group has concluded its task as identified when the Board approved its creation during its May 20, 2021 meeting. Its specific recommendations are contained hereinabove and include the recommendation to approve the CMP Supplement.

While the Task Group recommends dissolution at this time since it has concluded its current scope of work, it continues to recognize the long-standing issues surrounding Maunakea. The Task Group acknowledges the work of the University administration in its stewardship, and simultaneously recognizes the deeply-rooted beliefs and opinions of people across the State. It encourages the University and community-at-large to work together toward collaborative governance and stewardship.

ATTACHMENTS

Volume 1 – Comprehensive Management Plan 2022 Supplement: Management Actions Update

Volume 2 – Comprehensive Management Plan 2022 Supplement: Summary of Outreach and Input Received

COMPREHENSIVE MANAGEMENT PLAN 2022 Supplement: Management Actions Update Volume 1

COMPREHENSIVE MANAGEMENT ACTION MEU-2



Approved by the University of Hawai'i Board of Regents on DATE Approved by the Board of Land and Natural Resources on DATE

> PREPARED FOR: University of Hawai'i

PREPARED BY: Planning Solutions, Inc. Ho'okuleana, LLC

APRIL 11, 2022

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FOREWORD

In 2009 the Board of Land and Natural Resources (BLNR) approved the *Mauna Kea Comprehensive Management Plan; UH Management Areas* (2009 CMP) prepared by Ho'akea, LLC dba Ku'iwalu for the University of Hawai'i (UH). Consistent with Hawai'i Administrative



Rules (HAR) § 13-5-2, the CMP¹ is UH's "comprehensive plan to manage multiple uses and activities in order to protect natural and conserve and cultural resources." To achieve comprehensive management of the UH Management Areas, the 2009 CMP laid out 12 subjects, each with a desired outcome, and management actions (103 in total) designed to achieve the desired outcomes. As specified in the 2009 CMP, status reports and periodic

updates/supplements are to be conducted to ensure the management actions remain relevant and sufficient to achieve the desired outcomes based on experience, data, and learning. While annual reports on the status of UH's implementation of the CMP have been submitted to BLNR, this is the first review and update that will benefit from an Outcome Analysis Report of the CMP management actions.

Ecosystem management is a complex process, so the 2009 CMP was developed and based on the principle of adaptive management. Adaptive management is defined in the 2009 CMP as:

[A] systematic process for continually improving management policies and practices for resource protection by learning from the outcomes of past and current management activities. Adaptive management recognizes that there is a level of uncertainty about the "best" policy or practice for a particular management issue, and therefore requires that each management decision be revisited in the future to determine if it is providing the desired outcome.

As discussed in the Introduction (CHAPTER 1) of this supplement, the bulk of the 2009 CMP remains unchanged by this supplement. The body of this supplement replaces Section 3.1.1 and Section 7 of the 2009 CMP; all other portions of the 2009 CMP are retained and unchanged. This supplement focuses primarily on continuing and adapting the CMP management actions using the principle specified above. Some management actions have been substantively changed based on what we have learned since 2009, while others have not. Where changes have been made, the reasons for the changes are provided. At their core, all changes are made to improve the quality and efficiency of management and UH's ability to achieve the desired outcomes. What remains unwavering is UH's sustained commitment to collaboratively manage multiple uses and activities

¹ Where "CMP" is used it refers to the Comprehensive Management Plan as supplemented. Where "2009 CMP" is used it refers to the *Mauna Kea Comprehensive Management Plan; UH Management Areas* as original adopted by BLNR in 2009.

to protect and conserve natural and cultural resources, building a global model of harmonious and inspirational stewardship that is befitting of Maunakea.

As UH was in the process of evaluating and updating the management actions originally set forth in the 2009 CMP, the 2021 State House of Representatives created the Mauna Kea Working Group (MKWG) to engage in a separate process to explore governance options for managing Maunakea. The MKWG prepared a report ("He Lā Hou Kēia Ma Mauna A Wākea: A New Day on Mauna A Wākea") for the legislature. Like the 2009 CMP's Cultural Anchor, the MKWG Report's Foreword discusses Hawaiian creation chants and how Maunakea is considered the eldest offspring, born of Wakea and Papa, male and female energies from which all life springs. The MKWG Report also speaks of Kumu Kānāwai: the Native Hawaiian concept of environmental kinship. Traditionally, four kānāwai (laws of nature) govern our relationship to the 'āina, ensuring the health of the 'āina so that it will continue to nurture all life forms: Ho'okikī Kānāwai - the edict of continuum; Kua'ā Kānāwai – the edict of emergency; Kai'okia Kānāwai – the edict of boundaries; and Kīho'iho'i Kānāwai – the edict of regeneration.

UH acknowledges and appreciate the holistic and integrated worldview of the kānāwai principles described in the MKWG Report. The principle's symbiotic connections between the elements of nature, and of nature with humans, emphasizes the importance of sustaining balance between these forms. These principles are valuable guidelines for land use planning and decision making. UH's management operations and plans are consistent with the kānāwai principles and are informed by Native Hawaiian knowledge, as discussed in the CMP.

UH will continue to use an adaptive and integrated approach that draws upon Native Hawaiian knowledge and methods as well as management tools from other sources as it implements applicable regulatory requirements.² UH recognizes that all scientific study includes systematic observation, measurement, interpretation, acknowledging patterns, and making decisions based on growing knowledge. This CMP Supplement further incorporates Native Hawaiian knowledge and directs that Native Hawaiian knowledge continue to be integrated as management actions are adapted in the future.

Maunakea is linked to the culture and cosmology of Native Hawaiian people, and for many the mauna is sacred. Its resources serve as the source for a diverse range of spiritual, research, educational, recreational, and subsistence experiences that all contribute to the significance of Maunakea. Its extraordinary blend of topographic and atmospheric qualities makes Maunakea the most desirable location for ground-based astronomy in the Northern Hemisphere, and the exceptional combination of alpine and subalpine ecosystems in a tropical environment make it ecologically unique as well. Managing for the protection of this range of valued resources, and the activities and uses that may impact them, requires the kind of holistic and integrated approach articulated in the 2009 CMP.

The University of Hawai'i Board of Regents, the University of Hawai'i at Hilo, the Center for Maunakea Stewardship, and those who are responsible for operating the astronomical facilities on the mauna understand that astronomy on Maunakea is a privilege that comes with the kuleana of stewardship which itself requires a comprehensive and cohesive management program given the unique nature of the resources we are responsible to protect. We embrace our responsibilities to Maunakea, the state, and the community we serve; those responsibilities are reflected in our 2022

² See also 2009 CMP Sections 2.2.2, 4.6, 5.1.1, 5.1.2, and 5.1.3 and CMP 2022 Supplement Section 3.4.4 regarding the integration of Native Hawaiian knowledge and methods.

Master Plan, our CMP, and HAR Chapter 20-26, entitled "Public and Commercial Activities on Mauna Kea Lands" (Maunakea Administrative Rules) that collectively and specifically outline our integrated and balanced approach.

AMP Archaeological Monitoring Plan AR Astronomical Resources ACT Activities and Uses **BLNR** Board of Land and Natural Resources BMP **Best Management Practices** BOR **UH Board of Regents** BTP **Burial Treatment Plan** С **Construction Guidelines CDUA Conservation District Use Application** CDUP **Conservation District Use Permits** CIP Capital Improvement Program CMP **Comprehensive Management Plan** CMS Center for Maunakea Stewardship CR Cultural Resources CRMP Cultural Resources Management Plan CSO Caltech Submillimeter Observatory DBEDT Department of Business, Economic Development & Tourism DHHL Department of Hawaiian Home Lands **DLNR** Department of Land and Natural Resources DOFAW Division of Forestry and Wildlife (DLNR) DOCARE Division of Conservation and Resources Enforcement (DLNR) DoD U.S. Department of Defense EA **Environmental Assessment** EC **Environment Committee** EIS **Environmental Impact Statement EISPN EIS** Preparation Notice EO Education and Outreach FLU Considering Future Land Use HAR Hawai'i Administrative Rules HP Halepōhaku HRS Hawai'i Revised Statutes ICM Independent Construction Monitor IM Infrastructure and Maintenance IRM Interpretive Resource Manual KKM Kahu Kū Mauna LEED Leadership in Energy and Environmental Design MEU Monitoring, Evaluation and Updates MEOP Maunakea Education and Outreach Plan MKMB Maunakea Management Board

LIST OF ACRONYMS

Maunakea Observatories

MKO

ACT

Activities and Uses

MUCD	
MKSR	Mauna Kea Science Reserve
MKSS	Mauna Kea Observatory Support Services
NAR	Natural Area Reserve
NARS	Natural Area Reserve System (DLNR)
NOI	Notice of Intent
NR	Natural Resources
NRMP	Natural Resources Management Plan
OAR	Outcome Analysis Report
OCCL	Office of Conservation and Coastal Lands (DLNR)
OI	Operations and Implementation
O&M	Operations and Maintenance
OMKM	Office of Mauna Kea Management
OMMP	Operations, Monitoring and Maintenance Plan
Р	Permitting and Enforcement
RFI	Radio Frequency Interference
SHPD	State Historic Preservation Division (DLNR)
SOP	Standard Operating Procedures
SR	Site Recycling, Decommissioning, Demolition, and Restoration
TCP	Traditional Cultural Property
TMT	Thirty Meter Telescope
UH	University of Hawai'i
UH Hilo	University of Hawai'i at Hilo
USFWS	U.S. Fish and Wildlife Service
VIS	Visitor Information Station

CHAPTER 1 INTRODUCTION

1.1 PURPOSE OF THIS SUPPLEMENT

The purpose of this document is to supplement the *Mauna Kea Comprehensive Management Plan* (2009 CMP) (Ho'akea, LLC dba Ku'iwalu, April 2009). Section 1.2 of this document replaces Section 3.1.1 of the 2009 CMP, and all other parts of this document replace Section 7 of the 2009 CMP. This CMP 2022 Supplement does not propose new activities or land uses.

This supplement, together with the *Outcome Analysis Report* (Center for Maunakea Stewardship, August 2021) (2021 OAR) (Appendix A) and other annual reports submitted by UH to DLNR, is part of what the 2009 CMP describes as a "systematic process for continually improving management policies and practices for resource protection by learning from the outcomes of past and current management activities."³ Such "adaptive management" allows resource managers and stewards to set aside completed management actions (CHAPTER 2), decide whether to continue a management action as written in 2009, or to adjust course and refine them, based on lessons learned and input from resource experts, Native Hawaiian cultural practitioners, agencies, and others familiar with particular resources.⁴

This supplement also provides clear and transparent measurements of accountability and progress for implementers, primarily through the University of Hawai'i at Hilo (UH Hilo) Center for Maunakea Stewardship (CMS), and those overseeing and advising UH's implementation (the Department and Board of Land and Natural Resources (BLNR/DLNR), MKMB's Environment Committee (EC), the Kahu Kū Mauna Council (KKM), and Maunakea Management Board (MKMB)), and the interested public.

1.2 UPDATE TO LOCATION AND DESCRIPTION OF UH MANAGEMENT AREAS

In April 2009, BLNR approved, subject to conditions, the 2009 CMP, an exhaustive and overarching plan guiding UH's management of multiple uses and activities in order to protect and conserve natural and cultural resources within the "UH Management Areas."

This section replaces Section 3.1.1 of the 2009 CMP and updates the definition of "UH Management Areas." The term "UH Management Areas" will be synonymous with "Mauna Kea lands," which are defined under Hawai'i Revised Statutes (HRS) § 304A-1901 as:

... the lands that the University of Hawaii is leasing from the board of land and natural resources, including the Mauna Kea Science Reserve, Hale Pohaku, the connecting roadway corridor between Hale Pohaku and the Mauna Kea Science Reserve, and any other lands on Mauna Kea that the University of Hawaii leases or over which the University of Hawaii acquires control or jurisdiction.

³ The 2009 CMP refers to this approach as "adaptive management." Adaptive management is defined as a systematic process for continually improving management policies and practices for resource protection by learning from the outcomes of past and current management activities. Adaptive management recognizes that there is a level of uncertainty about the "best" policy or practice for a particular management issue, and therefore requires that each management decision be revisited in the future to determine if it is providing the desired outcome.

⁴ "Resources" include the natural environment and human practices, values, and traditions and their physical manifestations.

The UH Maunakea Lands or UH Management Areas presently consist of two parcels that UH leases and the portion of a third parcel over which UH holds a non-exclusive easement (Figure 1.1):

- Parcel TMK 4-4-015:009 via General Lease S-4191, which expires December 31, 2033. This 11,287.854-acre parcel is called the Mauna Kea Science Reserve (MKSR).⁵
- Parcel TMK 4-4-015:012 via General Lease S-5529, which expires in 2041. This 19.261-acre parcel is known as Halepōhaku.
- Portion of parcel TMK 4-4-015:001 under a non-exclusive roadway easement. This easement, which encompasses 70.798 acres, contains the roadway between the two leased parcels.

Over the life of the UH's tenancy on Maunakea the specific area that falls within UH Maunakea Lands, and thus the UH Management Areas, has and may continue to change.⁶ This CMP is only binding on the UH Maunakea Lands.⁷ If UH Maunakea Lands are modified as the extent of land that UH has control or jurisdiction changes, this CMP will govern only those lands still authorized for use by UH, without the need to amend the CMP.

This CMP supplement does not propose expanding or contracting the UH Maunakea Lands.

⁵ Note that approximately 2,033.2 acres were withdrawn from the MKSR by BLNR in 1998 for the Mauna Kea Ice Age Natural Area Reserve.

⁶ For example, in 1998 land was withdrawn from General Lease S-4191, as discussed in footnote 5. UH is working toward and supports a new general lease from BLNR that will include approximately 640 acres for the Mauna Kea Science Reserve, Halepõhaku, and the access road as discussed in Alternative 2 of *Environmental Impact Statement Preparation Notice for Land Authorizations for Long-Term Continuation of Astronomy on Maunakea*, published with the Office of Environmental Quality Control, on February 12, 2018.

⁷ The CMP does not apply to areas not defined as UH Management Areas, although UH has actively sought coordination and consultation with neighboring landowners such as BLNR, DHHL, and others, since species and cultural resources, for example, know no boundaries.

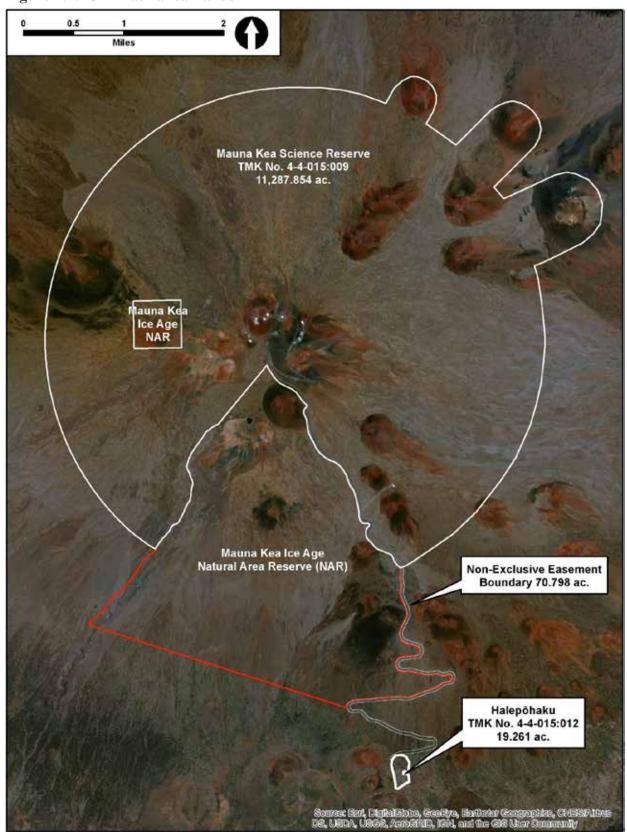


Figure 1.1: UH Maunakea Lands

Source: Planning Solutions, Inc. (PSI)

1.3 OVERVIEW OF COMPREHENSIVE MANAGEMENT PLAN COMPONENTS

This section describes the structure of the remainder of this document, which is divided into 12 subjects with management actions associated with each of them; the 12 subjects are:

- 1. Cultural resources (CR)
- 2. Natural resources (NR)
- 3. Education and outreach activities (EO)
- 4. Astronomical resources, activities, and uses (AR)
- 5. Activities and uses (ACT)
- 6. Permitting and enforcement (P)
- 7. Infrastructure and maintenance (IM)
- 8. Construction guidelines (C)
- 9. Site recycling, decommissioning, demolition, and restoration (SR)
- 10. Considering future land use (FLU)
- 11. Operations and implementation (OI)
- 12. Monitoring, evaluation, and updates (MEU)

Each of the 12 subjects has its own chapter in this document (Chapters CHAPTER 3 through CHAPTER 14) with the following subsections:

- <u>Introduction</u>, which provides a brief background and identifies the section of the 2021 OAR (Appendix A) where information concerning the current status of the topic can be found.
- <u>Desired Outcome</u>, which summarizes the goal(s) associated with the subject. The desired outcomes have not substantially changed; UH's remains committed to achieving the desired outcomes approved in 2009.
- <u>Need</u>, which provides a brief high-level discussion of why the subject and its management actions are needed to advance proper management of the UH Management Areas.
- Management Actions, which provides details regarding each of the subject's ongoing management actions. This document updates the CMP management actions, where warranted, per management action MEU-2 to better realize the desired outcomes using adaptive management techniques that considered lessons learned, information collected, and input received since the CMP was adopted.⁸ In some cases the management actions in this supplement remain nearly identical to their original 2009 version. In other cases, they have been substantially adapted. At a minimum, the management actions have been adapted to be consistent with the Maunakea Administrative Rules, which did not exist in 2009; the Master Plan for the University of Hawai'i Maunakea Lands, E O I Ka Leo (Listen to the Voice) (Planning Solutions, Inc., January 2022) (2022 Master Plan), which is substantially

⁸ As discussed in Chapter 2, fourteen (14) of the 103 management actions in the original 2009 CMP have been completed and are therefore not discussed outside of Chapter 2 in this document. That is why some management action numbers are missing. For example, management action CR-5 through CR-9 are complete; therefore, the reader will find management actions CR-1 through CR-4 and then CR-10 in this document.

different than the 2000 Master Plan; and UH's Maunakea governance structure as of 2021. In all cases, this supplement provides the complete set of management actions.

1.4 BACKGROUND AND CONTEXT

1.4.1 UH PLANS, LAND AUTHORIZATIONS, AND RULES APPLICABLE TO UH MANAGEMENT

The CMP is an integrated planning tool intended to enable wise resource management. It provides the framework for managing multiple existing and future activities, such as recreational and commercial activities, scientific research (e.g., astronomy), and for protecting Maunakea's unique cultural and natural resources. Together, UH's land authorizations, the CMP, and the Maunakea Administrative Rules provide both the guidance and the authority that UH needs to manage the UH Management Areas.

The only active plans relevant to UH decision-making regarding the UH Maunakea Lands are: (*i*) the CMP, which is periodically updated/supplemented and approved by the BOR and the BLNR; and (*ii*) the 2022 Master Plan, which was approved and adopted by UH. The CMP and the 2022 Master Plan are consistent and complement one another and are intended to be implemented together. The CMP addresses management of activities and resources. The 2022 Master Plan addresses the planning, siting, and design of new facilities and significant material changes to existing facilities.

<u>1.4.2</u> MAUNAKEA ADMINISTRATIVE RULES

The Maunakea Administrative Rules¹⁰ were adopted by the Board of Regents on November 6, 2019, and approved by the Governor on January 13, 2020, after the 2009 CMP and 2000 Master Plan. The adoption and approval of the Maunakea Administrative Rules completed CMP management action ACT-11 and addressed significant elements of many other management actions; the rules are an essential tool for managing and protecting resources.

The purpose of the Maunakea Administrative Rules as stated in HAR § 20-26-1, is as follows:

"to provide for the proper use, management, and protection of cultural, natural, and scientific resources of the UH management areas; to promote public safety and welfare by regulating public and commercial activity within the UH management areas; to ensure safe and appropriate access to the UH management areas for the public; and to foster co-management with the department of land and natural resources in UH management areas."

Rangers are authorized to issue citations to enforce the Maunakea Administrative Rules under HAR § 20-26-74 (ACT-3, Section 7.4.3). To protect Maunakea's resources, civil violations under the Maunakea Administrative Rules include littering; parking in undesignated areas; and removing, injuring, or disturbing resources. The Maunakea Administrative Rules address public and commercial activities only within the UH Management Areas.

Under the Maunakea Administrative Rules, four types of permits are issued or reviewed by CMS: research, special use, commercial tour activity, and commercial film and recordings. Special use permits may allow activities otherwise prohibited under the rules. The permitting process allows for the consideration of a proposed activity's:

¹⁰ <u>https://www.hawaii.edu/offices/bor/adminrules/chapter26.pdf</u>.

- Compatibility with the functions and purpose of the UH Management Areas, consistency with approved management plans;
- Potential effect on the surrounding resources, existing facilities, and the public's activities within the UH Management Areas;
- Compatibility with existing approved uses; and
- Compatibility with scheduled or ongoing construction, repairs, or maintenance activities.

The rules do not regulate Native Hawaiian traditional and customary rights. The Maunakea Administrative Rules explicitly acknowledge that "Native Hawaiian traditional and customary rights as recognized and protected under article XII, section 7, of the Hawai'i State Constitution shall not be abridged." Article XII, section 7, of the Hawai'i State Constitution provides that "The State reaffirms and shall protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by ahupua`a tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778, subject to the right of the State to regulate such rights."

<u>1.4.3</u> The CMP Management Actions Update/Supplement Process

The authors of the 2009 CMP used the best information available at the time that it was adopted. At the same time, they recognized that the resource information would improve over time, new management structures might be introduced, and public opinions would continue to evolve as the community engagement effort that is part of the CMP (see management actions EO-7, EO-8, and others) was implemented. With these considerations in mind, the CMP noted that community cooperation in the long-term management of Maunakea's resources is essential if all its desired outcomes are to be achieved and the trust between the community and UH is to be rebuilt.

In accordance with the provisions of the CMP, CMS, which has replaced the Office of Mauna Kea Management (OMKM) as the entity responsible for overseeing the UH Maunakea Lands, prepared a *Draft Outcome Analysis Report* (Center for Maunakea Stewardship, April 2021) describing the progress that UH had made in implementing the management actions contained in the CMP and outlining the adaptations, adjustments, and changes that it believed should be made to those measures in the coming years. It circulated the draft OAR to agencies and advisors participating in the review process at the end of April 2021, and followed up over the following weeks with video-conference meetings with those agencies and advisors. It then used the written and oral feedback that it received to revise and finalize the OAR. The 2021 OAR (Center for Maunakea Stewardship, August 2021) (Appendix A), which reflects the feedback that was received from agencies and advisors participating in the review process, forms the basis of the updates and adaptations of the management actions in this document.

1.4.4 UH MAUNAKEA GOVERNANCE STRUCTURE AND ROLES IN CMP IMPLEMENTATION

The CMP management actions will be implemented through the governance structure approved via a motion by the BOR. The BOR delegated responsibility for the governance and management of UH Maunakea Lands to UH Hilo, which is advised by the groups listed below. UH Hilo has, in turn, created the Center for Maunakea Stewardship (CMS) to administer the lands. This governance structure is established through BOR motions and is outside the scope of the CMP management actions. The governance structure at the time this plan supplement was adopted is

illustrated in Figure 1.2. The structure may be modified from time to time without requiring the CMP to be amended.

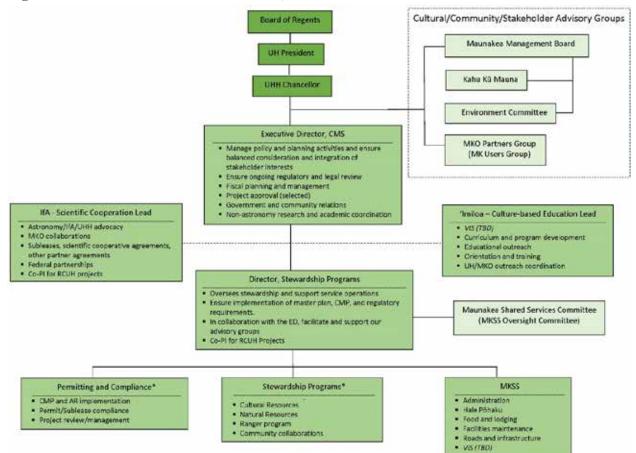


Figure 1.2: CMS Governance Structure, Established in 2020

 Notes:
 * Shown here for descriptive purposes. Organization of these functions to be finalized by Director of Stewardship Programs. The structure may be modified from time to time without triggering a need to amend this plan.

 Source:
 CMS

The "Cultural/Community/Stakeholder Advisory Groups" are important aspects of UH's governance and they fill important advisory roles on a regular basis as UH implements the CMP. These groups are:

- Maunakea Management Board (MKMB) provides the community with a sustained direct voice for the management of Maunakea. The Board is composed of seven members from the community nominated by the University of Hawai'i Hilo (UH Hilo) Chancellor and approved by the UH Board of Regents. The volunteer members represent a cross-section of the community and serve as the community's voice, providing input on operations and activities, developing policies, and reviewing and providing recommendations for land uses planned for Maunakea.
- Kahu Kū Mauna (Guardians of the Mountain) Council (KKM) is a community-based volunteer council whose members are from the Native Hawaiian community. KKM advises the CMS, MKMB, and the UH Hilo Chancellor on Hawaiian cultural matters affecting the UH Management Areas. They review proposed projects and give their input to MKMB, and a KKM member participates in MKMB discussions during its public meetings.

- Environmental Committee (EC) advises MKMB, CMS, and the UH Hilo Chancellor on environmental issues, protection and enhancement of the natural environment, and resource management practices to advance the stewardship of Maunakea's natural resources. The EC members serve as subject matter experts on environmental matters to support evidence-based, holistically evaluated planning, project management, and policy development by UH.
- Maunakea Observatories (MKO) advises CMS, Institute for Astronomy, 'Imiloa and the UH Hilo Chancellor on plans, policies, programs and operational issues of mutual interest.

<u>1.4.5</u> ISSUES AND CONCERNS BEYOND THE SCOPE OF THE CMP

Through the extensive community outreach that took place during the review of the draft 2022 Master Plan and other efforts, it remains clear that the community has several concerns related to past and future activities on Maunakea and specifically within the UH Management Areas that went beyond the scope of the 2022 Master Plan and also go beyond the scope of the CMP 2022 Supplement. Some of these issues and concerns are listed below. Policy makers are urged to consider them in their broader decision making related to Maunakea.

- The existing general lease between UH and DLNR and/or the CDUP for the TMT project (HA-3568) should, or should not, be terminated.
- A new land authorization that would allow for astronomy to continue on Maunakea beyond 2033 should, or should not, be awarded in the future.
- UH is, or is not, the appropriate entity to manage the cultural landscape and natural resources in the summit region or access to this sensitive area.
- The UH Maunakea Lands were "stolen" from the Hawaiian Kingdom.
- Whether or not the annexation of Hawai'i by the United States was legal.
- The desire by some for Hawaiian sovereignty.
- Whether or not the state's activities, uses, and management of Maunakea accord with the United Nations Declaration on the Rights of Indigenous Peoples.

CHAPTER 2 COMPLETED MANAGEMENT ACTIONS

As documented in the 2021 OAR, UH has completed 14 of the management actions identified in the 2009 CMP.¹¹ Those actions are listed in Table 2.1 below. To learn how UH completed these management actions please see the section in the 2021 OAR (Appendix A) stated in the right column of the table.

		For Completion
Mgmt.	Description	Details See
Action	Description	OAR Section
CR-5	Develop and adopt guidelines for the culturally appropriate placement and removal of offerings.	2.1.3.5
CR-6	Develop and adopt guidelines for the visitation and use of ancient shrines.	2.1.3.6
CR-0 CR-7	Kahu Kū Mauna (KKM) shall take the lead in determining the appropriateness of	2.1.3.7
CK-7	constructing new Hawaiian cultural features.	2.1.3.7
CR-8	Develop and adopt a management guideline for the UH Management Areas on	2.1.3.8
	the scattering of cremated human remains.	
CR-9	A management guideline for the culturally appropriateness of building ahu or	2.1.3.9
	"stacking of rocks" will need to be developed by KKM who may consider similar	
	policies adopted by Hawai'i Volcanoes National Park.	
CR-11	Complete an archaeological survey of the portions of the Summit Access Road	2.1.3.11
	corridor that are under UH management.	
CR-12	Consult with KKM about establishing buffers (preservation zones) around known	2.1.3.12
	historic sites near facilities, to protect them from potential future development.	
NR-15	Conduct baseline inventories of high-priority resources, as outlined in an	2.2
	inventory, monitoring, and research plan.	
ACT-11	Seek statutory authority for the University to regulate commercial activities in	3.4.2.11
	the UH Management Areas.	
P-3	Obtain statutory rule-making authority from the legislature, authorizing the	3.5.2.3
	University of Hawai'i to adopt Administrative Rules pursuant to Chapter 91 to	
	implement and enforce the management actions.	
P-6	Obtain legal authority for establishing, and then establish, a law enforcement	2.5.2.6
	presence on the mountain that can enforce rules for the UH Management Areas.	
FLU-2	Develop a map with land use zones in the Astronomy Precinct based on updated	3.9.2.2
	inventories of cultural and natural resources, to delineate areas where future land	
	use will not be allowed and areas where future land use will be allowed but will	
	require compliance with prerequisite studies or analysis prior to approval of	
01.1	Conservation District Use Permit.	2 4 0 2 4
OI-1	Maintain OMKM, MKMB, and KKM in current roles, with OMKM providing	3.10.2.1
	local management of the UH Management Areas, and MKSS providing	
	operational and maintenance services.	2 10 2 2
OI-2	Develop training plan for staff and volunteers.	3.10.2.2
Source: Tabl	es 4.1 through 4.25 in 2021 OAR.	

 Table 2.1
 Completed Management Actions

Since these 14 management actions (Table 2.1) are completed, they have not been modified from their 2009 form, are not discussed further in this document, and will not be discussed in future annual reports or future updates. This accounts for the management action numbering gaps, since

¹¹ The 2021 OAR indicated that 15 management actions were complete. UH decided during the preparation of this document that management action CR-13 was not complete because the Burial Treatment Plan is still being implemented and therefore ongoing. Thus, there are now 14 management actions considered complete.

COMPLETED MANAGEMENT ACTIONS

this CMP 2022 Supplement retains the 2009 CMP assigned management action numbers to minimize confusion about the origin of the ongoing management actions.

CHAPTER 3 CULTURAL LANDSCAPE

3.1 INTRODUCTION

Section 7.1.1 of the 2009 CMP provided information and formulated management actions relevant to the protection, preservation, and enhancement of the cultural resources of the UH Management Areas. In this supplement, the term "Native Hawaiian Cultural Resources" has been replaced with "Cultural Landscape." As used in the CMP, the cultural landscape is composed of physical elements which manifest with culture and human use through time. The cultural landscape includes akua, cultural practices and beliefs, resource extraction, traditional trail systems, navigation, and historic properties (e.g., archaeological sites). Cultural practices are (*i*) Native Hawaiian customary and traditional practices, and (*ii*) contemporary practices. Information concerning the current status of the cultural landscape can be found in Section 2.1 of the 2021 OAR (Appendix A).

3.2 DESIRED OUTCOME

The "desired outcome" with respect to the cultural landscape is to:

Increase understanding and appreciation of Native Hawaiian history and cultural practices related to Maunakea to ensure that these practices are protected and respected. Identify, document the condition of, and protect cultural resources and historic properties in the UH Management Areas.¹²

3.3 NEED

Given the significance of the cultural landscape as a whole, there is a need to continue the implementation of the CMP's management actions related to the cultural landscape to avoid and/or minimize disturbance and potential impacts to the cultural landscape. The CMP strategies reflect a series of general guidelines including:

- Recognizing that Maunakea is for some is a *wahi pana* (storied/legendary place) and for others is a *wao akua* (realm of the gods).
- Recognizing the need to continue and reinvigorate outreach to the Native Hawaiian community, including customary and traditional practitioners and families with lineal and historic connections to Maunakea, when formulating plans and guidelines.
- Recognizing that Native Hawaiian customary and traditional practices may evolve over time and that management needs may also change.
- Ensuring a balanced approach between Native Hawaiian customary and traditional practices related to the cultural landscape and the need to protect natural resources and historic properties.¹³

¹² As used in this report, "cultural practices" means: (1) Native Hawaiian customary and traditional practices protected by the State of Hawai'i Constitution and (2) contemporary practices.

¹³ The 2009 CMP did, and this document confirms, that pursuant to the legal requirements under the Hawai'i Supreme Court's ruling in *Ka Pa'akai*, access to UH Management Areas for Native Hawaiian traditional and customary practices will not be restricted. To the extent that public safety and resources are affected, activities may be allowed under the Maunakea Administrative Rules with reasonable restrictions to ensure public safety and resources protection. The 2009 CMP lists the

- Disseminating culturally sensitive and appropriate educational information to visitors and others who are not familiar with this cultural landscape or who do not engage in customary and traditional Native Hawaiian practices to protect the cultural landscape effectively and efficiently.
- Complying with and enforcing applicable rules and regulations to protect the cultural landscape.
- Focusing efforts to address issues identified in the *Independent Evaluation of the Implementation of the Mauna Kea Comprehensive Management Plan* (Kuiwalu, December 2020), specifically (*i*) materials and training programs to increase understand of Native Hawaiian history and cultural practices related to Maunakea; and (*ii*) engagement with the Native Hawaiian community.
- Embracing UH's commitment¹⁴ to collaboratively build a global model of harmonious and inspirational stewardship that is befitting of Maunakea that is informed by and integrates indigenous and other management principles, including the kānāwai principles.

3.4 MANAGEMENT ACTIONS

As discussed in detail in Section 2.1 of the 2021 OAR and summarized in CHAPTER 2 of this document, half of the 14 CMP management actions related to cultural landscape have been completed. The seven (7) management actions that are ongoing are listed in Table 3.1 and detailed in Sections 3.4.1 through 3.4.7.

following as examples of the access that it expects will continue: (*i*) access for traditional and customary practices, including the gathering of cultural resources; (*ii*) access for families to visit *na iwi kupuna* (the bones of their ancestors); (*iii*) access to scatter 'ohana ashes; (*iv*) access through the trails located within the UH Management Areas for subsistence gathering and hunting; (*v*) access for families to continue to bury their 'ohana piko; (*vi*) access for traditional and customary practices, including religious and spiritual observances, pilgrimage, offerings, and prayers; and access for families to gather water from Lake Wai'au for religious and spiritual purposes. The CMP also outlines an approach to be used in the event of disputes or determination of appropriateness of traditional and customary practices, including cultural, historical, and natural resources.

¹⁴ UH Board of Regents Resolution "Affirming Commitment to the Collaborative Stewardship of Maunakea's Cultural, Natural, Educational and Scientific Resources" adopted August 24, 2017.

Mgmt.		.
Action	Description	Discussion
Manage	ment	
CR-1	UH will engage with families with lineal and cultural connections to Maunakea, Native Hawaiian customary and traditional practitioners, and other Native Hawaiian groups, including Kahu Kū Mauna Council (KKM), toward the development and maintenance of appropriate guidance regarding cultural issues.	3.4.1
CR-2	Support application for designation of the summit region of Maunakea as a Traditional Cultural Property, under the National Historic Preservation Act of 1966, Public Law 89-665, as amended.	3.4.2
CR-3	Conduct educational efforts to generate public awareness about the importance of preserving the cultural landscape.	3.4.3
Native I	Iawaiian Cultural practices and knowledge	
CR-4	Collect information on customary and traditional Native Hawaiian cultural practices, contemporary cultural practices, and traditional Native Hawaiian knowledge.	3.4.4
Historic	properties	
CR-10	Continue to implement the Long-Term Historic Property Monitoring Plan for the University of Hawai'i Management Areas on Mauna Kea, Ka'ohe Ahupua'a, Hāmākua District, Hawai'i Island, State of Hawai'i (Pacific Consulting Services, Inc., April 2014) and seek SHPD approval of amendments.	3.4.5
CR-13	Continue to implement the Burial Treatment Plan for Burial Sites in the Mauna Kea Science Reserve and the Mauna Kea Access Road Corridor, Ka'ohe Ahupua'a, Hāmākua District, Island of Hawai'i (Pacific Consulting Services, Inc., July 2014).	3.4.6
CR-14	Continue to immediately report any disturbance of a historic shrine or burial site to DOCARE, KKM, and SHPD.	3.4.7
Note: Source:	The exact wording of the management actions listed in the table has been revised from the 2009 CMP and the 202 the progress made to date, adaptation made based on the lessons learned, information collected, and input rec Adapted from the 2021 OAR, Table 2.5.	

 Table 3.1
 Ongoing Cultural Landscape Management Actions

3.4.1 CR-1: ENGAGE WITH CULTURAL COMMUNITY AND DEVELOP AND MAINTAIN APPROPRIATE GUIDANCE REGARDING CULTURAL ISSUES

UH continues to take into account the Hawai'i Supreme Court's analytical framework to ensure that traditional and customary Native Hawaiian rights are preserved and protected. This framework has its foundation in *Ka Pa'akai*.¹⁵ This includes at a minimum addressing: "(1) the identity and scope of 'valued cultural, historical, or natural resources' in the petition area, including the extent to which traditional and customary native Hawaiian rights are exercised in the petition area; (2) the extent to which those resources – including traditional and customary native Hawaiian rights – will be affected or impaired by the proposed action; and (3) the feasible action, if any, to be taken by the [agency] to reasonably protect native Hawaiian rights if they are found to exist."

To achieve this, UH will continue to work cooperatively with KKM, families with lineal and cultural connections to Maunakea, Native Hawaiian customary and traditional practitioners, the Office of Hawaiian Affairs (OHA), and other Native Hawaiian groups. In carrying out this work:

• CMS will increase the frequency with which it reaches out to representatives of the types of groups listed above as part of its interaction and relationship building with the community. CMS anticipates that the outreach will include:

¹⁵ Ka Pa'akai O Ka 'Aina v. Land Use Commission, 94 Hawai'i 31 (2000) (Ka Pa'akai).

- Maintaining a CR-1 mailing list (with a preference for email communication) that includes individuals and families that self-identify as Native Hawaiian, including those that self-identify as having lineal and cultural connections to Maunakea and/or self-identify as customary and traditional practitioners, OHA, and other Native Hawaiian groups. The CR-1 mailing list will be updated regularly.
- Providing regular updates (minimum once a year) to those on the CR-1 mailing list. Timely updates will be sent so that those on the CR-1 mailing list are informed about and can provide input on the following; thus, updates will be sent at least 6 days prior to these items appearing on public MKMB agendas:
 - Land use proposals¹⁶ (during Phase 2, 3 and 4 proposal reviews);
 - Proposed procedures and guidelines that are being developed as part of this management action;
 - Updates to plans;
 - · Annual Archaeological Monitoring Reports (CR-10, Section 3.4.5); and
 - Other actions being considered or reports prepared by/for UH and CMS that may be of interest or concern to those on the CR-1 mailing list.

By this process, Native Hawaiians and organizations that represent Native Hawaiians will be informed and have opportunities to provide input early in the process, well before proposed uses, plans, and guidelines are finalized and adopted by UH. The materials that will be used in support of this outreach will include copies of draft plans and guidelines and detailed written information regarding opportunities to review and comment on draft proposals and plans.

- CMS will provide regular updates to the individuals that the Hawai'i Island Burial Council recognizes as lineal and cultural descendants of Ka'ohe Ahupua'a. In all cases the updates will be provided at least once each calendar year.
- CMS will make efforts to have KKM's seven members represent a broad spectrum of perspectives on Maunakea's cultural landscape and Native Hawaiian issues.
- Based on the results of its outreach efforts and input from the Native Hawaiian community, CMS will, if appropriate, develop new and/or modify existing management guidelines regarding cultural issues and it will continue to consider, and potentially amend or modify, adopted management guidelines regarding cultural issues, including those associated with completed CMP management actions CR-5, CR-6, CR-7 (which also addresses CR-9), CR-8, and CR-12 (see <u>https://hilo.hawaii.edu/maunakea/culture/management</u>). This will be done in a manner that is consistent with the CMP, 2022 Master Plan, and Maunakea Administrative Rules.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). The title of this management action previously stated "Kahu Kū Mauna shall...." KKM is an advisory body, not an action entity; therefore, this management action has been adapted to specify that "UH

¹⁶ Land use is defined in HAR § 13-5-2, as (1) the placement or erection of any solid material on land if that material remains on the land more than fourteen days, or which causes a permanent change in the land area on which it occurs; (2) the grading, removing, harvesting, dredging, mining or extraction of any material or natural resource on land; (3) the subdivision of land; or (4) the construction, reconstruction, demolition, or alteration of any structure, building, or facility on land.

will...." Based on community input, this management action has been adapted to place greater emphasis on outreach to the Native Hawaiian community and specify that such outreach will not be limited to establishing guidelines related to appropriate behavior within the UH Management Areas, but be expansive and seek input on all proposals, plans, and actions early and often. Other aspects of the management action are retained, such as developing policy regarding cultural issues.

3.4.2 CR-2: SUPPORT APPLICATION FOR DESIGNATION OF SUMMIT AS TCP

UH will share its reports and studies related to the cultural landscape within the summit region of Maunakea with others and not oppose an application submitted by any entity that requests portions of the summit region of Maunakea be designated a Traditional Cultural Property (TCP), under the National Historic Preservation Act of 1966, Public Law 89-665, as amended.

Kūkahau'ula has been assigned State Inventory of Historic Places (SIHP) site number 50-10-23-21439; however, UH is not aware of an application being submitted for its or any other portion of Maunakea to the National Register of Historic Places to be listed as a TCP. Should an application be prepared to designate the portions of the Maunakea summit region similar to those shaded yellow in Figure 3.1, UH's reports and studies may be used to inform it and UH would not oppose it.

Figure 3.1: Potential Traditional Cultural Properties in the UH Management Areas

Source: Planning Solutions, Inc.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). The management action, which in 2009 was a single sentence, has been expanded to clarify what "support" means (e.g., sharing its reports if an entity nominates portions of the summit region of Maunakea to be designated a TCP).

3.4.3 <u>CR-3: CONDUCT EDUCATIONAL EFFORT TO RAISE PUBLIC AWARENESS OF</u> <u>IMPORTANCE OF PRESERVING THE CULTURAL LANDSCAPE</u>

UH's ongoing management efforts related to this topic have two interrelated, but distinct, thrusts. The first, which is focused on raising the level of public awareness of the importance of preserving the cultural landscape on Maunakea, consists of the combined effort by CMS and 'Imiloa that are discussed elsewhere in this document (see, for example, Section 5.4.3.1). The second, which is oriented toward limiting threats to the cultural landscape through management of activities and uses, is discussed in Section 7.4. To achieve this, UH and CMS will:

- Ensure CMS' staff members who are knowledgeable about the cultural landscape participate in the implementation of EO-# coded management actions (Sections 5.4.1, 5.4.2, and 5.4.3), which focus on education and outreach. The education and outreach programs will be managed so that materials are regularly updated by personnel knowledgeable about the cultural landscape. This may include:
 - Adding cultural landscape content to the educational materials prepared as part of EO-# coded management actions (Sections 5.4.1, 5.4.2, and 5.4.3) that, among other things, affirms Maunakea as a wahi pana and wao akua.
 - Compile cultural, archaeological, and historic background materials, maps, chronology, and photographs to aid staff presentation or interactions with public.
- Ensure CMS' cultural resource specialists participate in the implementation of ACT-# coded management actions focused on managing activities and uses that are discussed in detail in Section 7.4.
- Partner with other cultural-based entities within UH Hilo and the community to increase Native Hawaiian participation in programs like Maunakea Scholars (www.maunakeascholars.org) and identify opportunities and create programs that build a cultural component to the Multidisciplinary Field Station concept at Halepōhaku.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). The second thrust of limiting threats to the landscape was added to this management action, related to ACT-# coded management actions, to make it clear that cultural resources shall be considered during the management of activities and uses, like the natural resources management action NR-1. This was done because, during implementation of the CMP, UH recognized that the CR and NR management actions did not, but should, have similar scopes.

3.4.4 <u>CR-4: Collect Information on Traditional, Customary, and Contemporary</u> <u>Cultural Practices and Knowledge</u>

In accordance with management action CR-4, UH has collected and is continuing to collect information on traditional, customary, and contemporary cultural practices on Maunakea. One of UH's core value, *'ike Hawai'i; nohona Hawai'i* (traditional knowledge; traditional practices), involves integrating traditional knowledge and practice into its stewardship to strengthen the protection and conservation of Maunakea's resources. CMS will partner with educational institutions such as the UH Hilo and Hawai'i Community College to establish an oral history program that is devoted to memorializing the traditional and customary practices and knowledge associated with Maunakea.

In addition, Native Hawaiian families or communities that self-identify as having a cultural connection to Maunakea have been and will continue to be invited to work with CMS (CR-1, Section 3.4.1). While there are several reports on Native Hawaiian customary and traditional practices and cultural sites on Maunakea, identifying these practices and sites is an ongoing process to ensure those practices are protected and respected.

Examples of the ongoing efforts related to the collection of information on traditional, customary, and contemporary practices that CMS expects to undertake include the following:

- Conduct and update oral histories and ethnographic studies gathered from those knowledgeable of cultural practices on Maunakea.
- Work with 'Imiloa to capture and incorporate information on cultural practices in curriculum and education/outreach program development.
- Hold events, similar to the Maunakea Speakers Series, that focus on cultural topics that can serve as convening events for those knowledgeable of cultural practices on Maunakea.
- Work with UH Hilo entities, including those associated with Hawaiian language and Hawaiian studies, to develop programs that delve more deeply into Maunakea's cultural connections and take advantage of UH's objective to utilize the facilities at Halepōhaku as a Multidisciplinary Field Station.

Working with its advisory groups (e.g., KKM, EC, and MKMB), UH is and will continue to integrate the accumulated Native Hawaiian knowledge with other scientific findings and use both to inform its approaches to implementing the CMP. This may inform approaches to any of the CMP management actions, not just the CR management actions. For example, programs to implement education management actions (EO-#, Section 5.4.3) and the access management action (ACT-1, Section 7.4.1) will continue to incorporate Hawaiian knowledge and methods.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Traditional knowledge was added to the management action to recognize that 'ike Hawai'i can inform UH's broad stewardship of Maunakea. Community events were added to this management action because UH has learned that conversations at these events often provide insights into cultural practices.

3.4.5 CR-10: IMPLEMENT THE HISTORIC PROPERTY MONITORING PLAN

UH will continue to implement its SHPD-approved *Long-Term Historic Property Monitoring Plan* (Pacific Consulting Services, Inc., April 2014). This includes: (*i*) an annual assessment of historic properties in relatively close proximity to land uses (e.g., near astronomy facilities and alongside the Mauna Kea Access Road); (*ii*) assessment of the more remote sites within the MKSR on a three- and five-year rotational basis; and (*iii*) submission of annual reports regarding the status of historic properties to SHPD after seeking the advice of the KKM on management action recommendations.

As discussed in Section 2.1.4.1 of the 2021 OAR, experience gained during years of intensive historic properties monitoring and reporting, has led CMS to conclude that it is appropriate to adjust the monitoring in a way that maintains effective stewardship of cultural resources while at the same time better utilizing the finite financial resources that are available for this purpose. CMS hopes to revise the monitoring plan so that it focuses on the resources that are demonstrably the most vulnerable, while limiting monitoring of the least vulnerable resources to *ad hoc* surveillance. Specifically, it will likely be asking SHPD for permission to revise the monitoring program as follows:

• Reassess the current annual assessment program for sites on the 1-year list (including sites on Pu'umākanaka [as per the Burial Treatment Plan (BTP), see CR-13], and all sites near astronomy facilities and the road corridor). Remove sites from the 1-year list (and place

them on 3-year or 5-year assessment lists) that are farther away from facilities and roads and have shown no changes throughout the 10 years of monitoring.

- Reduce the number of sites requiring visits during the 3-year and 5-year assessments (possibly excluding shrine sites with no upright/erect stones or surface lithic scatters).
- Conduct a full assessment once every ten years rather than once every five years (as is now the case).
- Update the list of historic properties sites to reflect new sites found, if any, during the monitoring, and add new information about historic properties, if any, that may have been identified since the baseline.
- Link ad hoc visits to historic resources (not assessed annually) to work conducted as part of other projects or studies (e.g., biological and geological surveys).
- Make the report submitted to SHPD labeled as neither a "draft" or "final." Instead title the reports as Year Historic Property Monitoring Report, UH Maunakea Lands (e.g., "2022 Historic Property Monitoring Report, UH Maunakea Lands"). The report will only be modified to address SHPD comments in the event that comments are received.

Going forward, CMS will review the recommendations in the annual historic properties monitoring reports and those found to be appropriate for implementation will be incorporated into the ongoing historic property monitoring program, historic property mitigation program, or other CMP program as appropriate for implementation in subsequent years.

CMS will also seek to use budget made available through the amendment of the monitoring plan to implement the data recovery efforts that are outlined below. These data recovery efforts were recommended in past annual historic property monitoring reports, which indicate data recovery at several historic properties is appropriate before the sites' integrity diminishes to a point where they are no longer considered significant. The types of data recovery efforts deemed appropriate vary from archaeological excavation to archaeological mapping. Specific "still-to-be-acted-upon" recommendations from the archaeological monitoring reports include the following:

- <u>SIHP No. 50-10-23-16204</u>. With advice from KKM and in coordination with SHPD, develop a data recovery plan as a proactive response to collect baseline data before the likely loss of data due to continued alteration at the site. The plan should include: (*i*) a subsurface testing strategy for features with likely subsurface deposits (i.e., the enclosures and lithic scatters) and (*ii*) detailed mapping of the site (potentially using technologies such as LIDAR and 3-dimensional scanning) that not only records archaeological features, but non-feature-related rocks within the site complex.
- <u>SIHP No. 50-10-23-25766</u>. Develop a data recovery plan, in coordination with SHPD and KKM, to determine whether a subsurface component to the site exists and whether that deposit retains any significance; and upon completion of the subsurface excavations, reevaluate the significance of Site 25766.
- <u>SIHP Nos. 50-10-23-9074 and -9075</u>. Consult with Architectural historian or engineer to determine the proper level of conservation for Sites 9074 and 9075.

- <u>SIHP No. 50-10-23-25770</u>. With advice from KKM and in coordination with SHPD, develop a plan to append site map for Site 25770 and track possible movement of surface artifacts.
- <u>SIHP No. 50-10-23-10314</u>. With advice from KKM and in coordination with SHPD, develop a data recovery plan to collect baseline data for Site 10314. The plan should include a research design, planned analyses, as well as a review of the site's known history of research; upon completion of the subsurface excavations, re-evaluate the significance of Site 10314.
- <u>SIHP Nos. 50-10-23-18683, 25768, 25769, 21214, 21452, 25807, and newly recorded lithic</u> <u>scatters</u>. With advice from KKM and in coordination with SHPD, develop a plan to map sites and track possible movement of surface artifacts.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Over many years of implementing the *Long-Term Historic Property Monitoring Plan*, UH has learned that (*i*) monitoring the remote historic properties subjects staff and consultants to unnecessary safety risks, (*ii*) monitoring the remote historic sites is costly, and (*iii*) the remote historic sites are not being adversely impacted by ongoing activities and uses in the UH Management Areas. Another realization has been that greater efforts are necessary to preserve and document historic sites near activities, facilities, and uses in the UH Management Areas that are being impacted directly or indirectly by those activities, facilities and uses. Therefore, UH proposes to amend the monitoring plan and direct savings, if any, to recommended preservation and documentation tasks.

3.4.6 <u>CR-13: IMPLEMENT THE BURIAL TREATMENT PLAN</u>

UH will continue to implement the SHPD-approved *Burial Treatment Plan* (BTP) (Pacific Consulting Services, Inc., July 2014). It is important to note that the BTP concerns historic burials. The modern scattering or leaving of ashes within the UH Management Areas is not covered in the BTP; guidance regarding the scattering or leaving of ashes can be found at <u>https://hilo.hawaii.edu/maunakea/culture/management</u> (see guidance associated with completed CMP management action CR-8).

In addition to implementing the BTP, UH has and will continue to establish, implement, and regularly update guidelines that define such things as: (*i*) the way that lineal descendants and/or others wishing to visit burial sites should notify the Maunakea Rangers and other management staff in advance so that the visits can be made safely and securely; (*ii*) the way UH notifies commercial tour operators that visits to burial sites are prohibited; and (*iii*) the procedures, which are discussed in CR-1 (Section 3.4.1), that UH will follow to provide annual or more frequent updates to individuals that the Hawai'i Island Burial Council recognizes as lineal and cultural descendants of Ka'ohe Ahupua'a on the status of known burials on the mountain.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). The information obtained during preparation of the 2021 OAR did not indicate a need to change these procedures at this time, i.e., no adaptive management actions are required.

3.4.7 CR-14: REPORT DISTURBANCE OF HISTORIC SHRINE OR BURIAL SITE

As part of their regular activities the Rangers will continue to monitor activities within the UH Management Areas on a daily basis and are in a good position to monitor for/observe disturbance of a historic property which may include shrines or possible burial sites and/or to take reports from others who have seen such actions. Changes to a historic property may include rebuilding or "restoration" of a shrine. Per this management action and consistent with HRS Chapter 6E and its implementing rules, the Rangers will immediately report historic property disturbances to CMS, and then CMS will immediately forward the report to DOCARE, KKM Council, and SHPD via electronic mail.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). The word "historic" was added to the title of the management action to provide clarity. The text provides a description of reporting process that has been developed since the CMP was approved in 2009.

CHAPTER 4 NATURAL RESOURCE

4.1 INTRODUCTION

Section 7.1.2 of the 2009 CMP contains information and management actions intended to ensure the protection, preservation, and enhancement of the natural resources of the UH Management Areas. Based on a comprehensive review of existing scientific studies, biological and physical resource inventories, and historical documentation that are referenced in the 2009 CMP and OAR (Appendix A), the CMP addressed the protection and preservation of natural resources and examined human uses of the area, with particular emphasis on those uses' impacts on natural resources. Information concerning the current status of the natural resources can be found in Section 2.2 of the 2021 OAR (Appendix A).

4.2 DESIRED OUTCOME

The "desired outcome" with respect to natural resources is to:

Increase understanding of the status of natural resources (biotic and abiotic) and identify threats to these resources to better protect and preserve unique geological features, ecosystem functions, subalpine and alpine habitats, and biological communities through adaptive management of stressors and threats.

4.3 NEED

There is a need to continue the implementation of the CMP's management actions related to natural resources to avoid and/or minimize actual and potential impairment. The CMP strategies reflect a series of general precepts including:

- Sustainable management needs to allow for multiple uses and activities including astronomy and other scientific research, education, recreation, and cultural practices.
- UH needs to focus on limiting the impacts of human activities on natural resources, starting with educating/orienting individuals about the natural resources before they engage in uses and activities, so that they know how to minimize their impacts on the resources.
- Natural resources management planning should use an ecosystem¹⁷ approach.
- The planning and execution of natural resources management programs should involve the community during planning and implementation (including scientists, educators, volunteers, and the public—as well as from natural resource managers).

¹⁷ Ecosystem is defined as a dynamic system of living organisms (plants, animals, and microorganisms) within an area, the environment that sustains them, and their interactions.

Ecosystem management is an important concept in natural resource management. Management at the ecosystem level approaches the protection, enhancement, and restoration of natural resources from the perspective that ecosystems are structural wholes, and it recognizes that people, policies, and politics are as much a part of an ecosystem as are plants and animals. The five general goals of ecosystem management are: (*i*) maintaining viable populations; (*ii*) having a representation of all ecosystem types on the landscape; (*iii*) maintaining ecological processes, notably natural disturbance regimes; (*iv*) protecting the evolutionary potential of species and ecosystems; and (*v*) accommodating human uses of the landscape. These five goals have been incorporated into the natural resources management actions.

- The habitats and ecosystems in UH Management Areas are sensitive and unusual and, although not known to harbor threatened and endangered species, warrant protection.
- Enhancing the existing native bio-communities and rehabilitating damaged ecosystems is feasible in certain situations and should be conducted primarily in high-use areas where native biological communities may have become degraded or disturbed.
- Mitigating adverse impacts to natural resources by land uses and activities should be a component of the planning process (see also FLU-6).
- Long-term global environmental factors such as climate change should be considered when planning natural resource management activities.
- Ensuring that compliance personnel, such as Rangers, are present is necessary to ensure that rules and regulations are followed and natural resources are protected.
- Embracing UH's commitment¹⁸ to collaboratively build a global model of harmonious and inspirational stewardship that is befitting of Maunakea that is informed by and integrates indigenous and other management principles, including the kānāwai principles.

4.4 MANAGEMENT ACTIONS

As discussed in detail in Section 2.2 of the 2021 OAR and summarized in CHAPTER 2 of this document, only one (1) of the 18 management actions related to natural resources has been completed.¹⁹ The 17 that are ongoing are listed in Table 4.1 and detailed in Sections 4.4.1 through 4.4.17.

¹⁸ UH Board of Regents Resolution "Affirming Commitment to the Collaborative Stewardship of Maunakea's Cultural, Natural, Educational and Scientific Resources" adopted August 24, 2017.

¹⁹ Only NR-15, which called for UH to conduct baseline inventories of high-priority resources, has been completed, see Chapter 2.

Mgmt. Action	Description	Discussion
THREAT	PREVENTION AND CONTROL	
NR-1	Limit threats to natural resources through management of activities and uses.	4.4.1
NR-2	Implement the Maunakea Invasive Species Management Plan (C. Vanderwoude,	4.4.2
	February 2015) and modify, amend, and update it as warranted.	
NR-3	Minimize loss of native biodiversity.	4.4.3
NR-4	Minimize barriers to species migration.	4.4.4
NR-5	Allow, and where possible facilitate, ecosystems to respond to climate change.	4.4.5
NR-6	Conduct educational efforts to generate public awareness about the importance of preserving Maunakea's natural resources.	4.4.6
ECOSYST	EM PROTECTION, ENHANCEMENT, AND RESTORATION	
NR-7	Protect areas with high biodiversity or unique communities/features from development.	4.4.7
NR-8	Establish conditions under which UH would fence areas to keep out feral ungulates.	4.4.8
NR-9	Increase native plant density and diversity through an outplanting program.	4.4.9
NR-10	Require mitigation measures in plans for new development.	4.4.10
NR-11	Conduct habitat rehabilitation projects following unplanned disturbances.	4.4.11
NR-12	Plan and conduct habitat restoration activities, as needed.	4.4.12
PROGRAM	M MANAGEMENT	
NR-13	Increase communication, networking, and collaborative opportunities that support management and protection of natural resources.	4.4.13
NR-14	Follow adaptive management principles when reviewing/updating programs.	4.4.14
INVENTO	RY, MONITORING, AND RESEARCH	
NR-16	Continue regular long-term monitoring.	4.4.15
NR-17	Conduct research to fill knowledge gaps that cannot be addressed through monitoring.	4.4.16
NR-18	Maintain geospatial database of natural resources.	4.4.17
	e exact wording of the management actions listed in the table has been revised from the 2009 CMP and the 20 the progress made to date, adaptation made based on the lessons learned, information collected, and input r apted from the 2021 OAR, Table 2.6.	

 Table 4.1
 Ongoing Natural Resource Management Actions

4.4.1 NR-1: LIMIT THREATS THROUGH MANAGEMENT OF ACTIVITIES AND USES

CMS' administrators and natural resource managers will continue to participate in the implementation of all the ACT-# coded management actions, which focus on managing activities and uses. Those management actions, which are discussed in Section 7.4 of this document, include such things as:

- Managing access and parking (ACT-1, ACT-2. ACT-4).
- Maintaining interpretive and compliance personnel (Rangers) on the mauna to educate users, deter violations, and encourage adherence to restrictions (ACT-3).
- Implementing guidelines to reduce impact of recreational hiking (ACT-5) and snow play (ACT-6).
- Confining tours and stargazing activities to previously disturbed areas and established parking areas (ACT-7) and managing commercial tours (ACT-9).
- Overseeing and providing recommendations concerning the issuance of film permits (ACT-10).

• Ensuring input by CMS staff, MKMB, KKM, and EC on all scientific research permits (ACT-12).

In addition, UH will continue to implement several other measures to minimize or prevent habitat alteration and disturbance related to:

- Facilities and land uses via the Future Land Use (FLU) management actions in Section 12.4.
- Construction activities via the Construction Guideline (C) management actions in Section 8.4.
- Inspecting facilities compliance with permits, rules, and regulations via the Permitting and Enforcement (P) management actions in Section 8.4, in particular management actions P-7 and P-8.
- Maintaining spill response materials in Ranger staff vehicles per management action OI-5 (Section 13.4.3).
- Requiring those entering the UH Management Areas have educated themselves through the orientation per management action EO-2 (Section 5.4.3).
- Removing trash at the end of each snow play season from areas where snow play has taken place, which will be done in addition to the Rangers' normal trash removal efforts as specified in management action ACT-6 (Section 7.4.6).
- Maintaining infrastructure in a manner that encourages compliance with rules and limits the potential for adverse impacts to resource per the Infrastructure and Maintenance (IM) management actions (Section 9.4).

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during the preparation of the 2021 OAR indicated that no changes to this management action are needed at this time; however, greater specificity and examples have been added to the discussion and those measures in the Natural Resources Management Plan (NRMP) that have been found to be effective/implementable have been incorporated.

4.4.2 NR-2: IMPLEMENT THE MAUNAKEA INVASIVE SPECIES MANAGEMENT PLAN

As discussed in the 2021 OAR, the *Maunakea Invasive Species Management Plan* (C. Vanderwoude, February 2015) provides detailed guidance regarding ways to limit the incursion of invasive species into the UH Management Areas. UH will continue to fully implement the measures called for in the plan.

The *Maunakea Invasive Species Management Plan* is an adaptive plan and will be updated as needed to be consistent with broader state or federal biosecurity guidelines, and to support any new guidelines or methods that increases our ability to effectively manage invasive species. New or modified Standard Operating Procedures (SOPs) will be put into effect as needed. Any updates to the plan or associated SOPs will follow guidelines identified in <u>SOP-Z: Revising the Invasive Species Management Plan</u>. CMS will also continue to coordinate with neighboring land managers of other subalpine and alpine lands on Maunakea (NR-13, Section 4.4.13) regarding the management of invasive species. Input from those and other sources will inform updates and

adaptations to the *Maunakea Invasive Species Management Plan* and related measures, such as C-2 (Section 10.4.2).

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). The management action was adapted to recognize that a plan has been created, adopted, and is being implemented.

4.4.3 NR-3: MINIMIZE LOSS OF NATIVE BIODIVERSITY

As discussed in the 2021 OAR, the native plant and animal populations that are present within the UH Management Areas are a function of large-scale natural processes which are beyond the control of UH alone (for example, changes in rainfall and temperature due to climate change). However, CMS will continue to support this action through: (*i*) implementing the *Maunakea Invasive Species Management Plan* (NR-2, Section 4.4.2); (*ii*) conducting invasive weed removal (NR-2) including facilitating volunteer weed pull events (EO-8, Section 5.4.2.2); (*iii*) supporting efforts to increase native plant density and diversity (NR-9, Section 4.4.9); (*iv*) educating the public and stakeholders about resources (NR-6, Section 4.4.6); and (*v*) managing ecosystems to respond to climate change (NR-5, Section 4.4.5).²⁰ It will also continue to provide support for implementation of DLNR's 2011 *Mauna Kea Wildland Fire Management Plan* (Beavers, June 2011).

UH will continue to evaluate measures to address other causes of population and/or diversity decline, including habitat loss, sample collection, pollution, loss of pollinators and seed distributors, genetic bottlenecks, and small population size.²¹ For example, the following were identified in the NRMP and will continue to be considered as part of the adaptive management effort going forward:

- For loss of pollinator populations: (*i*) hand pollination (work with experts to develop guidelines or collaborate in existing programs); (*ii*) outplanting of greenhouse-grown plants to increase plant density; and (*iii*) collaborating with outside experts if opportunities present themselves to create and take advantage of opportunities for the rearing and re-introduction of native pollinators.
- <u>For missing seed dispersers</u>: (*i*) hand-spreading of seed (pre-treat seed, if necessary, for germination); (*ii*) re-introducing seed dispersers; and (*iii*) studying effectiveness of other species as seed dispersers.
- For fire prevention, control weeds in the following locations (particularly around Halepōhaku): (*i*) roadsides; (*ii*) pullouts used by the tour companies; (*iii*) unpaved parking lots and roads; and (*iv*) around Halepōhaku to create a firebreak.
- <u>For fire threat reduction</u>: (*i*) require tour companies not idle their vans in unpaved areas and (*ii*) provide educational signage requesting that visitors do not smoke on trails, in the DOFAW silversword exclosure, or in other unpaved areas.

²⁰ This includes training Rangers and staff to recognize new introduced plants and remove known invasive plants visible near observatories, roads, or other facilities, and in pavement cracks and retaining walls along the Mauna Kea Access Road.

²¹ In doing this, it will continue to consider the full range of measures discussed in the NRMP, but implementation of many of these is likely to be constrained by budgetary constraints.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time; however, greater specificity and examples have been added to the discussion and those measures in the NRMP that have been found to be effective/implementable have been incorporated.

4.4.4 NR-4: MINIMIZE BARRIERS TO SPECIES MIGRATION

As discussed in the 2021 OAR, neither UH nor its sublessees have erected any structures that reduce the ability of species to migrate across UH Management Areas, and going forward, through implementation of the 2022 Master Plan and the Future Land Use (FLU) management actions (Section 12.4), UH will not undertake any actions that would create barriers to species migration. UH staff will continue to coordinate with Forest Reserve, Natural Area Reserve, and Department of Land and Natural Resources technical staff to identify issues, craft appropriate responses, and investigate concerns regarding ecosystems and flora and fauna populations (NR-13, Section 4.4.13).

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time; however, reference to the 2022 Master Plan, which is substantially different from the 2000 Master Plan in place when the 2009 CMP was drafted, have been added.

4.4.5 NR-5: ADDRESSING CLIMATE CHANGE

UH will continue to do what it can within the UH Management Areas to allow and facilitate responses to climate change. Examples of the kinds of actions that are supportive of this include, but are not limited to:

- Collecting weather data within the UH Management Areas and make it publicly available for use in climate change modeling and other studies.
- Examining weather data and other long-term monitoring information (NR-16) for trends and impacts potentially associated with climate change.
- Continuing to coordinate frequently with Forest Reserve and Natural Area Reserve staff (NR-13) to ensure that UH's management activities do not inadvertently impede natural ecosystem responses to change, including those related to climate change. Cooperation will allow the agencies to make better management decisions regarding climate change responses.
- Reducing non-climate stressors by limiting the further incursion of/removing existing invasive species (NR-2) so that native species within the UH Management Areas can adapt to climate change without added pressures from competition, predation, etc.
- Increasing native plant density by outplanting (NR-9) and conducting habitat restoration (NR-11) to enhance native ecosystems in a manner that aids or supplements the natural migration of communities and helps maintain ecosystem interactions.

- Collecting seeds from various individuals and at higher elevations (when possible) within the ecotype to increase genetic diversity, thereby helping ecosystems adapt to climate change.
- Considering information in recent publications and guidelines related to ecosystem resilience and climate change for inclusion in management activities (i.e. <u>U.S. Climate</u> <u>Resilience Toolkit</u>).

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time; however, additional references to other management actions and information in recent publications has been added.

4.4.6 NR-6: EDUCATE PEOPLE ABOUT MAUNAKEA'S NATURAL RESOURCES

As documented in the 2021 OAR, UH has implemented many measures aimed at reducing threats to Maunakea's natural resources by educating those working in and visiting the UH Management Areas and the public about them.²² CMS is committed to continuing and expanding these efforts in the future. CMS will ensure that its natural resource staff participates in the implementation of all the EO-# coded management actions (CHAPTER 5). That participation will improve education program quality and help keep them current.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time; however, adaptations to the overall educational programs are discussed in CHAPTER 5.

4.4.7 NR-7: PROTECT BIODIVERSE AND UNIQUE AREAS FROM DEVELOPMENT

As discussed in several sections of the 2021 OAR, UH has assembled additional information related to these topics for areas in the vicinity of the astronomy facilities and Halepōhaku since the CMP was completed, and the work is nearly complete. Moreover, its ongoing monitoring helps it better understand the ecosystem and CMS expects to conduct some additional research related to NR-7 as funding permits. Monitoring and research are being used to inform adjustments to management actions aimed at increasing the level of protection that is provided.

Protection from development will largely be achieved through implementing the 2022 Master Plan (FLU-1, Section 12.4.1), which calls for:

- Astronomy facilities to be restricted to a limited number of "astronomy sites" already being utilized and/or approved for astronomy facilities through conservation district use permits issued by BLNR.
- A preference for siting non-astronomy facilities in previously disturbed areas, including former astronomy sites.

²² See, for example, the 2021 OAR discussions of CR-3 (Section 2.1.3.3), community engagement (Section 3.1.3), ACT-3, P-4 (Section 3.5.2.5), and C-8 (Section 3.7.2.8).

• Repurposing/reusing existing facilities at Halepōhaku, rather than new construction, to accommodate the expanded educational activities that the 2022 Master Plan now envisions.

For those few and minor land uses that may be placed in areas not previously developed, it will remain important that areas with high biodiversity or unique communities/features continue to be known and avoided to the extent practicable. This includes areas with cultural and historic resources, unique geological features, and habitat for rare, threatened, or endangered native species. The implementation of other FLU-# management actions (Section 12.4) and the implementation of the proposal review process in the 2022 Master Plan will also contribute to the identification, delineation, and protection from development of important natural resources.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Adaptations centered on incorporating references to the FLU-# management actions (Section 12.4) and incorporating applicable aspects of the 2022 Master Plan.

4.4.8 NR-8: ESTABLISH CONDITIONS UNDER WHICH UH WOULD BUILD UNGULATE FENCES

The primary purpose of building fences is to keep feral ungulates out of areas. As discussed in the 2021 OAR, UH has not built any ungulate fences in the UH Management Areas and it is unlikely to do so given DLNR's efforts to encircle Maunakea with ungulate fencing at a lower elevation. Nevertheless, there may be conditions or situation under which UH would build ungulate fences. CMS, working with DLNR and the EC, will prepare a document that enumerates those conditions and/or situations. Then, should such a condition or situation arise, UH would propose building a fence. Because fencing is likely to qualify as a "land use" under the Conservation District Rules, those efforts will need to comply with the provisions of the 2022 Master Plan, including the proposal review process, prior to implementation.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action now recognizes that DLNR has made substantial gains in completing an ungulate fence at a lower elevation on Maunakea. Based on input from DLNR, this may not eliminate every situation under which UH might build a fence and UH should identify the situations under which it would build a fence.

4.4.9 <u>NR-9: INCREASE NATIVE PLANT DENSITY AND DIVERSITY THROUGH AN OUTPLANTING</u> <u>PROGRAM</u>

UH has established a greenhouse within the Halepōhaku parcel and will continue to maintain and utilize it to propagate native plants for outplanting to the UH Management Areas. All plants in the greenhouse will be grown from seeds collected locally within the ecotype (NR-5, Section 4.4.5), and approved by DLNR through CMS's seed collecting permit which will be renewed annually. CMS will continue to outplant subalpine species within Halepōhaku and potentially expand the program to the road corridor and neighboring Forest Reserve if needs are met within the UH Management Areas. The outplanting program at Halepōhaku will extend to establishing and maintaining native gardens that help educate the public by providing living examples of unique and rare plant species in the greenhouse to be out-planted in the alpine and subalpine ecosystems on Maunakea.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action now recognizes that UH has established a nursery and will utilize it to support specific outplanting efforts.

4.4.10 NR-10: REQUIRE MITIGATION MEASURES IN PLANS FOR NEW DEVELOPMENT

Commitments and provisions in the 2022 Master Plan will: (*i*) result in a contraction in astronomy uses through decommissioning and the reduction in the number of available astronomy sites; (*ii*) ensure future astronomy uses avoid adverse effects to natural resources by confining them to the existing astronomy sites; and (*iii*) require review and approval of all land use proposal by UH, including natural resource staff and specialists, during early planning phases.

As documented in the 2021 OAR (see, for example, Sections 3.6.2.1 and 3.9.2.6), UH's proposal review process requires those proposing new development within the UH Management Areas to incorporate, and UH to approve, measures to avoid, minimize, and mitigate potential adverse effects to natural resources, including sensitive habitats. This ensures that mitigation measures will be implemented as appropriate whenever new development occurs, and CMS will continue to enforce these requirements. In overseeing other entities' use of the lands that it manages, UH will:

- Ensure that any habitat that will be permanently removed is replaced on at least a one-to-one basis, through either creation of new habitat, restoration of degraded habitat, or by permanent protection of similar unique habitats.²³
- Make the full implementation of mitigation plans the responsibility of the proposal proponent.
- Require that those performing mitigation projects include a monitoring program in their plans that calls for at least three (3) years of monitoring to assess success and to inform future conservation projects in the region.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). References to the 2022 Master Plan have been added and, because UH has learned that the harshness of the environment means it can take longer to detect mitigation project benefits, effectiveness monitoring was increased to at least three years.

4.4.11 <u>NR-11: Conduct Habitat Rehabilitation Projects Following Unplanned</u> <u>Disturbances</u>

UH has conducted and will continue to conduct damage assessments for rehabilitation in the event of unplanned disturbances (e.g., spills, vehicle accidents). Habitat restoration is also an option following an unplanned disturbance. The nature of the appropriate rehabilitation or restoration will necessarily continue to be determined on a case-by-case basis following an assessment of the specific circumstances of the unplanned disturbance. The Maunakea Administrative Rules state that those engaged in permitted activities are responsible for corrective actions in the event of an accident or non-compliance with conditions. For example, if an unplanned disturbance occurs during a permitted construction project, that project, not UH, will be responsible for rectifying the

²³ Mitigation projects that result from a planned impact to designated critical habitat or threatened or endangered species will have different requirements, which will be established through coordination with the USFWS.

unplanned disturbance, under UH's supervision. Should a disturbance be the result of other activities (for example, public access) or due to the cumulative impacts of multiple activities, UH will both assess and rectify the unplanned disturbance. Examples of unplanned disturbances that may require rehabilitation or restoration responses include:

- Discrete incident disturbance, such as:
 - Off-road driving or vehicle accidents.
 - Construction equipment disturbing areas beyond their approved limits.
 - Hazardous material spills.
- Cumulative disturbance, such as:
 - Cinder compaction and soil erosion from overuse of existing dirt roads and trails.
 - Creation of new trails, trail widening, or trail realignment.
 - Stormwater runoff causing erosion, which is of particular concern at Halepōhaku.

Depending on the scope and scale of the rehabilitation or restoration, effectiveness monitoring may be appropriate to assess success and inform future conservation projects in the region.

Because certain rehabilitation and restoration response efforts are likely to qualify as "land uses" under the Conservation District Rules, those efforts will need to comply with the provisions of the 2022 Master Plan prior to implementation.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). The discussion expanded to clarify who is responsible for rehabilitation and added some examples and details.

4.4.12 NR-12: PLAN AND CONDUCT HABITAT RESTORATION ACTIVITIES, AS NEEDED

As discussed in the 2021 OAR (see, for example, Sections 2.2.8.3, 2.2.9.3, and 2.2.10.3), UH intends to continue habitat restoration as needed and as the opportunities present themselves. The effort will continue to be informed by the extensive information collected by UH during the preparation and implementation of the CMP. This management action is closely associated with management actions NR-8 (Section 4.4.8) and NR-9 (Section 4.4.9). Also associated is the restoration of the astronomy sites, which is discussed in SR-2 (Section 11.4.1) and SR-3 (Section 11.4.2).

The greenhouse at Halepōhaku will continue to be used to support restoration activities within the UH Management Areas and elsewhere on Maunakea. CMS will endeavor to see that restoration planning is coordinated with the other agencies (NR-13) that operate on Maunakea, many of which have existing restoration programs or projects that might be expanded to include UH Management Areas. Where appropriate, it will seek funds and staff resources that will allow it to provide assistance or funding for habitat restoration activities in response to requests from other parties conducting activities on Maunakea and provide guidance and techniques for restoration planning.

Habitat restoration efforts involve three phases: (*i*) planning, (*ii*) implementing, and (*iii*) monitoring effectiveness. Efforts within the UH Management Areas will focus on the following:

• Creating viable habitat for the endangered Palila bird (*Loxioides bailleui*), other native bird species, and for native insects and pollinators such as the Hawaiian Yellow-faced bees

(*Hylaeus spp.*), which are critical to the reproductive success of many native plant species.²⁴ The only portion of the UH Management Areas that is within the Subalpine Māmane Woodlands is Halepōhaku. The area is too small (~19 acres) to establish an independently viable woodland plot. However, it is located at the upper reaches of māmane woodlands which can provide some habitat and resources for native birds that follow the elevational flowering patterns of māmane. This upper elevation māmane woodlands can also serve as a refuge where birds can escape from avian malaria which is expected to extend its range higher on the mountain as climate change accelerates and raises the mosquito line. Neighboring land managers are also working on bird corridors to connect the lower elevation māmane woodlands to the higher elevation woodlands, and the UH managed lands will play a role in those efforts. This area is also suitable (and is being used for) the propagation of native subalpine and alpine plants on Maunakea.

- Supporting efforts to increase the density and abundance of endangered Mauna Kea silversword, or 'āhinahina (*Argyroxiphium sandwicense sandwicense*). Mauna Kea silversword has historically been found on Maunakea at elevations from 8,500 feet to 12,300 feet and two small wild populations are still present in that range.
- Improving wēkiu bug habitat where habitat is impaired.
- Restoring roadside native plant communities in the distinctive ecological zones between 9,500-13,000 feet.
- Continuing invasive species management (NR-2, Section 4.4.2) that is vital for supporting restoration efforts.

Restoration effectiveness should be monitored for at least three (3) years following completion to assess success and inform future conservation projects in the region. Moreover, because the results of restoration are unlikely to be fully felt within three years, UH will attempt to budget for a subsequent follow-up survey at the 8 to 10-year mark.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). The focus areas were added, as informed by UH's experience managing the area since the CMP was approved. Effectiveness monitoring was also added to provide consistency with other restoration and mitigation management actions.

4.4.13 NR-13: INCREASE COMMUNICATION, NETWORKING, AND COLLABORATION THAT SUPPORTS MANAGEMENT AND PROTECTION OF NATURAL RESOURCES

As discussed in various parts of the 2021 OAR (see, for example, Sections 3.1.3 and 3.10.2.1), UH has established the relationships and put in place the communication procedures needed to carry out this measure. UH's overall outreach effort, which incorporates this management action, is discussed in detail in the "Outreach/Coordination Cluster" in Section 5.4.2.

UH is working vigorously to continue and strengthen these relationships and the fruit they bear. For example, it is: (*i*) producing reports to inform stakeholders, public, and collaborating agencies about the status of the natural resources; (*ii*) sharing its reports with collaborating agencies and stakeholders; (*iii*) placing its summary reports on its website, where they are readily available to

²⁴ The subalpine māmane woodlands on Maunakea which includes Halepōhaku is designated as critical habitat for the Palila.

the general public; (*iv*) presenting the results of its management activities and monitoring program at scientific meetings; (*v*) producing this CMP 2022 Supplement detailing changes over time, and resource responses to management actions; and (*vi*) increasing the level of effort that it expends coordinating with the public and with the Maunakea Watershed Alliance, DLNR, and other agencies and organizations.

UH is also continuing to identify opportunities for collaborative data collection and resource management. It is doing this by (*i*) regularly communicating and meeting with other natural resource management agencies and scientists to discuss natural resource conditions on Maunakea; (*ii*) hosting such meetings at Halepōhaku or UH Hilo facilities; (*iii*) inviting agencies, researchers, and others involved in high-elevation natural resource management or research in Hawai'i to undertake work on Maunakea; (*iv*) sharing data with other agencies and using data collected by other agencies; and (*v*) entering into agreements with collaborating agencies as needed to facilitate cooperative work.

The COVID-19 pandemic, budget limitations, and organizational and staff changes have limited the extent to which UH has been able to pursue networking and collaboration opportunities over the past few years. However, CMS has made the re-establishment of close ties with land management groups a high priority and is working collaboratively with the staff of 'Imiloa Astronomy Center ('Imiloa) to establish new relationships and partnerships that it believes will enable UH to better achieve the CMP's desired outcomes.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time; however, greater specificity has been added to the discussion and those measures in the NRMP that have been found to be effective/implementable have been incorporated.

4.4.14 NR-14: FOLLOW ADAPTIVE MANAGEMENT PRINCIPLES WHEN REVIEWING/UPDATING PROGRAMS

In accordance with this measure, UH will continue to use the principles of adaptive management when developing programs and methodologies. As discussed in the 2021 OAR, UH has established and continues to implement a process through which potential adjustments and revisions to CMP management actions are informed by data collected and documented in annual reports and periodic updates. Similarly, it regularly updates program plans, such as the *Maunakea Invasive Species Management* Plan (C. Vanderwoude, February 2015), as it learns from experience and communicates these to interested parties at MKMB meetings and elsewhere.

During the adaptation of all management actions, and in particular those related to natural resources, Native Hawaiian knowledge and methods will continue to inform updates to existing and the establishment of new programs and methodologies. Specifically, this will include new knowledge accumulated through the implementation of NR-4 (Section 3.4.4) and the kānāwai principles discussed in the MKWG Report (Mauna Kea Working Group, December 2021).

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time.

4.4.15 NR-16: CONDUCT REGULAR LONG-TERM MONITORING

UH will continue to conduct regular long-term monitoring within the UH Management Areas. The authors of the 2009 CMP anticipated that the long-term monitoring would be conducted in accordance with an "inventory, monitoring, and research plan." For a variety of reasons, CMS has concluded that a single formal inventory, monitoring, and research plan would not be useful as there are multiple, coordinated programs that are already in place which serve this purpose. These ongoing long-term monitoring programs will continue.

Generally, the long-term monitoring effort will be periodically reviewed. The review will involve the following steps:

- 1. Re-evaluating which resources to monitor. This will involve an assessment of data gaps, consideration of trends in the data collected to date, and an appraisal of the metrics that UH does or could track and report per the CMP management action MEU-1 (Section 14.4.1).
- 2. Considering new monitoring tools, methodologies and research and update established monitoring guidelines based on available information.
- 3. Writing or revising resource-specific monitoring plans so that they fully consider such things as whether the monitoring can: (*i*) be accomplished using in-house staff; (*ii*) be streamlined to address multiple resources, minimize expenses while improving safety, and avoid impacts to the resources; and (*iii*) focus on the provision of scientifically and statistically sound data that can be used to identify trends and program needs.
- 4. Implementing monitoring plans.
- 5. Drawing conclusions, evaluating if the correct resources are being monitored, and considering if existing monitoring should continue or the program adapted by returning to step 1.

Some of the underlying objectives of the long-term monitoring include:

- Measuring progress toward achieving the desired outcome.
- Identifying trends (range expansion or contraction, population size or density changes, etc.) in the status of natural resources.
- Detecting short-term changes and threats to high-elevation ecosystems.
- Detecting long-term changes and threats to high-elevation ecosystems.
- Assessing the effectiveness of enhancement, mitigation, restoration, and rehabilitation projects so that lessons can be applied to future projects.

Continuing long-term monitoring will involve:

- Continuing to obtain data on certain climatic parameters (e.g., temperature, precipitation, wind, etc.).
- Annual arthropod monitoring.
- Invasive species monitoring/early detection, prevention, rapid response, and control efforts (NR-2).

• Tracking the outcome of the restoration and rehabilitation projects that are undertaken (NR-11, NR-12, and others).

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). The concept for an inventory, monitoring, and research plan has been removed for the reasons presented above. Those measures in the NRMP that have been found to be effective/implementable, such as the six-step process, have been incorporated. Including list of some of the long-term monitoring topics were added.

4.4.16 NR-17: CONDUCT RESEARCH TO FILL KNOWLEDGE GAPS THAT CANNOT BE ADDRESSED THROUGH MONITORING

The OAR describes the extensive research that UH has funded since the CMP went into effect and notes that the results of that research have helped guide many of the ongoing management actions that UH is carrying out. UH will continue to seek funding for research projects deemed appropriate to filling data gaps and inform its management actions. The research funding will be based on a rigorous evaluation and prioritization process. In developing its proposed research funding priorities, CMS will:

- Maintain and regularly update a list of potential research projects based on knowledge gaps identified during completed and ongoing reviews, studies, monitoring, and research.
- Prioritize research projects based on:
 - The breadth of the results' applicability (e.g., a research project that can provide information that will be useful for management of a variety of natural resources or a large area would generally be prioritized over research whose results are applicable to only a single resource or a small area).
 - The immediacy of the need for the information the results would provide (e.g., a question that must be answered quickly to prevent a significant decline in conditions in natural resources, would be given a high priority).
 - The status of the resource being researched (e.g., research on endangered species would generally be prioritized over research on a native but non-threatened species).
 - The speed with which information must be available to be useful (e.g., research into natural resources that respond very quickly to perturbations would generally be prioritized over those that are slower to respond).

Based on its prioritized list of desirable research projects, CMS will continue to work with scientists to develop research guidelines and seek funding for prioritized research projects. In doing this, it will:

- Review literature and consult with experts regarding methodologies best suited to answer research questions.
- Assess where the research project can be conducted and determine if enough replicates can be established to ensure statistical rigor, consulting with statisticians as needed.
- Explore opportunities for collaboration or cooperation with other land management agencies (NR-13), especially if the resource being studied crosses property boundaries.

- Review research guidelines to ensure compatibility of data with the data already obtained.
- Estimate personnel and equipment and supplies costs of the research and seek the internal and/or outside funding needed to complete the project.
- Obtain, when appropriate, peer review from other natural resource managers and local experts, if feasible.

Regardless of whether the research is conducted by CMS' own staff or by outside entities, CMS will:

- Enter the data into the CMS database. When the research is conducted by CMS's own staff, the goal will be to assemble and analyze the data the research generates within a year of the completion of the dataset's collection.
- Prepare and issue a report summarizing the results of research, with a goal of doing so within one year of the completion of the analysis. For long-term research projects, if any, a summary progress report will be prepared annually.
- Share the results of research projects through attendance at conferences and meetings, publication in scientific journals, publication on CMS website and newsletter, and through press releases, as appropriate and desired.

CMS will evaluate the information obtained through relevant studies and, where appropriate, use it to:

- Evaluate the success of the research, i.e., the extent to which it answered the questions that had been posed.
- Assess the extent to which the research had identified (or left) gaps in the data or raised further questions that ought to be the subject of further investigations.
- Use the information obtained from the research to improve the way in which resources are managed (i.e., adaptive management, NR-14).

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Those measures in the NRMP that have been found to be effective/implementable, such as how research funding is prioritized, have been incorporated.

4.4.17 NR-18: MAINTAIN GEOSPATIAL DATABASE OF NATURAL RESOURCES

As described in the 2021 OAR, a GIS database of resources surveyed utilizing ArcGIS and distributed as GoogleEarth layers has been developed; as new data becomes available, it is added to this database. CMS will maintain that database and commits to entering additional data into it as rapidly as staffing and other resource limitations allow.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time.

CHAPTER 5 EDUCATION AND OUTREACH

5.1 INTRODUCTION

Section 7.1.3 of the 2009 CMP established eight management actions regarding UH's education and outreach efforts (EO-1 through EO-8). As used in the CMP, the term "Education" includes providing information about natural, cultural, and astronomical resources to the public, through on-site and off-site materials and programs. The term "Outreach" refers to activities intended to increase public participation in the stewardship of Maunakea, through community engagement and community involvement in resource management activities, especially through volunteer-based programs. Information concerning the current status of education and outreach can be found in Section 3.2 of the 2021 OAR (Appendix A).

The discussion of education and outreach are presented as "clusters" in this supplement. This is done to better capture, in one section, the diverse CMP management actions that address these two topics and to avoid repetition and inconsistency. Importantly, clustering reflects UH's holistic approach to them and identifying opportunities for place-based and community-based programs that can amplify UH's efforts and benefits to the community.

5.2 DESIRED OUTCOME

The "desired outcome" for the education and outreach program is to:

Build and maintain a constituency to engage in active and meaningful stewardship of Maunakea, through education and involvement of the public, to support/enhance conservation, and sustain the natural, cultural, and astronomical resources of Maunakea.

5.3 NEED

5.3.1 EDUCATION NEEDS

As discussed in the 2021 OAR and in accordance with the guidance contained in UH's recently updated 2022 Master Plan, protecting Maunakea's unique resources in the face of the increasing numbers of persons who wish to visit it requires improved methods and programs to adequately educate visitors about such things as: (*i*) the status and threats to natural and cultural resources; (*ii*) appropriate vehicle use; (*iii*) personal safety; and (*iv*) applicable laws, rules, and regulations while visiting the mountain. UH has made great strides related to education but there remains a need to continue and enhance the programs that have been established. Specific educational needs include the following:

- Producing a succinct video that provides an orientation for visitors, which is required in the Maunakea Administrative Rules, and incorporates Native Hawaiian cultural perspectives and cultural sensitivity.
- Enhancing efforts to present the orientation and provide other information to the entire community.

5.3.2 OUTREACH NEEDS

As outlined in the 2021 OAR and in accordance with the guidance contained in UH's 2022 Master Plan, there is a need for greater effort to reach and inform the Native Hawaiian community so that input from its members informs decision-making. This outreach should be done in coordination with management action CR-1 (Section 3.4.1). At the same time, continuing outreach to and participation by other community constituencies remains important. In accordance with this there is a need to redouble effort regarding outreach and community engagement in a manner that results in:

- The community being in the decision-making process early and often through the CMS volunteer advisory groups (e.g., MKMB, KKM, and EC) and diverse community engagement and outreach activities.
- Diverse community representation on the CMS volunteer advisory groups.
- Focusing efforts to improve engagement with the Native Hawaiian community to address issues identified in the *Independent Evaluation of the Implementation of the Mauna Kea Comprehensive Management Plan* (Kuiwalu, December 2020).

5.4 MANAGEMENT ACTIONS

As discussed in detail in Section 3.2 of the 2021 OAR (Center for Maunakea Stewardship, August 2021), all eight of the education and outreach management actions (Table 5.1) are ongoing.

Mgmt. Action	Description	Discussion
Program	Development	
EO-1	Modify, amend, and update the <i>Maunakea Education & Outreach Plan</i> (MEOP) (University of Hawaii, December 2019) as warranted.	5.4.1
Education	1	
EO-2	Require orientation of all persons accessing the UH Management Areas in a manner consistent with the MEOP and Maunakea Administrative Rules.	5.4.3
EO-3	Consistent with the MEOP, continue to develop, update, and distribute materials explaining important aspects of Maunakea.	
EO-4	Consistent with the MEOP, implement the <i>Maunakea Sign Plan</i> (Office of Mauna Kea Management, February 2017) and modify, amend, and update it as warranted.	
EO-5	Consistent with the MEOP, develop interpretive themes and features.	
EO-6	Consistent with the MEOP, engage in outreach and partnerships with schools.	
Outreach		
EO-7	Consistent with the MEOP, continue and increase opportunities for community members to provide input on management plans and activities.	5.4.2
EO-8	Consistent with the MEOP, continue and increase opportunities for community members to participate in stewardship activities.	
	he exact wording of the management actions listed in the table has been revised from the 2009 CMP and the 202 the progress made to date, adaptation made based on the lessons learned, information collected, and input rec dapted from the 2021 OAR, Table 3.11.	

 Table 5.1 Ongoing Education and Outreach Management Actions

Through the course of implementing the CMP, UH has learned that the eight education and outreach management actions are complementary and draw from the same materials. That is why the *Maunakea Education & Outreach Plan* (MEOP) (University of Hawaii, December 2019) address all of them at some level. Furthermore, other CMP management actions are closely

associated or directly related to these EO management actions. Therefore, this group of CMP management actions are discussed as two clusters – the "Outreach Cluster" (Section 5.4.2) and the "Education Cluster" (Section 5.4.3) – in order to avoid repetition and confusion by discussing each management action separately.

5.4.1 EO-1: MAINTAIN THE MAUNAKEA EDUCATION AND OUTREACH PLAN

The *Maunakea Education & Outreach Plan* (MEOP) (University of Hawaii, December 2019) was developed collaboratively by representatives of 'Imiloa Astronomy Center, Maunakea Observatories, the Maunakea Visitor Information Station (VIS), and OMKM and approved by the MKMB in July 2020.²⁵ The implementation of the MEOP is addressed in Sections 5.4.2 and 5.4.3. Hence, this section concerns only its modification, amendment, and updating.

The MEOP does not specify a process for its modification or amendment, nor does it specify that it needs to be updated after the passage of a certain period of time or the occurrence of a certain event. Currently, CMS anticipates that it will monitor the effectiveness of the measures called for in the plan on an ongoing basis and will adjust the activities it engages in as quickly as it is able. It will formally modify, amend, and/or update the MEOP document as appropriate and consistent with adaptive management principles.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Because the MEOP has been adopted this management action now addresses the modification, amendment, and updating based on the principles of adaptive management.

5.4.2 OUTREACH/COORDINATION CLUSTER (EO-7, EO-8, AND RELATED)

The outreach/coordination cluster of CMP management actions includes all those actions that address outreach and coordination. There are management actions in several CMP sections that guide outreach and coordination activities, sometimes broadly as EO-7 does, and sometimes specifically, such as NR-13, which guides outreach to agencies and entities with similar natural resource management challenges. To avoid repetition or inconsistency, all the outreach and coordination are listed and discussed together in this section as a "cluster."

The CMP management actions in the outreach/coordination cluster include the following:

- EO-7: Consistent with the MEOP, continue and increase opportunities for community members to provide input on management plans and activities. All the outreach and coordination activities associated with this management action are discussed in this section and involve the implementation of the MEOP.
- EO-8: Consistent with the MEOP, continue and increase opportunities for community members to participate in stewardship activities. All the outreach and coordination activities associated with this management action are discussed in this section and involve the implementation of the MEOP.

²⁵ Note: The CMP calls for the education and outreach plan to "...outline the process and discuss a venue for mandatory visitor orientation, and community consultations." The program that was formally adopted makes the program "mandatory" only for "users", which Section 1.1.1 of the MEOPO defines as "...individuals working under the auspices of a land-use permit on Maunakea. Examples of users include observatory employees, observatory vendors, University support staff, and other public agency employees." However, mandatory visitor orientation is addressed further in EO-2.

- EO-1: Maintain the Maunakea Education and Outreach Plan (Section 5.4.1). This management action concerns the modification, amendment, and/or updating of the MEOP when deemed appropriate. The MEOP provides guidance for all outreach and coordination activities.
- EO-6: Consistent with the MEOP, engage in outreach and partnerships with schools. To the extent that this action involves outreach to the schools, it is addressed in this section; education programs that involve schoolteachers and/or students are discussed in Section 5.4.3.
- CR-1: Engage with Cultural Community and Develop and Maintain Appropriate Guidance Regarding Cultural Issues (Section 3.4.1). Briefly, this management action discusses: (*i*) maintaining a CR-1 mailing list (a list of Native Hawaiians and others with cultural interests) and providing those on the list with timely updates regarding MKMB agendas, land use proposals, the development of cultural guidelines, reports, and other items of potential interest, and (*ii*) providing regular updates to the individuals that the Hawai'i Island Burial Council officially recognizes as cultural descendants of Ka'ohe Ahupua'a.
- NR-13: Increase Communication, Networking, and Collaboration that Supports Management and Protection of Natural Resources (Section 4.4.13). This management action involves identifying opportunities for collaborative data collection and resource management with agencies and entities with similar lands, needs, and/or experience.
- P-5: Coordinate Enforcement Efforts with Other Agencies (Section 8.4.4). This management action involves UH sharing Ranger reports and actively coordinating with other agencies (e.g., NAR, DOFAW, U.S. Fish and Wildlife Service (USFWS), and others) regarding enforcement of the rules and regulations that are applicable within the UH Management Areas and on immediately adjacent lands.
- OI-3: Coordinate Approach to Resource Management (Section 13.4.1). This action involves UH working closely with neighboring landowners and managers (e.g., DLNR, Department of Hawaiian Home Lands (DHHL), Mauna Kea Watershed Alliance, and others) to coordinate its actions within the UH Management Areas with their activities.

So that outreach and coordination is considered comprehensively, UH stewardship staff (CMS, 'Imiloa, and potentially others) involved in outreach and coordination activities associated with the UH Maunakea Lands will be aware of all these CMP management actions, their interrelationships, and their directives.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). The cluster approach detailing the outreach and coordination management actions reflects UH's efforts to integrate and consolidate outreach across all topics of concern within the UH Management Areas. The management actions also recognize that plans have been established to aid this effort.

5.4.2.1 Outreach Overview

CMS will continue its implementation of the outreach called for in the CMP and the MEOP, including ongoing efforts to expand opportunities for community members to: (*i*) provide input to cultural and natural resources management activities on Maunakea and (*ii*) ensure systematic input regarding planning, management, and operational decisions that affect natural resources, sacred

materials or places, or other ethnographic resources with which they are associated. This will include such things as contacting local civic and environmental groups, local experts in natural and cultural resources, families with lineal and cultural connections to Maunakea, kūpuna, cultural practitioners, the Office of Hawaiian Affairs, and other Native Hawaiian groups.

One component of this effort is to distribute information to the community so that the public remains well-informed. An equally important component is to continue collecting community input so that CMS can adjust its efforts accordingly. In furtherance of this outreach effort, CMS will continue to regularly update its list of community members who wish to be notified and from whom input should be sought on the following:

- Implementation of UH's 2022 Master Plan and CMP, including any updates, revisions, or amendments to them.
- Land use proposals being evaluated by UH (e.g., astronomy facilities, conservation actions, etc.).
- Proposed procedures and guidelines (e.g., concerning appropriateness of constructing new Hawaiian cultural features, invasive species SOPs, etc.) that are being developed.
- The availability of new information (e.g., Annual Archaeological Monitoring Reports, research reports, etc.).
- Other actions being considered or reports prepared by/for UH and CMS that may be of interest or concern to the community.

Information will be distributed and input sought via the method(s) that CMS's experience regarding community interest in a topic or product suggests would be most appropriate. As discussed in the 2022 Master Plan, one of UH's strategies is to involve the community in the decision-making process early and often through the CMS volunteer advisory groups (e.g., MKMB, KKM, and EC) and diverse community engagement and outreach activities. The methods that CMS will use may include:

- Posting on CMS website.
- Distribution to mailing list (via Email and/or U.S. mail).
- Inclusion in eNewsletters distributed by CMS.
- Regular updates regarding current activities and interaction with interested community members will be undertaken via CMS' website and social media accounts.
- Informal talk-story sessions (telephone, virtual meetings, and in-person meetings) with community members.
- Discussions with community representatives during advisory group (KKM, EC, and MKMB) meetings and with the public during MKMB meetings.²⁶
- Formal virtual and in-person meetings, open houses, and forums.

Some agencies and several types of community members will receive additional focus under the outreach program, they include:

²⁶ UH is diversifying community representation on the CMS volunteer advisory groups, including KKM, EC, and MKMB. This is included as a strategy in the 2022 Master Plan.

- DLNR, generally as the agency responsible for the lands and as the agency that issued the permits for the existing land uses, and specifically certain divisions as follows: (*i*) OCCL related to planning and land use; (*ii*) SHPD related to historic and cultural resource monitoring and protection (P-5: Coordinate Enforcement Efforts with Other Agencies (Section 8.4.4)); (*iii*) DOFAW related to overall management and ecosystem restoration (NR-13: Increase Communication, Networking, and Collaboration that Supports Management and Protection of Natural Resources (Section 4.4.13)); and (*iv*) DOCARE related to enforcement in general (P-5: Coordinate Enforcement Efforts with Other Agencies (Section 8.4.4), criminal enforcement (ACT-1: (Section 7.4.1)), and issues related to hunting (ACT-8: Monitor Hunting Activity and Adherence to Applicable DLNR Hunting Rules (Section 7.4.8)). UH will meet with DLNR representatives at least once a year to address these and other topics.
- Families with lineal and cultural connections to Maunakea, cultural practitioners, OHA, and other Native Hawaiian groups (CR-1: Engage with Cultural Community and Develop and Maintain Appropriate Guidance Regarding Cultural Issues (Section 3.4.1)).
- Other nearby property owners (OI-3: Coordinate Approach to Resource Management (Section 13.4.1)).
- Others (e.g., state agencies, federal agencies, nearby landowners, and non-governmental organizations) conducting conservation, restoration, and rehabilitation projects, especially those that involve volunteers, on Maunakea or in similar environments (NR-13: Increase Communication, Networking, and Collaboration that Supports Management and Protection of Natural Resources (Section 4.4.13)).
- Schools in association with EO-6 and expanding education for Hawai'i's students (Section 5.4.3.3).

5.4.2.2 Community Opportunities to Participate in Stewardship Activities

CMS anticipates continuing and intensifying the opportunities it creates for community members to participate in stewardship activities. Examples of these include workshops, meetings with citizen advisory groups, volunteer opportunities, and school-related programs that will help involve children. To the extent that these opportunities occur on UH Maunakea Lands, all participants will be required to comply with applicable provisions of the CMP and Maunakea Administrative Rules. Among other things, participants will need to have viewed the Maunakea orientation (Section 5.4.3.1) and park their vehicles in designated areas. These programs will also be offered and operated in a manner consistent with UH's intent to: (*i*) not expand its VIS offerings in a manner that would generate a greater number of visitors and (*ii*) preserve the ambiance and feeling of the cultural landscape and minimize adverse effects on the alpine and subalpine ecosystems and other resources.

After evaluating the CMP's and OAR's recommendation that UH establish a docent program to provide guided tours highlighting the cultural landscape and natural resources, CMS is evaluating the feasibility (from a cost, staffing, and desire to limit visitation levels) of reinstituting the kind of guided driving tours that ran on Saturdays and Sundays between 2005 and 2015 and was available to those having their own 4WD vehicle. Beginning with a safety brief by CMS staff at the VIS, knowledgeable volunteer docents could then lead guests up the Mauna Kea Access Road while stopping to describe various cultural, natural, and scientific points of interest.

CMS has made/is in the process of making arrangements for a variety of service projects that fulfill stewardship objectives that are in both the CMP and the 2022 Master Plan while also providing education and enjoyment to volunteers. Examples of the kind of such efforts that were made in the past (prior to 2016) include weekly trail maintenance by VIS staff on the path to Pu'ukalepeamoa and twice-annual trash pickup along the Humu'ula trail; both were intended to help reduce the impact of visitors and educate staff. In doing this UH is cooperating and collaborating with other entities that run volunteer-based projects. One aspect of that collaboration would be to increase the volunteer pool so that UH and others could conduct larger-scale projects on Maunakea than would be impossible with only their in-house resources.

The kinds of projects related to natural resources that CMS believes could benefit most from greater community participation include: (*i*) basic maintenance, such as trash pick-up and inspection for damage to facilities or signs; (*ii*) care of the botanical enclosure, such as weeding, watering, and inspecting the enclosure; (*iii*) enhancing native plant communities, such as weeding, outplanting, and care of native species around VIS and dormitories; (*iv*) trail maintenance and development; and (*v*) restoration projects for native plant communities. Potential service projects related to the cultural landscape that appear most likely to benefit from greater public participation in stewardship activities include the involvement of archaeology students and interested persons from the Native Hawaiian community knowledgeable in field methods related to the monitoring of cultural properties.

In addition to these "action-oriented" items, meetings of the MKMB, KKM, and the EC provide opportunities for members of the community to discuss and provide advice regarding the way the mountain is managed and the specific types of stewardship programs that ought to be undertaken. The latter is intended to be responsive to the concerns that some community members, particularly members of the Native Hawaiian community, have expressed about UH not listening and responding appropriately to their concerns and/or not undertaking certain stewardship activities they believe are important.

5.4.3 EDUCATION CLUSTER (EO-2, EO-3, EO-4, EO-5, EO-6, AND RELATED)

The education cluster of CMP management actions includes all those actions that address educational efforts. There are management actions in several CMP sections that direct educational activities, sometimes broadly as EO-3 does, and sometime specifically, such as CR-3, which addresses cultural elements of the educational effort. To avoid repetition or inconsistency, all the education management actions are listed and discussed together in this section as a "cluster." Another aspect of the cluster is to approach education more holistically and identify opportunities for place-based and community-based educational programs that can amplify their benefits. The CMP management actions in this cluster include the following:

- EO-2: Require orientation of all persons accessing the UH Management Areas in a manner consistent with the Maunakea Administrative Rules. All activities associated with this management action are discussed in this section (Subsection 5.4.3.1).
- EO-3: Consistent with the MEOP, continue to develop, update, and distribute materials explaining important aspects of Maunakea. All activities associated with this management action are discussed in this section (Subsection 5.4.3.2).
- EO-4: Consistent with the MEOP, implement the *Maunakea Sign Plan* (Office of Mauna Kea Management, February 2017) and modify, amend, and update it as warranted. All

activities associated with this management action are discussed in this section (Subsection 5.4.3.2).

- EO-5: Consistent with the MEOP, develop interpretive themes and features. All activities associated with this management action are discussed in this section (Subsection 5.4.3.2).
- EO-6: Consistent with the MEOP, engage in educational partnerships with schools. All activities associated with this management action are discussed in this section (Subsection 5.4.3.3).
- EO-1: Maintain the Maunakea Education and Outreach Plan (Section 5.4.1). This management action concerns the modification, amendment, and/or updating of the MEOP when deemed appropriate. The MEOP provides guidance for all education activities.
- CR-3: Conduct Educational Effort to Raise Public Awareness of Importance of Preserving the Cultural Landscape (Section 3.4.3). This management action involves the cumulative implementation of all the education activities outlined in this section.
- NR-6: Educate People About Maunakea's Natural Resources (Section 4.4.6). This management action involves the cumulative implementation of all the education activities outlined in this section.
- ACT-3: Maintain Ranger Program (Section 7.4.3). This management action involves the continuation of the Maunakea Rangers and is detailed in Subsection 5.4.3.4.
- P-4: Promote Manager and Permittee Awareness of Applicable Rules & Permit Requirements (Section 8.4.3). This management action involves the cumulative implementation of all the education activities outlined in this section.
- IM-2: Require Maintenance Worker Orientation (Section 9.4.2). This management action involves the cumulative implementation of all the education activities outlined in this section.
- C-7: Educate Construction Workers Regarding Historical and Cultural Significance (Section 10.4.7). This management action involves the cumulative implementation of all the education activities outlined in this section as they apply to personnel working on construction projects within the UH Maunakea Lands.
- C-8: Educate Construction Workers Regarding Environment, Ecology, and Natural Resources (Section 10.4.8). This management action involves the cumulative implementation of all the education activities outlined in this section as they apply to personnel working on construction projects within the UH Maunakea Lands.

UH will endeavor to provide all education materials discussed in this section in a multilingual format (i.e., make them available in English, Hawaiian, Japanese, etc.) as deemed appropriate.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). The cluster approach detailing the education management actions reflects UH's efforts to integrate and consolidate educational efforts across all topics of concern within the UH Management Areas. The management actions also recognize that a plan has been established to aid this effort and that 'Imiloa has been engaged to aid in educational efforts, particularly orientations.

5.4.3.1 Mandatory Visitor Orientation

HAR § 20-26-5 provides that:

As set forth in the comprehensive management plan, all persons accessing the UH management areas shall be required to complete an orientation regarding cultural and natural resources, safety matters, and other relevant information prior entering the UH management areas.

UH has required and provided an orientation for those working on the mountain since 2013. The worker orientation program will continue to be a more robust orientation than the visitor orientation program that CMS is implementing. Astronomy facility staff, tour operators, support staff, contractors, vendors, Rangers, and others working within the UH Maunakea Lands will be required to complete the worker orientation prior to starting their work. The worker orientation will consist of an approximately 25-minute video and will require satisfactory scores on a brief assessment quiz given at its conclusion. The updated worker orientation video, produced by 'Imiloa, will placed the CMS website complete be on once (https://hilo.hawaii.edu/maunakea/stewardship/orientation). The worker orientation must be repeated every three (3) years, more frequently if required by a permit, or as directed by UH in accordance with the Maunakea Administrative Rules. For those working on Maunakea under a permit (CDUP or permit issued under the Maunakea Administrative Rules), participation is tracked and CMS will continue to report summary statistics annually to BLNR.

The requirement that all <u>visitors</u>²⁷ also receive and demonstrate reasonable proficiency with the material contained in the orientation is relatively new. 'Imiloa is developing a brief (approximately 10 minute) visitor orientation video that will satisfy this requirement. It will be posted on the CMS website. Enforcement of the visitor orientation requirement will require procedures, personnel, and equipment that have, with some exceptions, not heretofore been in place. CMS believes that the most efficient implementation method is by making orientation enforcement part of its overall program to manage access to the UH Maunakea Lands, which is discussed in CMP management action ACT-1 (Section 7.4.1).

5.4.3.2 Develop, Update, & Distribute Materials Explaining Important Aspects of Maunakea

As described in Section 3.2.2.3 of the 2021 OAR, UH has prepared a variety of printed materials covering topics such as safety, cultural landscape, natural resources, and recreational activities and is continuing to distribute these free of charge from various outlets (e.g., VIS, IfA/CMS office in Hilo, 'Imiloa, commercial tour operators, at events CMS holds or attends, etc.). It also makes copies of most of these available on its website. These materials have included and will continue to include:

- <u>Informational brochures</u> (available as handouts and on website), which will be updated periodically by knowledgeable personnel, regarding the following: (*i*) Visiting Maunakea Safely and Responsibly; (*ii*) Maunakea Heritage and Natural Resources Guide²⁸ (English and Japanese versions); (*iii*) copies of previous literature shared with visitors to Maunakea and at public events (e.g., "*Maunakea: Ka piko kaulana o ka 'aina* (the famous summit of the land)" cultural significance brochure).

²⁷ Visitors are defined as individuals entering the UH Management Areas that are not working under the auspices of a CDUP or permit issued under the Maunakea Administrative Rules.

²⁸ This document is scheduled for updating during 2022.

- <u>Displays at the VIS</u> that educate the public about the prehistory and history of Maunakea, encourages the preservation of the cultural landscape and natural resources, and inform the public about the restrictions and precautions associated with the landscape and resources. Certain exhibits were mostly recently updated in July 2020. The exhibits will continue to be updated periodically by knowledgeable personnel, including 'Imiloa representatives.
- <u>Periodic CMS newsletters</u> that include new information or findings related to the cultural landscape, natural resources, and other important aspects of Maunakea.

CMS is, in cooperation with 'Imiloa, also developing more interactive web-based products that it believes will reach an even-broader audience. Examples of the items that it is developing and expects to deploy include the following:

- An augmented reality exhibit that uses GIS data to share different aspects of Maunakea and Hawai'i Island.
- Measures that feature greater ease of access to in-depth content and source material (cultural, historical, astronomical, management, and natural history).
- Content additions to the CMP website.
- CMS social media accounts, including Facebook and Instagram.

Physical signs are another important educational material medium. As discussed at length in Section 3.2.2.4 of the 2021 OAR, The *Maunakea Sign Plan* (Office of Mauna Kea Management, February 2017) was formally adopted in February 2017, and it has guided and will continue to guide the design, installation, and maintenance of all signage on the mountain. The plan will be modified, amended, and updated as warranted. Signs will be integrated into the overall educational program so that information on signs is consistent with information provided on brochures and displays and the various modes of education enhance each other. This is especially applicable to interpretive signs, but applies to all sign types.

Several of the specific recommendations in the *Maunakea Sign Plan* have not yet been implemented. Those items, as well as the steps that CMS is committed to taking to implement them, include the following:

- As a preliminary step to updating hazard and safety information signs, CMS completed a sign inventory in 2021. The inventory includes roadway and building signs within the UH Management Areas. The next step is to assess need, content, and siting for any new signage. Efforts will be made to consolidate messaging as much as possible and to eliminate unnecessary signs to keep the number of signs at a minimum.
- CMS will work with responsible agencies, including DLNR, and its advisory groups to explore creation and installation of wayside signs at appropriate locations on the summit region and in designated parking areas. Such signs may be modeled on existing DLNR waysigns at Pu'uhuluhulu and Kaulana Manu Nature Trail.
- CMS staff anticipates a redesigned VIS patio in 2022 showcasing the unique aspects of Maunakea. General visitor information will be displayed on posters mounted to a VIS wall. Mobile patio exhibits will showcase other aspects of importance.

- While CMS continues to consider areas appropriate for use as a future nature trail or heritage walk, the still-young Native Plant Restoration area near the VIS is presently too delicate for this purpose. Other options continue to be considered.
- Regulatory signage will be posted in appropriate areas with appropriate citations in order to
 provide proper notice to the public of applicable provisions of the Maunakea Administrative
 Rules. A copy of the rules is online and is available at the VIS for the public's reference.

As indicated in Section 3.2.2.5 of the 2021 OAR, thus far UH has made only limited progress with respect to the development of interpretive features and activities that would make information about, and interaction/experience with, cultural and natural resources more available to those visiting the UH Maunakea Lands. Specifically, because it has struggled to appropriately balance input from advisory groups, concerns related to health and safety, and the imperative to conserve the resources, UH has not yet implemented a number of the possibilities for interpretive features mentioned in the CMP. UH will continue to consider the integration of the following interpretive functions into its integrated education programs:

- A self-guided tour (using brochures or previously downloaded podcasts) of geological resources in the summit region.
- Development of one or more small pullout gardens along the Mauna Kea Access Road, between Halepōhaku and the summit region, planted with representative vegetation and accompanying interpretive signage, to illustrate change of vegetation communities with an increase in elevation.

5.4.3.3 Educational Partnerships with Schools

The OAR documents the many ways in which UH has interacted with the community over the years since the CMP was adopted. It has entered into partnerships with many schools by collaborating with local experts, teachers, and university researchers, and by working with 'Imiloa, which is a part of UH Hilo. CMS' partnerships with schools will continue. The following are examples of the programs that UH will continue, and expand on, to continue and strengthen its partnerships with schools:

- Hosting educational programs and school visits at UH Hilo and Halepōhaku, and community programs such as AstroDay and The Universe Tonight.
- Participating in the UH Hilo Pacific Internship Programs for Exploring Science.
- Maintaining the Akamai Internship Program, which mentors students and prepares them for careers.
- Expanding the Maunakea Scholars program, one component of which involves high school students being allocated telescope time.
- Summer HI STAR Program.
- Providing education opportunities to schools and students on a broad range of topics through the Multidisciplinary Field Station concept slated for Halepōhaku.

5.4.3.4 Rangers

The Rangers will continue to be UH's primary means of ensuring public safety, protecting resources, encouraging appropriate behavior, and monitoring compliance with permit conditions and applicable rules. The Rangers will continue to play a lead role in educating the public about the cultural significance and environmental uniqueness of Maunakea and the ways in which visitors can remain safe and minimize their impact on the landscape. In addition, the Rangers have authority to issue citations under the Maunakea Administrative Rules and will do so when appropriate. Ensuring that the Rangers continue their primary interpretive and education roles on Maunakea will enable them to also continue their responsibilities related to other management actions, including:

- CR-14: Report Disturbance of Historic Shrine or Burial Site (Section 3.4.7). This management action involves the Rangers reporting observed disturbance of shrines or burial sites to CMS and other entities.
- ACT-3: Maintain Ranger Program (Section 7.4.3). This management action involves the continuation of the Maunakea Rangers for interpretive and compliance purposes. The interpretive portion of this responsibility is discussed in this section and the compliance aspect is detailed in Section 7.4.3.
- ACT-8: Monitor Hunting Activity and Adherence to Applicable DLNR Hunting Rules (Section 7.4.8). Rangers report suspected hunting violations observed on DLNR lands to DLNR, including DOCARE.
- P-1: Comply with Applicable Laws, Regulations, and Permit Conditions (Section 8.4.1) and P-7: Review Facility Compliance with CDUPs (Section 8.4.5). Related to these management actions, the Rangers monitor activities for compliance and will continue to conduct inspections of the summit observatories and Halepōhaku facilities for compliance with their CDUPs.
- P-4: Promote Manager and Permittee Awareness of Applicable Rules & Permit Requirements (Section 8.4.3). This management action involves the cumulative implementation of all the education activities outlined in this section.
- P-8: Enforce Conditions contained in UH-Issued Permits (Section 8.4.6). Rangers' responsibilities include monitoring compliance with the conditions of commercial tour operator permits and the conditions of special use permits issued by CMS.
- IM-5: Finalize & Implement Debris Removal, Monitoring, and Prevention Plan (Section 9.4.5). Rangers, as well as the CMS's VIS and natural resource staff routinely check for and pick up trash and debris in accordance with the approved *Debris Removal, Monitoring, and Prevention Plan* while on their daily patrols.
- OI-3: Coordinate Approach to Resource Management (Section 13.4.1). Rangers report unusual or suspicious behavior observed on DLNR lands to DLNR, including DOCARE.

CHAPTER 6 ASTRONOMICAL RESOURCES

6.1 INTRODUCTION

Section 7.1.4 of the 2009 CMP established two management actions intended to preserve the conditions that make the UH Management Areas so well-suited for astronomy research. Section 3.3.1 of the 2021 OAR (Center for Maunakea Stewardship, August 2021), discusses the status of the two management actions, AR-1 and AR-2. Information concerning the current status of the astronomical resources can be found in Section 3.3 of the 2021 OAR (Appendix A).

6.2 DESIRED OUTCOME

The "desired outcome" with respect to astronomy resources is:

Astronomical resources shall be protected by preventing the intrusion of activities and uses incompatible with astronomy facilities, such as those that generate nuisance light, dust, and radio frequencies.

This desired outcome has been adapted to focus on the scientific resources and eliminate terms that have or may become obsolete.

6.3 NEED

Astronomical resources are subject to actual and potential impact from incompatible uses or activities in the summit region. Without planned protections and a commitment to protect astronomical resources, adverse effects may occur. Measures to protect other resources in the UH Management Areas, such as the cultural landscape and natural resources (management actions CR-# and NR-#), will also protect astronomical resources, to a degree. A few additional measures are necessary to address specific concerns related to astronomical resources.

6.4 MANAGEMENT ACTIONS

As discussed in Section 3.3 of the 2021 OAR, both of the management actions in the CMP (AR-1 and AR-2) that are intended to preserve the conditions that make Maunakea so well-suited for astronomy research are ongoing. The actions are summarized in Table 6.1 and a discussion of each is presented below in Sections 6.4.1 and 6.4.2.

Mgmt.		
Action	Description	Discussion
AR-1	Manage activities and uses in the UH Management Areas to avoid, minimize, or	6.4.1
	mitigate adverse impacts to astronomical resources.	
AR-2	Prevent light pollution, radio frequency interference (RFI) and dust.	6.4.2
Note: The exact wording of the management actions listed in the table has been revised from the 2009 CMP and the 2021 OAR to reflect the progress made to date, adaptation made based on the lessons learned, information collected, and input received.		
Source:	Adapted from the 2021 OAR, Table 3.12.	

 Table 6.1 Ongoing Astronomy Resource Management Actions

6.4.1 AR-1: LIMIT THREATS THROUGH MANAGEMENT OF ACTIVITIES AND USES

The sublease terms between UH and the operators of the non-UH astronomy facilities and the conditions UH includes with permits issued under the Maunakea Administrative Rules have proven extremely effective in protecting the value of the summit area for astronomical research. UH will continue to incorporate similar and/or more restrictive clauses in all new agreements it enters. Additionally:

- Proposed land uses will be subject to the proposal review process outlined in the 2022 Master Plan and an astronomy resource specialists will participate in that review, as appropriate. Specific attention will be placed on adherence to the design guidelines related to dust, lighting, and radio frequency interference (RFI).
- CMS' administrators and astronomy resource specialists will continue to do their utmost to ensure that they perform the ACT-# coded management actions (Section 7.4), which focus on managing activities and uses, in such a way as to forestall negative impacts on astronomical resources.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time; however, this action now specifies that an astronomy resource specialist will participate in ACT-# coded actions to be consistent with components of the CR and NR management actions.

6.4.2 AR-2: PREVENT LIGHT POLLUTION, RADIO FREQUENCY INTERFERENCE, AND DUST

UH will enforce the provisions in the Maunakea Administrative Rules that authorize UH to continue to provide the astronomical resource protection called for in the CMP. The best examples of this, perhaps, may be found in HAR § 20-26-23, which prohibits radio transmissions, artificial illumination, and other activity that materially interferes with the scientific and educational operations of the astronomical facilities or research equipment within the UH Management Areas above Halepōhaku and in the restrictions on vehicular travel contained in HAR § 20-26-38. Regarding RFI, activities and uses will be required to comply with the Maunakea Observatories Summit Radio Frequency Transmitter Policy, which may be updated from time to time.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time.

CHAPTER 7 ACTIVITIES AND USES

7.1 INTRODUCTION

Section 7.2.1 of the 2009 CMP contains management actions related to scientific research work, cultural activities, and recreational activities and uses within the UH Management Areas. While the original CMP notes that the best known and most prominent scientific activity on Maunakea at the time was astronomical research, other fields of scientific research, including archaeology, biology, geology, and meteorology, are also described. The CMP also refers to the cultural and religious practices associated with the mountain, including prayer, burial, construction of small shrines, and other rituals. Finally, the CMP acknowledges the value of the recreational activities that occur in the UH Management Areas, including sightseeing of the natural beauty and scenic areas, stargazing, snow play, hiking, biking, and hunting.

Information concerning the current status of activities and uses can be found in Section 3.4 of the 2021 OAR (Appendix A). Section 3.4.1 of the 2021 OAR reviews the "Permitted General Uses" and the "Permitted Public Uses" in the CMP. Importantly, it notes that many of those are the same as those that are included in the Maunakea Administrative Rules, which is consistent with the provisions of the CMP.

The *Revised Management Plan for the UH Management Areas on Mauna Kea* (University of Hawaii, March 1995), which the CMP refers to as the *1995 Management Plan*, is no longer referenced because it has been replaced by the Maunakea Administrative Rules, elements of this document (e.g., Section 7.4.2), and elements of the 2022 Master Plan.

7.2 DESIRED OUTCOME

The "desired outcome" with respect to activities and uses is:

To retain and enhance recreational and cultural activities, ensure regulation of commercial activities, and support scientific studies while maintaining adequate protection of resources, educating users regarding resource sensitivity, and ensuring the health and safety of those visiting or working at Maunakea.

7.3 NEED

Public access to Maunakea has become much easier since the construction of the Mauna Kea Access Road, and, more recently, improvement of Daniel K. Inouye Highway (aka Saddle Road). These developments have led to far greater numbers of people entering the UH Management Areas than was once the case. Managing activities and uses within the UH Management Areas involves managing (*i*) access to the UH Management Areas, and (*ii*) the facilities and uses that are developed and operated within the UH Management Areas. Such measures will help protect resources, enhance safety, and maintain the unique qualities of Maunakea.

Needs to manage activities and uses include:

- Developing education, citation, enforcement, and appeal procedures within CMS to implement the Maunakea Administrative Rules
- Implementing the 2022 Master Plan, which addresses new facilities and uses.

- Implementing CMP management actions that address public and commercial access and activities.
- Monitoring and documenting visitor activities, including numbers entering, times of day present, locations accessed, and their impacts to the resources.

7.4 MANAGEMENT ACTIONS

As discussed in Section 3.4 of the 2021 OAR and summarized in CHAPTER 2 of this document, 11 of the 12 CMP management actions related to activities and uses are ongoing.²⁹ Those actions are listed in Table 7.1, and the nature of the work that is continuing are summarized in Sections 7.4.1 through 7.4.11.

Mgmt. Action	Description	Discussion	
Action Description Discussion General Management Image: Control of the second s			
ACT-1	Development and implement robust access management guidelines and procedures.	7.4.1	
ACT-2	Implement and enforce Maunakea Administrative Rules to reduce impacts of parking and traffic.	7.4.2	
ACT-3	Maintain the Ranger program to educate and encourage adherence to rules and guidelines and enforce Maunakea Administrative Rules.	7.4.3	
ACT-4	Maintain and strengthen infrastructure to educate and encourage adherence to rules and guidelines.	7.4.4	
Recreatio	nal Activities		
ACT-5	Implement and enforce Maunakea Administrative Rules to reduce impacts of recreational hiking.	7.4.5	
ACT-6	Manage snow play activities in a manner that minimizes its impacts and maintains public safety and welfare.	7.4.6	
ACT-7	Confine UH and other sponsored (non-commercial) tours and stargazing activities to previously disturbed ground surfaces and established parking areas.	7.4.7	
ACT-8	Support DLNR conservation resource enforcement officers by monitoring and reporting hunting activity and adherence to applicable DLNR hunting rules.	7.4.8	
Commerc	ial Activity Permits		
ACT-9	Implement and enforce Maunakea Administrative Rules pertaining to commercial tour permitting.	7.4.9	
ACT-10	Provide input on permits for filming activities.	7.4.10	
Other Act	tivity Permits		
ACT-12	Vet all proposals for activities that require a research or special use permit under the Maunakea Administrative Rules.	7.4.11	
	he exact wording of the management actions listed in the table has been revised from the 2009 CMP and the the progress made to date, adaptation made based on the lessons learned, information collected, and inpudapted from the 2021 OAR, Table 3.13.		

 Table 7.1 Ongoing Activity and Use Management Actions

7.4.1 <u>ACT-1: Develop and Implement Access Management Guidelines and</u> <u>Procedures</u>

Under HAR § 20-26-38, UH is authorized to implement the following specific access management measures, among others as reasonable:

²⁹ Only ACT-11, which called for UH to obtain statutory authority to regulate commercial activities within the UH Management Areas has been completed, see Chapter 2.

- Install a gate or other control structure (with the approval of BLNR) to manage vehicular access to the UH Management Areas.
- Close or limit access to all or portions of the UH Management Areas when needed for protection from hazardous conditions, including but not limited to inclement weather, construction or maintenance activities on or near the roadway or at astronomy facility sites, transportation of wide, heavy, or otherwise hazardous loads, or roadway congestion.
- Limit access by private vehicles for public safety and welfare, for the protection of resources, and to reduce congestion. Restrictions may include, but are not limited to, setting a maximum number of private vehicles allowed within the UH Management Areas at any one time, restricting the areas in which private vehicles may operate, or requiring the use of shuttle vehicles in lieu of private vehicles.
- Limit public access hours for the UH Management Areas, provided that hunters have access to hunting areas pursuant to UH's land authorizations and DLNR's hunting rules.

UH understands that access management is one of the most sensitive (and desired) issues for the public. No access management proposals will be developed without substantial public outreach and input. Therefore, it will likely be a few years before an access management project is permitted and implemented. CMS is exploring implementing access management measures in phases; the phases include:

- An <u>initial phase</u> that may involve the installation of certain infrastructure that is outlined in the 2022 Master Plan (e.g., a manned kiosk, an optional gate, etc.). The establishment of procedures that are consistent with the rules that include such things as: (*i*) conducting spotchecks to ensure that occupants of vehicles proceeding above Halepōhaku have completed the orientation program; (*ii*) establishing a reservation and ticketing system that would allow UH to track and, at certain times of day, limit the number of vehicles proceeding above Halepōhaku; and (*iii*) requiring certain visitors pay fees prior to entrance.
- A <u>shuttle phase</u> that may involve such things as: (*i*) the construction of additional improvements and infrastructure as outlined in the 2022 Master Plan; (*ii*) the adoption and implementation of guidelines and procedures that are consistent with the Administrative Rules that result in most or all visitors entering the UH Management Areas doing so via a shuttle; and (*iii*) cooperating with the DHHL or another organization and/or concessionaire to operate the shuttle, especially if the shuttle base facility is on DHHL land.

CMS will continue to gather input on its contemplated managed access phases. Each phase will be developed into a proposal that involves infrastructure (e.g., land uses) and guidelines and procedures (e.g., management measures that are consistent with the Administrative Rules) that work together to contribute to the desired outcome (Section 7.2). During proposal development UH may test temporary access management measures to help assess and obtain public input on the location of the access management point, staffing requirements, measures that could be incorporated to help improve compliance with the Maunakea Administrative Rules, and guidelines/technology (e.g., reservation system) related to how access is managed. Those proposals will be vetted and acted on through the proposal review and approval process outlined in the 2022 Master Plan. CMS anticipates that both phases are likely to borrow from similar access management systems that the State or Counties have already implemented (e.g., Hā'ena State Park, Hanauma Bay State Park, and Diamond Head State Monument).

When fully implemented, these measures (including the possible shuttle system) have the potential to significantly reduce visitor-related vehicular traffic in the UH Management Areas, with the greatest reduction felt on the particularly sensitive stretch above Halepōhaku.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action has been extensively adapted based on progress UH has made on several components of this management action (e.g., studying an access fee structure), access to other state lands has successfully been managed, and voluminous input received from the community regarding access management. In addition, references to the 1995 Management Plan have been replaced by references to the Maunakea Administrative Rules.

7.4.2 ACT-2: IMPLEMENT RULES AND GUIDELINES TO REDUCE IMPACTS OF PARKING AND TRAFFIC

As discussed in Section 3.4.2.2 of the 2021 OAR, UH has used capital improvement funds to implement various ingress/egress upgrades and area improvements to address concerns of traffic flow and pedestrian safety. In addition, having the Maunakea Administrative Rules in place puts UH in a position to enforce those CMP management actions that have parallel provisions in the rules.

The need for and management of parking within the UH Management Areas will go hand in hand with UH's approach to managing access (ACT-1, Section 7.4.1). UH will also actively enforce the Maunakea Administrative Rules, including HAR § 20-26-28, which addresses several aspects of vehicles and transportation (e.g., it prohibits operating or parking vehicles on trails or roads not designated for vehicle use and parking in undesignated areas).

In furtherance of its effort to reduce the impacts of vehicle use and parking, CMS will continue to:

- Distribute maps, at both the VIS and online, delineating designated parking areas along with materials informing visitors about safety concerns.
- Maintain informational and interpretive traffic and parking signs.
- Have Rangers monitor access, traffic, and parking; educate visitors; and, when necessary, enforce the rules.

On high traffic days such as snow days and during special events (e.g., solstice, eclipse, or meteor showers), UH may manage parking and traffic as described in ACT-6 (Section 7.4.6) regarding snow play.

These measures will reduce the potential impacts of vehicular movements and parking in the UH Management Areas and maintain safety.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action has been adapted based on progress UH has made related to providing parking and managing ingress/egress and incorporates the Maunakea Administrative Rules.

7.4.3 ACT-3: MAINTAIN RANGER PROGRAM

The Ranger program has been active since 2001. The 2009 CMP indicated that "The ranger program has been successful in providing a presence on the mountain for operational and visitor

support," and "the program could support a mix of enforcement and interpretive rangers" that "deter violations and encourage adherence to restrictions." As discussed in the 2021 OAR (Section 3.1.7), the Ranger program continues to successfully satisfy those management needs.

UH will continue to maintain the Ranger program, which provide a presence of interpretive and compliance personnel on the mountain. An overview of the many management actions the Rangers play a role in is provided in Section 5.4.3.4. This management action is the core CMP management action for the Rangers, but the Chief Ranger and other managers should be cognizant of the many other management actions where the Rangers play a role.

The Ranger's primary role will continue to be educational and interpretive in nature. They will focus on deterring violations and encourage adherence with applicable rules using a relatively light-handed approach with positive public messaging and friendly in-person warnings to individuals and groups out of compliance. Among the many methods employed by the Rangers, their activities may include informal discussions with visitors as they enter the UH Management Areas to encourage compliance with rules and guidelines, including access management and visitor orientation requirements.

The Ranger's secondary role will be to enforce the Maunakea Administrative Rules. Should the Ranger's education and interpretive efforts not result in the desired compliance, then they will issue administrative citations and/or take other appropriate actions, which may include contacting DOCARE and Hawai'i County Police Department officers for assistance in the event of violations of the Conservation District Rules, penal code, or other applicable rules. Rangers enforcement of the Maunakea Administrative Rules will consist of them issuing citations that can lead to penalties being imposed as provided for in HAR § 20-26-73 and HAR § 20-26-74. To fully implement the Maunakea Administrative Rules, UH will:

- Develop citation, enforcement, and appeal procedures within CMS.
- Provide training, materials, and support to Rangers.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action has been adapted to clarify that the Rangers can enforce the Maunakea Administrative Rules within the UH Management Areas.

7.4.4 ACT-4: MAINTAIN AND STRENGTHEN INFRASTRUCTURE TO EDUCATE AND ENCOURAGE ADHERENCE TO RULES AND GUIDELINES

UH will continue to maintain infrastructure to educate and encourage adherence to rules and guidelines. Maintenance of infrastructure overall is more thoroughly discussed in the IM-# management actions (Section 9.4); this management action reinforces the need to maintain and strengthen infrastructure with the intent of encouraging adherence to rules and guidelines. Infrastructure that encourages adherence to rules and requires periodic maintenance includes, but is not limited to, the following:

• <u>Roads and Parking Areas</u>. These will be maintained in good condition so that drivers are not tempted to leave the designated areas.

- <u>Restrooms and Trash Receptacles</u>. These will be maintained so that people have access to comfort stations and can easily/securely/appropriately dispose of their trash, which will discourage littering.
- <u>Guardrails and Boulder Barriers</u>. These visual and physical barriers to vehicles leaving designated areas (i.e., roads and designated parking areas) will be maintained, supervised, and in some cases constructed.
- <u>Signs</u>. Signage that directs and educates people will be installed and maintained, and periodically updated, replaced, or renewed.
- <u>Visitor Information Station</u>. The VIS will be maintained, staffed, and equipped in a fashion that allows it to adequately serve the needs of visitors.
- <u>CMS Website</u>. The CMS website is expected to be an ever-more-important means of educating those who use the mountain and encouraging them to adhere to the applicable rules and regulations.

UH will also seek to strengthen these examples and other types of infrastructure that educate and encourage adherence to rules and guidelines. To the extent that such strengthening requires a land use, proposals will be developed and vetted per the proposal review process outlined in the 2022 Master Plan prior to implementation. In some cases, land use approvals already exist that allow for the strengthening of infrastructure if it is found that existing infrastructure is insufficient to achieve the desired result (e.g., the placement of additional boulders to discourage off-road vehicle travel if it is found that people are circumventing the boulders originally placed, or replacing signs to improve messaging).

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). UH has expanded this management action from infrastructure to discourage off-road vehicle use to all types of infrastructure because UH has learned that a wide range of infrastructure is needed to encourage compliance with rules and guidelines.

7.4.5 ACT-5: IMPLEMENT RULES AND GUIDELINES TO REDUCE IMPACTS OF RECREATIONAL HIKING

As discussed in Section 3.4.2.5 of the 2021 OAR, UH is doing its best to keep a limited, wellmaintained, trail network within the UH Management Areas as a means of minimizing the development of new, unwanted trails by individuals and groups. Accordingly, UH is actively enforcing the provisions of HAR § 20-26-21(10), which specifically prohibits hiking, conducting nature study, or conducting any activity on pu'u unless on designated trails or roads, except by written permit. Similarly, HAR § 20-26-28 prohibits operating or parking vehicles on trails or roads not designated for vehicle use.

In furtherance of its effort to reduce the impacts of recreational hiking, CMS:

 Distributes maps, at both the VIS and online, delineating designated trails accessed from the UH Management Areas along with materials informing visitors about safety concerns. Hikers are informed that off-trail hiking is prohibited; and alerted of safety concerns, including the fact that hiking alone at high elevations is dangerous, particularly in bad weather and/or late in the day and that it is best if one hikes with one or more buddies.

- Maintains informational and interpretive traffic and trail signs.
- Has Rangers periodically monitor and patrol recreational trails.
- Highly encourages hikers to self-register at the VIS.

CMS has also established guidelines regarding any proposed new trail or substantial alteration of an existing route (both of which are considered land uses in the Conservation District). Proposals must comply with the 2022 Master Plan's proposal review process and be fully permitted prior to implementation. That planning and permitting process may include seeking input from community groups, advice from CMS advisory groups, and receiving SHPD approval.

Due to human health and safety concerns, as well as resource impact concerns, UH does not anticipate establishing any new trails in the MKSR. Designated trails in the MKSR are limited to (*i*) the summit or Kūkahau'ula trail, which extends from Astronomy Site 9 (former Hōkū Kea site) to Pu'uwēkiu, the true summit and the highest point on Maunakea, (*ii*) the trailhead near the Batch Plant for the Humu'ula Trail into the NAR that leads to Lake Wai'au and Halepōhaku, and (*iii*) the trailhead at Parking 2 for the trail that goes to the Lake Wai'au Trail in the NAR. People can also hike along the shoulders of the roadways. UH has posted signs discouraging use of the track from Astronomy Site 12 (SMA) to the summit of Pu'upoli'ahu, as this is not a designated footpath.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time, but this clarifies why UH does not intend to develop any new trails.

7.4.6 ACT-6: REGULATE SNOW PLAY

As discussed in Section 3.4.2.6 of the 2021 OAR, HAR § 20-26-39 specifically authorizes UH to restrict and/or prohibit skiing, snowboarding, sledding, and other similar winter or snow sports to maintain public safety and welfare, to prevent damage to resources, and to minimize conflicts among visitors. It also bans formally or informally organized contests, meets, or competitions, snow play tours, or other similar events for skiing, snowboarding, sledding or other forms of snow recreation or snow activities and the operation of snowmobiles, all-terrain vehicles, or other motorized vehicle used for snow recreation.

The regulation of snow play will generally be achieved by:

- Informing the public whether snow play is allowed or not each day.³⁰ Such information will be provided using means and methods that prove efficient and effective, which may evolve over time.
- Posting signs or using other methods to inform visitors of some of the risks inherently associated with snow play.
- Maintaining a Ranger presence in the summit region to monitor public safety and welfare, prevent damage to resources, and minimize conflicts among visitors.

³⁰ Generally, snow play will only be allowed on days when: (*i*) the road is sufficiently clear of hazards to allow safe public access and (*ii*) there is sufficient snow coverage and depth that snow play will not pose a threat to resources.

• Maintaining a Ranger presence in the summit region when snow play is not allowed but visitors may be tempted to attempt snow play (e.g., days where snow is present, but not at sufficient depth or coverage) to enforce the prohibition.

During periods when snow play is particularly heavy and the Rangers feel it is appropriate, they will continue their practice of establishing one-way traffic flow on the summit area loop road so that vehicles are able to move safely when the designated parking areas are full and many cars are parked along the sides of the roadway.

At the end of each snow play period, CMS will conduct a trash inspection and removal in snow play areas in addition to areas the Rangers normally monitor for trash during their daily patrols.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Adaptations clarify aspects of the snow play guideline. They also eliminated the suggestion that Rangers will delineate snow play areas on a map; this was eliminated because the Rangers have found that (i) appropriate areas are different day-to-day, storm-to-storm, and (ii) snow play is largely a self-regulating activity, with people generally not venturing to areas where there is no snow or conditions are unsafe.

7.4.7 ACT-7: CONFINE SPONSORED TOURS TO PREVIOUSLY DISTURBED AREAS

UH will continue to confine UH and other sponsored (non-commercial) tours and stargazing activities to previously disturbed ground surfaces and designated parking areas within the UH Management Areas. This will be achieved through monitoring compliance with conditions applied to Research Permits and Special Use Permits issued per HAR § 20-26-61, 62, and 63.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time, but references to the Maunakea Administrative Rules were added to this management action, which had a one sentence description in the 2009 CMP.

7.4.8 <u>ACT-8: MONITOR HUNTING ACTIVITY AND ADHERENCE TO APPLICABLE DLNR</u> <u>HUNTING RULES</u>

Under the existing general lease, BLNR reserved "[a]ll hunting and recreation rights" subject to BLNR's rules. As discussed in Section 3.4.2.8 of the 2021 OAR, UH has worked with DLNR to ensure that recreational hunting within the UH Management Areas is consistent with applicable DLNR regulations. As codified in HAR § 20-26-3, where there is a conflict between the HAR Chapter 20-26 and DLNR rules, then the DLNR rules govern. HAR § 20-26-3(d) further states that UH's rules will be implemented in such a way as to allow hunting in accordance with DLNR's hunting rules. Complementary assurances regarding hunting are provided elsewhere in UH's rules as well [see, for example, HAR § 20-26-4; HAR § 20-26-21(8); HAR § 20-26-27; HAR § 20-26-32; and HAR § 20-26-38(c)].

In addition to adhering to the provisions related to hunting contained in the aforementioned rules, moving forward CMS will meet with Hawai'i Island DOFAW representatives to be sure that CMS is aware of issues that hunting may raise. If this coordination reveals outstanding issues, CMS will follow up with DOFAW staff and/or hunters to see if the problems can be resolved. Finally, CMS staff will continue to proactively inform DOFAW and/or the Big Island hunting community

on a timely basis of any events and/or issues they believe may be of particular concern, including observations of parties engaged in hunting in a manner that is inconsistent with applicable hunting rules. These outreach efforts are part of the outreach management action (Section 5.4.2.1).

Hunters, like other visitors to the UH Management Areas, will be required to comply with the Maunakea Administrative Rules. The rules likely to be most applicable to hunters are those related to vehicles and parking, which are discussed in ACT-2 (Section 7.4.2).

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Clarify that UH and DLNR have agreed that DLNR hunting rules apply to the UH Management Areas and that, therefore, no additional policy regarding recreational hunting is required. Therefore, the primary UH action related to hunting will be to monitor hunting activity, which is why the title of this management action has changed.

7.4.9 ACT-9: OVERSEE COMMERCIAL TOUR PERMITTING PROCESS

As discussed in several sections of the 2021 OAR (see, for example, Sections 3.4.2.7 and 3.4.2.9), UH currently maintains close oversight and control of the commercial tour permitting process, and that will continue. Specific requirements are spelled out in HAR § 20-26-64, entitled "Commercial tour activity permits." UH will continue to attach conditions to commercial tour permits; those conditions are designed to minimize potential tour impacts on the cultural landscape and natural resources. Conditions may evolve over the years but UH will always require tour materials to be approved by CMS and confine commercial tours to limited areas that have previously been disturbed.

In collaboration with the UH Mānoa's Travel Industry Management program, UH initiated a study intended to assess the capacity for commercial tour operations in the UH Management Areas. Based on those findings and recommendations, CMS is exploring the contracting flexibility with respect to commercial tour operations that HAR § 20-26-64 provides. Specifically, it is considering whether to issue one or more concession agreements in lieu of, or in addition to, commercial tour activity permits. It is also evaluating the potential benefit of entering into an agreement with another public agency to manage commercial tour activities and transportation of passengers for hire within the UH Management Areas and allow such agreements to be in lieu of, or in addition to, written permits or concession agreements for such purposes. Finally, it is evaluating the desirability and implications of adjusting the fees that are paid to UH by commercial tour operators.

Thereafter, CMS will review the commercial tour permitting process at regular intervals to assess necessary or beneficial changes. Information including permit violations or commercial tour operations impacts to resources will be considered during the review process.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Reference the Maunakea Administrative Rules and illustrate how the permitting process will be used to manage and oversee commercial tours.

7.4.10 ACT-10: PROVIDE INPUT ON FILM PERMITS

As discussed in Section 3.4.2.10 of the 2021 OAR, HAR § 20-26-65 requires a permit for commercial video, digital, film, still photography, or any other visual and audio recordings within

the UH Management Areas. These permits are issued by the Hawai'i Film Office in the State of Hawai'i Department of Business, Economic Development & Tourism (DBEDT) following receipt of a CMS recommendation to approve (with applicable conditions) or deny the permit. UH does not promote Maunakea as a tourist destination. This sentiment is repeated by the Film Office, which also informs applicants that Maunakea is not open-access to all filming and that specific approval is required for commercial filming.

Since January 2020, when HAR § 20-26-65 took effect, CMS staff have been available to review applications for film permits that were received, continuing procedures that had formerly been handled by their predecessors at OMKM.³¹ Depending on the nature, scope and potential impacts of a particular application, CMS seeks input from KKM and MKMB. Standard and specific conditions apply to approved film requests, among them the following: (*i*) filming activity must be adhered to as approved; (*ii*) a property representative must accompany film crew for the duration of filming on the premises; and (*iii*) filming after dark with the use of artificial illumination is prohibited.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Clarify that UH's input on film permits is now included in the Maunakea Administrative Rules and that UH has standard and specific conditions, which UH has developed in coordination with the astronomy facilities and resource specialists.

7.4.11 ACT-12: VET RESEARCH AND SPECIAL USE PROPOSALS & OVERSEE PERMITS

Section 3.4.2.12 of the 2021 OAR addresses UH's oversight of research permits.³² Specifically, it notes that HAR § 20-26-62 fully implements the kinds of controls over research that the CMP calls for. HAR § 20-26-63 provides similar controls over other "special use" activities. These provisions:

- Allow UH to issue permits to parties wishing to engage in scientific, educational, management, or other activities otherwise prohibited by the rules.
- Require that applications for research or special use permits adequately describe the planned activity and submit the application well in advance of the date of the intended activity.
- Provide that applications for research or special use permits be carefully evaluated. UH will seek input from the advisory groups (e.g., KKM, EC, and MKMB), as appropriate, as part of their evaluation. Overall, all proposals will be evaluated for their consistency with the 2022 Master Plan, the CMP, and the Maunakea Administrative Rules.

In addition to the process discussed here and in the Maunakea Administrative Rules, those proposing research must consider the proposal review process in the 2022 Master Plan if their proposal involves a land use per the Conservation District rules.

Generally, in its review of research proposals, UH: (*i*) encourages proposers to utilize remotesensing whenever feasible; (*ii*) restricts projects (excluding mitigation projects) that disturb natural

³¹ The travel and workplace restrictions that have been in place during that time due to the pandemic limited filming activity to the point where only eight (8) film application requests were received, a fraction of the number that were received in the preceding non-pandemic years.

³² "Research" may or may not involve a "land use" in the Conservation District. See the 2022 Master Plan for more guidance concerning land uses. If it does involve a land use, then additional permits and approvals may be required.

habitat to non-sensitive areas whenever possible; (*iii*) requires that disturbed habitat be returned to original (or improved) condition upon project completion based on an approved restoration plan for sites and access routes; (*iv*) implements best management practices and not emit (or, at minimum, control) light, dust, and radio emissions; (*v*) requires that research projects provide, at no cost to UH, their raw data, "grey literature" products, and/or published papers; and (*vi*) encourages researchers to carry out their work in a way that eliminates or reduces any impacts to resources.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Expanded this action to include both research and special use permits for consistency with the Maunakea Administrative Rules.

CHAPTER 8 PERMITTING AND ENFORCEMENT

8.1 INTRODUCTION

Section 7.2.2 of the 2009 CMP addresses the permitting and enforcement that is needed to be proper stewards of Maunakea. UH took a key step forward in implementing these provisions with the adoption the Maunakea Administrative Rules. This chapter focuses on ensuring there is knowledge of, compliance with, and enforcement of applicable rules, regulations, and permit conditions. Information concerning the current status of permitting and enforcement can be found in Section 3.5 of the 2021 OAR (Appendix A).

8.2 DESIRED OUTCOME

The "desired outcome" with respect to permitting and enforcement is to:

Achieve compliance with existing and any new guidelines and regulations designed to manage and minimize human impacts, to preserve and protect Maunakea's resources.

8.3 NEED

Permitting and enforcement are essential tools for regulating activities and reducing their impacts on the resources. Compliance with all federal, state, and local laws (not the least of which is the Maunakea Administrative Rules) must be monitored and enforced by appropriate entities with jurisdiction. Likewise, compliance with the terms and conditions of commercial tour permits, research permits, special use permits, film permits, Conservation District Use Permits, and other permits or approvals must be monitored and enforced. Personnel knowledgeable in these subjects must be retained to work in UH Management Areas to monitor, enforce, and ensure adequate protection of resources.

8.4 MANAGEMENT ACTIONS

As discussed in Section 3.5 of the 2021 OAR, six of the eight CMP management actions related to permitting and enforcement are ongoing. Only management actions P-3 and P-6, which were related to rule-making, are complete (CHAPTER 2 of this document). The ongoing management actions are listed in Table 8.1, and the nature of the work that is continuing is summarized in Sections 8.4.1 through 8.4.6.

Mgmt.				
Action	LAWS AND REGULATIONS	Discussion		
LAWS AN	LAWS AND REGULATIONS			
P-1	Comply with all applicable federal, state, and local laws, regulations, and permit conditions related to activities in the UH Management Areas.	8.4.1		
P-2	Strengthen CMP implementation by recommending that compliance with the CMP be a condition of permits and agreements.	8.4.2		
P-4	Educate management staff and those working on the mountain about applicable rules, CMP management actions, and permit requirements.	8.4.3		
ENFORC	EMENT			
P-5	Continue coordinating with other agencies on enforcement needs.	8.4.4		
P-7	Periodically review facility compliance with Conservation District Use Permits.	8.4.5		
P-8	Enforce conditions contained in permits issued under the Maunakea Administrative Rules.	8.4.6		
Note: The exact wording of the management actions listed in the table has been revised from the 2009 CMP and the 2021 OAR to reflect the progress made to date, adaptation made based on the lessons learned, information collected, and input received. Source: Adapted from the 2021 OAR, Table 3.14.				

 Table 8.1 Ongoing Management Actions Related to Permitting and Enforcement

8.4.1 P-1: COMPLY WITH APPLICABLE LAWS, REGULATIONS, AND PERMIT CONDITIONS

As discussed in Section 3.5.2.1 of the 2021 OAR, responsibility for complying with applicable statutes and regulations continues to be the responsibility of everyone who enters the UH Maunakea Lands. On the Federal level these include, but are not limited to, such things as the Clean Air Act (42 U.S.C. 7401 et seq.), the Clean Water Act (33 U.S.C. 1251 et seq.), the Coastal Zone Management Act (16 USC §145 et seq.), the Endangered Species Act (16 USC §1531 et seq.), the National Environmental Policy Act (42 USC §4321 et seq.), and Section 106 of the National Historic Preservation Act, Public Law 89-665, as amended. On the State level, they include, but are not limited to, HRS Chapter 183C, Conservation District (HAR Chapter 13-5, "Conservation District Rules"), HRS Chapter 205A, Hawai'i's Coastal Zone Management Program, Maunakea Administrative Rules, HAR Chapter 13-209, "Natural Area Reserves System," and HRS Chapter 6E, "Historic Preservation."

As discussed in P-7 (Section 8.4.5), CMS will periodically review facility compliance with CDUP terms to assist DLNR-OCCL. As discussed in ACT-3 (Section 7.4.3), UH will implement and enforce the Maunakea Administrative Rules. As discussed in P-8 (Section 8.4.6), CMS will monitor compliance with permits issued under the Maunakea Administrative Rules.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time. References to the Maunakea Administrative Rules were added.

8.4.2 P-2: STRENGTHEN CMP IMPLEMENTATION THROUGH PERMIT AND AGREEMENT CONDITIONS

UH will implement this management action by: (*i*) requiring project proposals to include a summary description and/or plan showing how the proposer would comply with CMP management actions relevant to the proposal, ³³ and (*ii*) advocating that compliance with the CMP

³³ Per the 2022 Master Plan, this is also a criteria when UH considers if proposed land uses are appropriate for the UH Maunakea Lands.

be a condition of approval permits issued (e.g., CDUPs issued by BLNR, and permits issued by UH under the Maunakea Administrative Rules). Additionally, UH will advocate for similar conditions to be incorporated in future subleases and other agreements it enters, as appropriate.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This action has been expanded to specify that CMP compliance should also be a condition of permits issued under the Maunakea Administrative Rules.

8.4.3 P-4: PROMOTE MANAGER AND PERMITTEE AWARENESS OF APPLICABLE RULES & <u>PERMIT REQUIREMENTS</u>

As discussed in Section 3.5.2.4 of the 2021 OAR, all UH personnel with the authority to make significant decisions concerning activities on Maunakea are informed of the rules and permit requirements applicable to their areas of responsibility when they assume their positions and are kept current through periodic communiques from CMS. Similarly, UH provides an overview and detailed information regarding the Maunakea Administrative Rules and applicable permit conditions to sublessees, permittees, and their staff at new-project start-up meetings, during periodic orientations (Section 5.4.3.1), and other events. CMS will continue to implement these procedures.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time.

8.4.4 P-5: COORDINATE ENFORCEMENT EFFORTS WITH OTHER AGENCIES

As discussed in Section 3.5.2.5 of the 2021 OAR, UH actively coordinates with other agencies regarding enforcement of the rules and regulations that are applicable within the UH Management Areas and on immediately adjacent lands. This is part of the larger coordination effort discussed in Section 5.4.2. UH will continue to work with other agencies to achieve coordinated and consistent guidelines for access, activities, and use. Importantly, this coordination includes having entered into a formal "Cooperative Agreement" for efforts in the Mauna Kea Ice Age NAR with DLNR. Finally, UH will continue to coordinate its enforcement activities and share Ranger reports with other entities (e.g., NAR, DOFAW, and USFWS) on a timely basis in accordance with agreements and their requests.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Recognize that UH has entered an agreement with the NAR and established relationships with enforcement entities. Refer to other important management actions related to coordination.

8.4.5 P-7: REVIEW FACILITY COMPLIANCE WITH CDUPS

As discussed in Section 3.5.2.7 of the 2021 OAR, UH has developed a protocol for the Rangers to conduct biennial inspections of all the facilities within the UH Management Areas for which CDUP conditions exist. These twice-yearly inspections will continue. The Rangers will confirm that permit conditions and sublease terms are being met during their inspections. CMS will submit Ranger reports summarizing the inspections to DLNR as part of its annual reporting; however,

CMS will inform DLNR within 30 days if known or suspected non-compliance or violations are encountered by the Rangers during the inspections and they cannot be corrected promptly. This monitoring promotes responsible stewardship, helps minimize the potential for damage to Maunakea, and allows UH to detect and report infractions to DLNR.

During these inspections the Rangers will also ask the operators to confirm that the facilities are complying with applicable laws and regulations, including those listed in Section 8.4.1, and other provisions of the CMP. This assessment will cover a wide range of topics, including, but not limited to, evaluating if the facilities are:

- Properly storing hazardous materials, not storing unnecessary quantities of hazardous materials, and maintaining appropriate spill response equipment and materials.
- Adhering to manufacturer's maintenance and clean-out schedules and permit conditions related to their individual wastewater systems.
- Maintaining all exterior trash cans and dumpsters, if any, with effective lid closure mechanisms designed to withstand high winds.

The Rangers will also ask facility operators about other compliance issues. If any are identified, the Rangers will note this in their reports and request that the operators provide information directly to CMS. If there are still-unresolved compliance issues, CMS will follow up with the operators as appropriate to ensure that compliance issues are resolved in a timely fashion in accordance with applicable CMP management actions, permit conditions, and/or sublease terms.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action has been broadened to include items beyond CDUP conditions because CMS advisory groups and the public have indicated that they are concerned about facility compliance with other requirements and CMP management actions.

8.4.6 P-8: ENFORCE CONDITIONS CONTAINED IN UH-ISSUED PERMITS

As discussed in Section 3.5.2.8 of the 2021 OAR, the Rangers monitor activities within the UH Management Areas daily, recording pertinent data regarding commercial tour activity and providing real-time feedback to operators when activity is observed that appears to be inappropriate or inconsistent with tour permit conditions. The Rangers will continue to do this.

The Rangers will also continue to monitor other permitted activities, such as research, special use, commercial tour, and filming. Should the Rangers observe permit violations, they will document it and provide real-time feedback to permit holders so that violations can be corrected immediately. Should permitted activities continue to be conducted in a manner inconsistent with permit conditions following Ranger warnings, UH may implement one or more sanctions pursuant to the Maunakea Administrative Rules, including expelling and barring the violator from the UH Management Areas; fining the violator; and revoking the permit.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Discussion has been expanded to include all permits issued under the Maunakea Administrative Rules.

CHAPTER 9 INFRASTRUCTURE AND MAINTENANCE

9.1 INTRODUCTION

Section 7.3.1 of the 2009 CMP provided guidance concerning infrastructure and maintenance within the UH Maunakea Lands, ranging from basic tasks (e.g., painting buildings) to more complex and involved tasks (e.g., operating/maintaining septic tanks and keeping the roadways in serviceable condition). Activities to maintain the built environment continue and implementing the infrastructure and maintenance (IM) management actions are important to minimize the impact of these activities. Information concerning the current status of infrastructure and maintenance can be found in Section 3.6 of the 2021 OAR (Appendix A).

9.2 DESIRED OUTCOME

The "desired outcome" with respect to managing the built environment is to:

Manage the built environment by implementing an Operations, Monitoring and Maintenance Plan (OMMP) containing specific maintenance strategies and guidelines that will result in minimal disruptions to activities and uses, minimize impacts to the resources, and ensure that permittees remain compliant with their CDUP requirements.

9.3 NEED

The land uses and infrastructure within the UH Maunakea Lands (e.g., astronomy facilities, roads, utilities, signs, etc.) exist within the sensitive cultural landscape and subalpine and alpine ecosystems of Maunakea. UH needs to work closely with the astronomy facility operators and other maintenance personnel to continue existing practices and identify improved strategies to reduce impacts to resources associated with infrastructure and maintenance practices.

Furthermore, the astronomy facilities and UH are required to maintain their facilities and infrastructure in a manner that complies with the terms of their CDUPs, land authorizations, other approvals, and applicable rules and regulations. These agreements and approvals include conditions and provisions to protect the environment. For example, activities must be compliant with applicable historic preservation requirements, permits regarding the operation on individual wastewater systems, and the management of hazardous materials.

9.4 MANAGEMENT ACTIONS

As discussed in Section 3.6 of the 2021 OAR, none of the 14 CMP management actions related to infrastructure and maintenance have been entirely completed. Hence, all are ongoing and are listed in Table 9.1 and detailed in Sections 9.4.1 through 9.4.14.

Mgmt. Action	Description	Discussion
Routine N	Iaintenance	·
IM-1	Implement the <i>Operations, Monitoring, and Maintenance Plan</i> (OMMP) (Office of Mauna Kea Management, February 2017) and update it as appropriate.	9.4.1
IM-2	Require maintenance personnel to complete the worker orientation (EO-2).	9.4.2
IM-3	Ensure maintenance activities that involve ground disturb disturbance complete a historic preservation review.	9.4.3
IM-4	Ensure that maintenance personnel, equipment, and vehicles comply with the <i>Maunakea Invasive Species Management Plan</i> (C. Vanderwoude, February 2015).	9.4.4
IM-5	Finalize and implement a Debris Removal, Monitoring and Prevention Plan.	9.4.5
IM-6	Finalize and implement an Erosion Inventory and Assessment Plan.	9.4.6
IM-7	Collaborate with the Department of Defense to remove military wreckage.	9.4.7
Infrastru	eture	
IM-8	Assess improvements to the Mauna Kea Access Road consistent with the 2022 Master Plan.	9.4.8
IM-9	Assess improvements to parking facilities consistent with the 2022 Master Plan.	9.4.9
IM-10	Assess improvements to restroom and wastewater facilities consistent with the 2022 Master Plan.	9.4.10
Sustainab	le Technologies	
IM-11	Encourage existing facilities and new development to incorporate sustainable and energy-efficient technologies, whenever possible.	9.4.11
IM-12	Conduct periodic energy audits and implement recommendations.	9.4.12
IM-13	Install locally-based alternative energy sources as opportunities arise.	9.4.13
IM-14	Conduct periodic waste minimization audits and implement recommendations.	9.4.14
	he exact wording of the management actions listed in the table has been revised from the 2009 CMP and the 2009 the progress made to date, adaptation made based on the lessons learned, information collected, and input a dapted from the 2021 OAR, Table 3.15.	

 Table 9.1
 Ongoing Infrastructure and Maintenance Management Actions

9.4.1 IM-1: IMPLEMENT THE OMMP

As discussed in Section 3.6.2.1 of the 2021 OAR, UH completed its *Operations, Monitoring, and Maintenance Plan* (OMMP) (Office of Mauna Kea Management, February 2017) for Maunakea in 2017 and has been implementing it since that time. Consistent with the adopted OMMP and in accordance with its provisions, each astronomy facility and UH will continue to annually submit descriptions of projects and activities it anticipates undertaking over the coming five years (often referred to as "Five-Year Outlooks"). Monitoring of those projects and activities is then accomplished through the CMS' proposal review process (see 2022 Master Plan) and subsequent tracking, daily Ranger activity reporting, state permitting, and comparison of detailed project proposals with existing 5-year outlooks. The guidelines in the OMMP will be updated periodically as needed to remain consistent with the 2022 Master Plan, changes in the number and type of facilities present in the UH Management Areas, and to reflect the lessons learned during implementation.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action now recognizes that an OMMP has been adopted and is being implemented. In addition, it indicates that, as with other plans, it will be updated using adaptive management protocols into the future.

9.4.2 IM-2: REQUIRE MAINTENANCE WORKER ORIENTATION

As discussed in Section 3.6.2.2 of the 2021 OAR, UH has developed, and requires all persons who are going to work in the UH Maunakea Lands to complete, an educational orientation that informs them of the unique nature of the resources and the kinds of behavior that they need to engage in to protect them. UH will continue to require maintenance workers, whether employed by UH or another entity, comply with management action EO-2 and receive the worker orientation as outlined in Section 5.4.3.1.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time.

9.4.3 IM-3: Ensure Historic Preservation Review for O&M Activities

As discussed in Section 3.6.2.3 of the 2021 OAR, the ordinary daily activities and routine maintenance operations that take place within the UH Management Areas do not affect historic properties and are not subject to historic preservation review. At the same time, certain types of maintenance activities – those that result in ground disturbance where none has occurred previously – do require historic preservation review. UH has, in coordination with DLNR, developed a list that distinguishes between maintenance actions that require no further historic review and those that do require historic review. That list may be updated from time to time in coordination with DLNR. All operations and maintenance (O&M) activities that are not routine in nature and are not on the list of activities that do not require historic preservation review will be identified in the Five-Year Outlooks. The project-specific historic preservation review will occur as part of the proposal review process outlined in the 2022 Master Plan and downstream permitting and approval steps. UH and its sublessees will continue to follow the agreed-upon review and outreach procedures for all their O&M activities.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). The discussion has been expanded to highlight that, as the 2009 CMP suggested and in coordination with DLNR, a list of activities not requiring historic preservation review has been generated. O&M activities not on that list continue to require project-specific historic preservation review.

9.4.4 IM-4: Ensure O&M ACTIVITIES COMPLY WITH THE ISMP

As described in Section 3.6.2.4 of the 2021 OAR, based on the results of scientific studies that it commissioned, UH developed a set of standard operating procedures (SOPs) regarding the cleaning of vehicles and personal belongings that apply to the passengers, vehicle operators, immediate personal possessions, and any vehicle operating under a permit within the UH Management Areas. These SOPs are part of the *Maunakea Invasive Species Management Plan* (ISMP) (Section 4.4.2). This management action requires that O&M activities fully comply with the ISMP just as new construction activities do.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This action has been adapted to specify that O&M activities comply with the ISMP, which is a more stringent requirement than establishing and using a wash station near Halepōhaku as the 2009 CMP did.

Establishing a wash station near Halepōhaku was considered but it was decided that using a lower elevation wash station was the best approach to ISMP compliance.

9.4.5 IM-5: FINALIZE & IMPLEMENT DEBRIS REMOVAL, MONITORING, AND PREVENTION PLAN

As detailed in Section 3.6.2.5 of the 2021 OAR, OMKM/CMS developed a draft *Debris Removal, Monitoring and Prevention Plan* that contains numerous procedures aimed at maintaining the UH Management Areas in a clean and orderly condition for resource protection. It has been following those procedures since 2001, UH believes the procedures have been effective in achieving the enumerated goals, and UH expects to finalize the plan by the end of 2022. Once finalized, UH will continue to implement the plan and update it as warranted based on lessons learned, monitoring results, changes in the characteristics of debris encountered, or other factors.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action now recognizes that the plan called for has been developed, is being implemented, and will soon be officially adopted. In addition, it indicates that, as with other plans, it will be updated using adaptive management protocols into the future.

9.4.6 IM-6: FINALIZE & IMPLEMENT EROSION CONTROL PLAN

As discussed in Section 3.6.2.6 of the 2021 OAR, OMKM partnered with the UH Hilo Geography Department to initiate a study of surficial geology and cinder cone erosion issues. The purpose of the work was to quantify topographic changes over time relating to natural and anthropogenic disturbance and erosion and to: (*i*) identify locations of greatest concern for erosion and disturbance; (*ii*) determine how erosion rates in disturbed areas compare to erosion rates on undisturbed cones; and (*iii*) determine how these rates compare to other cinder cones globally. In carrying out the work the author assembled baseline high-resolution (< 1 m spatial resolution) imagery and topographic datasets.³⁴ The study results are detailed in the *Maunakea Summit Surficial Geomorphology & Erosion Monitoring Final Report*, which was published on February 8, 2021.

In discussing the conclusions and recommended approaches to addressing erosion issues within the summit area, the report noted the following:

- Erosion at the Maunakea summit is an active and ongoing concern.
- Early road construction activities in the 1960s and 1970s significantly altered natural surface runoff pathways and caused extensive gullying along the summit access road, particularly along the Pu'uwēkiu switchback.
- Those large historic gully features have now largely stabilized because of regular maintenance and road improvements that occurred in 1989-1990, but the culverts that were installed now direct excess surface flow into new locations, causing gullying and deposition in areas that were previously undisturbed.

³⁴ Those datasets have been used by others for other research activities and objectives, including producing spatially explicit habitat suitability maps across the summit area for the wēkiu bug and other arthropod species (Stephenson et al. 2017), documenting site stability and change at known archaeological sites, and contributing to other ongoing and new research efforts within the MKSR (Kirkpatrick, 2018; Schorghofer et al. 2018).

- New gullies continue to develop along roadways from large precipitation events, undermining existing infrastructure and presenting challenges. Without continued attention to road maintenance and cinder replenishment efforts, these gullies have the potential for dramatic growth and roadway damage in future storms.
- Continuing these maintenance efforts, which include periodic excavation from zones of cinder accumulation and re-deposition into actively eroding areas, is critical for limiting the growth of incipient gullies and stabilizing undercut surfaces. Without excavation, accumulated cinder eroded from over-steepened slopes will eventually overtop the retaining walls along the Pu'uwēkiu switchback and deposit onto the road surface. Similarly, without replenishment, undercut road infrastructure will eventually fail.

The Maunakea Summit Surficial Geomorphology & Erosion Monitoring Final Report concludes that:

- Additional improvements to the roadways and surface runoff infrastructure to minimize and redirect flow accumulation pathways would help reduce new gully formation and starve existing gullies of the concentrated runoff needed to do further geomorphic work.
- Existing culvert outflow locations will continue to receive surface runoff and sediment, and will remain areas of active geomorphic change and increasing visibility on the landscape.
- Erosion control infrastructure should continue to be maintained and cleared, particularly prior to large storm systems that may generate significant storm runoff.
- It is desirable to establish a regular erosion monitoring program, including an annual inventory report documenting changes, to identify and track areas of concern and help bettermanage summit resources.³⁵

As it finalizes the Erosion Control Plan CMS will identify operation, maintenance, repair, and/or improvement work to address the recommendations and conclusions in the report.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action recognizes that a plan is being developed and will be finalized. In addition, it indicates that, as with other plans, it will be updated using adaptive management protocols into the future.

9.4.7 IM-7: COLLABORATE WITH DOD TO REMOVE MILITARY WRECKAGE

Section 3.6.2.7 of the 2021 OAR notes that OMKM has submitted an inventory of all known military aircraft wreckage within the UH Management Areas to the U.S. Department of Defense (DoD) and in collaboration with DoD, OMKM/CMS has prepared a Draft *Military Wreckage Removal Plan*. UH will work with DoD and encourage DoD to finalize the plan, present it as a proposal to UH, have the proposal go through the 2022 Master Plan's proposal review process, obtain required permits and approvals (including historic preservation review), and then implement the plan.

³⁵ The report notes that the data generated as a result of such a monitoring program would also have utility for other subjects, including wēkiu bug habitat analysis and monitoring, invasive plant species detection, permafrost studies, and decommissioning.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action recognizes preliminary steps have been taken, but it is up to DoD to finalize a plan, obtain approvals, and then implement the plan.

9.4.8 IM-8: Assess Road Improvements Consistent with 2022 Master Plan

Section 3.6.2.8 of the 2021 OAR notes that the road paving issues discussed in the 2009 CMP have been considered since the CMP was adopted, and the outcomes of those considerations have been incorporated into UH's 2022 Master Plan. It confirms that after consulting with engineers, archaeologists, and other professionals, UH has determined that it will not pursue paving the <u>entire</u> unpaved portion of the Mauna Kea Access Road at this time.

UH will continue to assess the need for roadway improvements on a regular basis. The assessment will consider several variables, including access management, the types of vehicles using the road, the O&M effort that is required to keep the existing roadway functional, and the cost of making capital improvements. The types of improvements that it will continue to consider include those related to drainage, safety, and traffic flow. If improvements are deemed appropriate, they will be proposed as projects and approvals will be sought in accordance with the processes outlined in the 2022 Master Plan.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action now recognizes that "land uses," as defined in the Conservation District Rules, including improvements to a road, are correctly addressed in the Master Plan. The action now indicates UH will continue to assess potential improvements; implementation of resulting proposals will follow the 2022 Master Plan.

9.4.9 IM-9: Assess Parking Improvements Consistent with 2022 Master Plan

As discussed in detail in Section 4.5.1.9 of the 2021 OAR, the parking and pullout issues discussed in the 2009 CMP have been considered since CMP adoption and the outcomes of those considerations have either been implemented or incorporated into UH's 2022 Master Plan. Going forward, UH will continue to assess the need for parking improvements based on several variables, including access management, vehicle types, and capital improvement costs. Improvements that will continue to be considered include signage and parking infrastructure at locations within the MKSR as astronomy facilities are decommissioned. If improvements are deemed appropriate, they will be proposed as land uses and requests for approval will be handled in accordance with the processes outlined in the 2022 Master Plan.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action now recognizes that "land uses," as defined in the Conservation District Rules, including parking improvements, are appropriately addressed in the Master Plan. The action now indicates UH will continue to assess potential improvements; implementation of resulting proposals will follow the 2022 Master Plan.

9.4.10 IM-10: Assess Restroom and Wastewater Improvements Consistent with 2022 Master Plan

As stated in Section 3.6.2.10 of the 2021 OAR, because the extent to which additional public restroom facilities are needed in the MKSR and Halepōhaku is primarily a facility issue (and is strongly influenced by the measures that are implemented to manage access), it is properly being dealt with in the 2022 Master Plan. However, it can be said that the results of the analyses of this topic that have been done to date indicate that the number of likely visitors to the summit area will remain at a level where improved restroom facilities in the MKSR are appropriate. CMS is currently studying the most appropriate technologies and locations for these facilities. While not entirely the responsibility of UH, it is worth noting that all the astronomy facilities that continue operation beyond 2033 will use zero-discharge wastewater systems.

Improvements that are deemed appropriate and the zero-discharge conversions will be proposed as land uses and comply with the processes outlined in the 2022 Master Plan.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action now recognizes that "land uses," as defined in the Conservation District Rules, including restrooms and wastewater improvements, are correctly addressed in the 2022 Master Plan. The action now indicates UH will continue to assess potential improvements; implementation of resulting proposals will follow the 2022 Master Plan.

9.4.11 IM-11: ENCOURAGE SUSTAINABLE AND ENERGY-EFFICIENT TECHNOLOGIES

As described in detail in Section 3.6.2.11 of the 2021 OAR, UH is doing its utmost to encourage existing and new facilities within the UH Management Areas to maximize their use of sustainable, energy-efficient technologies. Prime examples of this include its formal "Sustainability Policy," which aims to achieve carbon neutrality, zero waste, and local food self-sufficiency, and Executive Policy 4.202 concerning "System Sustainability."

UH will continue to encourage designers to use sustainable and energy-efficient technologies for both existing and new facilities. Principal goals for this effort include:

- Reducing potable water use (e.g., at Halepōhaku separate gray wastewater from sewage waste and use gray water for habitat restoration irrigation).
- Reducing energy use (e.g., increase efficiency of HVAC systems, solar water heaters).
- Reducing the need for human operation and maintenance through programs for remote viewing and robotic operation.

Consideration of sustainable and energy-efficient technologies shall be encouraged through the Five-Year Outlook process for existing facilities and the proposal review process for all new facilities.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This action has been adapted to provide a specific goal and identify the process by which these technologies will be encouraged.

9.4.12 IM-12: CONDUCT ENERGY AUDITS AND IMPLEMENT RECOMMENDATIONS

As discussed in Section 3.6.2.12 of the 2021 OAR, UH has already completed energy audits for all its facilities on Maunakea and it has used the information obtained through these audits to develop measures that reduce energy usage at its facilities on Maunakea. CMS will continue to explore the potential for additional changes to UH facilities and encourage others to conduct audits to identify measures that would further reduce energy consumption. Similar to IM-11, this will continue to be done and encouraged for both existing and new facilities through the Five-Year Outlook process for existing facilities and the proposal review process for all facilities.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This action has been adapted to identify the process by which energy audits will be encouraged.

9.4.13 IM-13: INSTALL LOCALLY-BASED ALTERNATIVE ENERGY SOURCES AS OPPORTUNITIES ARISE

As outlined in Section 3.6.2.13 of the 2021 OAR, electricity produced by alternative energy sources is being substituted for electricity from fossil fuel-fired generators when opportunities arise. This will continue and additional sustainable generation possibilities will be identified and evaluated. When analyses indicate that they are beneficial, such equipment will be installed by UH, the astronomy facility operators, and others. In exploring the potential for additional sustainable energy use, UH will continue to consider both on-site sources and participation in renewable energy generation elsewhere equivalent to the amount used on Maunakea. Similar to IM-11, this will continue to be done and encouraged for both existing and new facilities through the Five-Year Outlook process for existing facilities and the proposal review process for all facilities.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This action has been adapted to identify the process by which the installation of alternative energy sources will be encouraged.

9.4.14 IM-14: CONDUCT WASTE AUDITS AND IMPLEMENT RECOMMENDATIONS

As discussed in Section 3.6.2.14 of the 2021 OAR, CMS is continuing to encourage the managers of its sublessees' facilities to conduct waste minimization studies and implement audit recommendations, when feasible. The information it receives from regular inspection reports and informal discussions that CMS staff members have had with users indicate a downward trend in the use of hazardous materials on Maunakea. Similar to IM-11, this will continue to be done and encouraged for both existing and new facilities through the Five-Year Outlook process for existing facilities and the proposal review process for all facilities.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This action has been adapted to identify the process by which waste audits will be encouraged.

CHAPTER 10 CONSTRUCTION GUIDELINES

10.1 INTRODUCTION

Section 7.3.2 of the 2009 CMP provides information and management actions focused on minimizing the direct and indirect impacts that construction activities related to large projects, including new buildings, site recycling, demolition, and site restoration, have on resources. The CMP construction guidelines supplement and complement, rather than replace, guidelines and mandates in other governing approvals and requirements so that these issues are considered early in the planning and development process. Information concerning the current status of the construction guidelines can be found in Section 3.7 of the 2021 OAR (Appendix A).

10.2 DESIRED OUTCOME

The "desired outcome" with respect to construction is to:

Minimize adverse impacts to resources during all phases of construction through use of innovative best management practices.

10.3 NEED

There is a need to implement best management practices (BMPs), which can consist of specifying the use of certain types of products at select location or identifying guidelines and procedures to be followed, to avoid or minimize adverse effects to resources during construction activities. Other important needs include: (*i*) gathering information needed to ascertain which BMPs are working and which are not; (*ii*) ensuring information obtained about Maunakea's resources during construction projects (e.g., subsurface conditions) is shared with UH and entered into databases; (*iii*) having an independent construction monitor present during construction activities; and (*iv*) monitoring construction work to ensure that contractors comply with permit conditions.

10.4 MANAGEMENT ACTIONS

As shown in Table 10.1, all nine of the CMP management actions related to construction guidelines are "ongoing", meaning that guidelines and procedures are in place and are being implemented. The nature of the work that is continuing is summarized in Sections 10.4.1 through 10.4.9.

Mgmt.			
Action	Description	Discussion	
GENERA	GENERAL REQUIREMENTS		
C-1	Require an independent construction monitor who has oversight and authority to ensure	10.4.1	
	that all aspects of construction comply with guidelines and permit requirements.		
BEST M	ANAGEMENT PRACTICES		
C-2	Require implementation of a UH-approved Best Management Practices Plan.	10.4.2	
C-3	Require implementation of a UH-approved Rock Movement Plan, when appropriate.	10.4.3	
C-4	Require contractors to provide information from construction activities to UH for input	10.4.4	
	into databases.		
C-5	Require on-site monitors (e.g., archaeologist, cultural resources specialist, invasive	10.4.5	
	species specialist) during construction, as determined by the appropriate agencies.		
C-6	Implement a SHPD-approved Archaeological Monitoring Plan, when appropriate.	10.4.6	
C-7	Educate construction personnel regarding the cultural landscape.	10.4.7	
C-8	Educate construction personnel regarding natural resources.	10.4.8	
C-9	Inspect construction equipment and materials for invasive species.	10.4.9	
Note: The exact wording of the management actions listed in the table has been revised from the 2009 CMP and the 2021 OAR to reflect the progress made to date, adaptation made based on the lessons learned, information collected, and input received. Source: Adapted from the 2021 OAR, Table 3.17.			

Table 10.1 Ongoing Management Actions Related to Construction Guidelines

10.4.1 C-1: REQUIRE AN INDEPENDENT CONSTRUCTION MONITOR

As discussed in Section 3.7.2.1 of the 2021 OAR, most of the construction projects that have been undertaken since the CMP was adopted have been small and did not involve the kind of ground-disturbing work that would require an independent construction monitor (ICM). However, an ICM has been present for two larger undertakings (*i*) the improvements made to VIS parking and other facilities at Halepōhaku, and (*ii*) the initial sitework for the TMT project.

UH will continue to require an ICM for proposals considered Type C per the process outlined in the 2022 Master Plan and may require an ICM for other proposal types when deemed appropriate. The ICM will:

- Be approved by the CMS Executive Director.
- Be knowledgeable in construction management and Maunakea's conditions and resources.
- Be funded by the project owner.
- Be present at the worksite as the ICM deem necessary and be readily available during all periods of construction (or deconstruction and restoration in the case of decommissioning projects), including, but not limited to: (*i*) delivery of construction materials to the project site or staging areas within the UH Management Areas; (*ii*) establishment of BMPs; and (*iii*) ground-disturbing activities.
- Monitor compliance with plans and specifications approved by UH (e.g., the BMP Plan), applicable rules and regulations, issued permits, and sublease and other agreement terms.
- Prepare weekly reports that are shared with UH and the project owner; the reports may also be shared with others, as deemed appropriate to the project.

The ICM may be a UH employee, a contractor or consultant, or other party agreeable to CMS Executive Director. The ICM cannot be an employee of the project owner or the project owner's prime contractor.

The ICM will have the authority to order that any or all construction activity within the UH Management Areas cease if and when, in the ICM's judgment, (*i*) there has been a violation of the terms or conditions of a permit that warrants cessation of construction activities or (*ii*) that continued construction activity will unduly harm natural or cultural resources (provided that the ICM's order to cease construction activities shall be for a period not to exceed seventy-two (72) hours for each incident). All orders to cease construction issued by the ICM shall be immediately reported to the Chairperson of BLNR and a designated UH representative.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Clarifications regarding the qualifications and responsibilities of the ICM were added to address uncertainties identified during recent projects.

10.4.2 C-2: REQUIRE A BEST MANAGEMENT PRACTICES PLAN FOR CONSTRUCTION

As outlined in Section 3.7.2.2 of the 2021 OAR, UH requires a BMP Plan for all construction projects. UH will continue to require that all projects prepare a BMP Plan, provide it to UH for review, and receive UH's acceptance of the plan prior to proceeding with construction activities within the UH Management Areas.

Project proposers bear all costs of preparing and implementing their BMP Plans. BMPs must:

- Incorporate applicable plans, guidelines, and SOPs that emanate from other CMP management actions (e.g., Maunakea Invasive Species Management Plan).
- Address all applicable C-# management actions.
- Capture all measures outlined in disclosure documents (e.g., EA or EIS) and permit applications.
- Where appropriate, include measures to minimize: (*i*) construction time (for example, by scheduling construction work so that, to the extent possible, the activity schedule includes concurrent work); (*ii*) water use; (*iii*) traffic; (*iv*) use and transport of toxic materials, including petrochemicals; (*v*) ground disturbance, graded area, and dust generation; (*vi*) noise; and (*vii*) threats related to invasive species.

UH will continue to assess the effectiveness of BMPs, based on ICM reports and other construction documentation.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time. Nevertheless, references to plans and guidelines developed since 2009 that should be considered in preparation of a BMP Plan were added.

10.4.3 C-3: REQUIRE A ROCK MANAGEMENT PLAN, WHEN APPROPRIATE

As described in Section 3.7.2.3 of the 2021 OAR, UH has and will continue to require a Rock Management Plan for all construction (including new development, maintenance activities, or site decommissioning) that involves excavation, grading, or other movement of rock material. The implementation of these plans has and should: (*i*) continue to minimize displacement of cinder during construction; (*ii*) result in cinder being stockpiled (so that it can be used for future

restoration projects) in a predetermined location rather than simply pushed out of the way, downslope; and (*iii*) eliminate side-casting of cinder or other materials into wēkiu bug habitat.

Rock Management Plans must be prepared by the project owner and reviewed and approved by UH prior to the project proceeding. The plans are required to:

- Document the location, type, and volume of source material and include separate discussions of native material (divided into cinder and other rock types) and imported material.
- Detail the extraction and movement process.
- Describe where excess native rock (cinder or otherwise) will be placed within the UH Management Areas. The designated location(s) must be included in the project area designated in permit applications and considered in the project's impact analysis. The location should also be accessible and previously disturbed.
- Address how the handling and storage of native rock will aid future site restoration, if applicable.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time. Nevertheless, clarifications regarding the intent and contents of a Rock Management Plan were added to address uncertainty identified during recent projects.

10.4.4 C-4: Require Contractors to Provide Information/Documentation for <u>Activities</u>

As discussed in Section 3.7.2.4 of the 2021 OAR, UH has been requiring contractors who perform work within the UH Management Areas to submit the required information, and it has maintained hard copy and/or electronic versions of that information in its files. It will continue to require that contractors submit: (*i*) BMP inspection forms; (*ii*) field logs and photographs; (*iii*) laboratory analysis, and (*iv*) other construction documentation that contain information on the biotic and abiotic environmental variables at the project site. Each project's BMP Plan (Section 10.4.2) must include a reporting section that provides a list of information likely to be produced and specify the method and format in which it will be provided to UH.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time. Nevertheless, references to a reporting section in a project's BMP Plan was added to avoid delays in management action compliance.

10.4.5 C-5: REQUIRE ON-SITE MONITORING DURING CONSTRUCTION

As reported in Section 3.7.2.5 of the 2021 OAR, the need for on-site construction monitors is determined by regulatory agencies (e.g., SHPD, DLNR, etc.) and the monitoring is focused primarily on those activities involving earth movement or disturbance. UH will continue to ensure that experts approved by the appropriate agency will monitor project activities as outlined in agency-approved monitoring plans. CMS anticipates that the following types of monitoring plans may be appropriate, depending on the project's scope and characteristics:

- Archaeological monitor who follows a project-specific Archaeological Monitoring Plan (AMP) that has been prepared by the project and approved by SHPD (see Section 10.4.6 for additional details). The archaeological monitor must work for a firm or be a scholar or organization that is identified by SHPD to be permitted to provide archaeological services in the State of Hawai'i.
- Cultural monitor who follows a project-specific Cultural Monitoring Plan that has been prepared by the project and approved by UH. The individual or firm providing cultural monitoring services will also be approved by UH.
- Invasive species monitor who follows a project-specific Invasive Species Monitoring Plan, prepared by the project, reviewed by UH and DLNR, and approved by UH.

These project-specific monitoring plans will be part of each project's BMP Plan (Section 10.4.2). The entities that implement these plans are identified and funded by the project proponents but are subject to the approvals outlined above, and, where applicable, must meet the qualification requirements of the appropriate agency (e.g., SHPD) as identified above.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Greater specificity has been added to address uncertainty regarding the types of monitors, the plans they will follow, and the approval of the monitor and plan.

10.4.6 C-6: REQUIRE AN ARCHAEOLOGICAL MONITORING PLAN

As stated in Section 3.7.2.6 of the 2021 OAR, archaeological monitoring has been conducted in accordance with SHPD guidance for all projects involving ground disturbance that have been initiated since the 2009 CMP was adopted. The project proponent will, in consultation with SHPD, establish whether archaeological monitoring is required during the project. If it is required, the project proponent will prepare an AMP and obtain SHPD approval of the plan prior to the start of any ground-disturbing work. Should any resources be encountered, the project proponent will strictly follow the provisions of the AMP.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time.

10.4.7 <u>C-7: Educate Construction Workers Regarding Historical and Cultural</u> <u>Significance</u>

Prior to entering the UH Management Areas, all construction personnel are informed of Maunakea's historical and cultural significance. That is done by: (*i*) successfully completing the same worker orientation program as astronomy facility employees, as outlined in CMP management action EO-2 (Section 5.4.3.1) and (*ii*) participating in a project kickoff meeting, or similar event, at which project-specific information, including information about the resources and cultural practices in the project area, are shared. Each BMP Plan (see Section 10.4.2) will include a section regarding how this education will be accomplished.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This action

has been adapted to specify the process that has been used since the CMP was approved to educate construction staff regarding historic and cultural aspects of their project area. It also now incorporates references to the orientation developed for workers on Maunakea.

10.4.8 <u>C-8: Educate Construction Workers Regarding Environment, Ecology, and</u> <u>Natural Resources</u>

Prior to entering the UH Management Areas, all construction personnel are informed of Maunakea's environment, ecology, and natural resources. That is done by: (*i*) successfully completing the same worker orientation program as astronomy facility employees, as outlined in CMP management action EO-2 (Section 5.4.3.1) and (*ii*) participating in a project kickoff meeting, or similar event, at which project-specific information, including information about the resources and cultural practices in the project area, are shared. Each BMP Plan (see Section 10.4.2) will include a section regarding how this education will be accomplished.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This action has been adapted to specify the process that has been used since the CMP was approved to educate construction staff regarding natural resources in their project area. It also now incorporates references to the orientation developed for workers on Maunakea.

10.4.9 C-9: INSPECT CONSTRUCTION EQUIPMENT AND MATERIALS

As discussed in Section 3.7.2.9 of the 2021 OAR, UH is fully implementing inspections and controls called for in this measure. This will continue and be part of the required project-specific Invasive Species Management Plan referenced in Section 4.4.2 and will be consistent with the Maunakea Invasive Species Management Plan (C. Vanderwoude, February 2015), including the inspection of construction equipment and materials. The person or firm conducting the monitoring and inspections will be a trained biologist, selected and funded by the project, and approved by UH and DLNR, as outlined in Section 10.4.5.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This action has been adapted to specify the process that has successfully been employed since the Maunakea Invasive Species Management Plan was approved and implemented.

CHAPTER 11 SITE RECYCLING, DECOMMISSIONING, DEMOLITION, & RESTORATION

11.1 INTRODUCTION

Section 7.3.3 of the 2009 CMP provides general guidance on-site recycling, decommissioning, demolition, and restoration for astronomy facilities in the UH Management Areas. Additional procedural guidance for demolition and site restoration is detailed in the *Site Decommissioning Plan Decommissioning Plan for Mauna Kea Observatories* (Sustainable Resources Group International, Inc., January 2010b). Information concerning the current status of site recycling and decommissioning can be found in Section 3.8 of the 2021 OAR (Appendix A).

11.2 DESIRED OUTCOME

The "desired outcome" with respect to site recycling, decommissioning, demolition, and restoration is:

To the extent possible, reduce the area disturbed by physical structures within the UH Management Areas by upgrading and reusing buildings and equipment at existing locations, removing obsolete facilities, and restoring impacted sites to predisturbed condition.

11.3 NEED

Each astronomy facility must identify what course of action they will pursue when the life expectancy of their facility is reached or when their lease/sublease expires. While UH will be responsible for overseeing compliance with the CMP, compliance with this section requires a collaborative effort between UH, DLNR, and the astronomy facility operators.

11.4 MANAGEMENT ACTIONS

As discussed in Section 3.8 of the 2021 OAR, the three CMP management actions related to site recycling, demolition, & restoration are "ongoing," meaning that guidelines and procedures are in place and are being implemented. The management actions are listed in Table 11.1 and discussed in Sections 11.4.1 and 11.4.2.

Mgmt.		
Action	Description	Discussion
SR-1	Require astronomy facilities to develop plans for reuse or removal in accordance with	11.4.1
	the Decommissioning Plan for the Mauna Kea Observatories (Sustainable Resources	
	Group International, Inc., January 2010b).	
SR-2	Require astronomy facilities to develop plans for site restoration in accordance with the	11.4.1
	Decommissioning Plan for the Mauna Kea Observatories (Sustainable Resources	
	Group International, Inc., January 2010b).	
SR-3	Require future astronomy facilities to consider decommissioning during project	11.4.2
	planning.	
Note: 7	The exact wording of the management actions listed in the table has been revised from the 2009 CMP and the 202	
	the progress made to date, adaptation made based on the lessons learned, information collected, and input rec	eived.
Source: A	Adapted from the 2021 OAR, Table 3.18.	

Table 11.1 Ongoing	Site	Recycling,	Decommissioning,	Demolition,	and	Restoration
Managem	ent A	ctions				

11.4.1 SR-1 AND SR-2: REQUIRE DECOMMISSIONING PLANNING

As discussed in detail in Section 3.8.2.1 of the 2021 OAR, UH is fully implementing the *Decommissioning Plan for the Mauna Kea Observatories* (Decommissioning Plan) (Sustainable Resources Group International, Inc., January 2010b). As detailed in Section 4.1.2 of the 2022 Master Plan, UH has committed to there being no more than nine operating astronomy facilities in the MKSR by the end of 2033.

As of the first quarter of 2022, there are 13 astronomy facilities present and a 14th astronomy facility permitted in the MKSR. Two of the 13 existing astronomical facilities (Hōkū Kea and CSO) have substantially completed the planning process specified in the Decommissioning Plan but have not obtained all the approvals needed to begin physically removing their facilities and restoring their sites. In addition, for reasons specified in the 2022 Master Plan, UH has notified the operator of the Very Long Baseline Array (VLBA) that its sublease will not be renewed and it will need to complete the decommissioning process before the end of 2033. Depending upon what transpires on Astronomy Site 13 (the permitted site for the TMT project), UH is committed to decommissioning either one or two additional astronomy facilities by the end of 2033 so that there will be no more than nine operating astronomy facilities in the MKSR by that time.

UH will continue to implement the procedures in outlined in the Decommissioning Plan, updating them as appropriate based on lessons learned during the decommissioning of Hōkū Kea and CSO, the first two astronomy facilities to decommission. CMS anticipates that they will update the Decommissioning Plan no later than mid-2024, soon after Hōkū Kea and CSO complete their decommissioning. The updated Decommissioning Plan will be in effect before operators of other facilities (e.g., VLBA and at least one other) need to begin preparing their decommissioning plans.³⁷

The preparation of the Decommissioning Plan was a condition of BLNR's approval of the CMP in 2009 and BLNR confirmed that UH successfully complied with that condition in 2010. As a result, the Decommission Plan has been referred to as a "subplan" of the CMP. Going forward the Decommissioning Plan, which provides detailed guidance regarding the SR-# management actions, will have the same standing as other plans that provide detailed guidance on the implementation of other management actions (e.g., the ISMP, MEOP, OMMP, etc.). The process

³⁷ Updating of the Decommissioning Plan may commence prior to Hōkū Kea and CSO receiving all their approvals if those approvals are delayed by contested case requests or other challenges.

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that CMS will follow in updating the Decommissioning Plan will be like the process UH follows when it updates other implementation plans/guidelines identified in this document. UH anticipates that this will entail the following steps: (*i*) preparing an updated document that reflects the lessons learned from the two decommissioning projects that are now underway in coordination with relevant agencies (e.g., OCCL, NAR, DLNR Land Division, SHPD, etc.); (*ii*) seeking input from the community, its advisory groups (e.g., MKMB, KKM, EC), and the Native Hawaiian community; (*iii*) revising its decommissioning procedures in response to the input and advice it receives; (*iv*) requesting that the UH Hilo Chancellor approve the revised plan; and (*v*) implementing the updated implementation plan once approved. The decommissioning procedures will be updated periodically following the same process if experience indicates updates would be beneficial.

UH anticipates that when the Decommissioning Plan is updated, it will retain the four fundamental components that are currently in place. Specifically, there will continue to be a requirement that facility operators: (*i*) submit a Notice of Intent to UH and DLNR; (*ii*) conduct Environmental Due Diligence; (*iii*) prepare and obtain approval of a Site Deconstruction and Removal Plan; and (*iv*) prepare and obtain approval of a Site Restoration Plan. The baseline for each decommissioning project will continue to be complete removal and full restoration.

It is envisioned that Decommissioning Plan updates will address such things as definitions, submittal content requirements and/or the level of detail required in certain decommissioning plan components, the planning process that is followed (to better align with the then-current proposal review process), and other details as informed by the lessons learned from previous decommissioning projects. UH envisions that it may be possible to streamline the approval process for projects that involve complete removal and full restoration.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Recognize that the Decommissioning Plan was developed, is being successfully implemented, and that the plan should be updated by the people most familiar with its implementation to date and have learned the most about decommissioning astronomy facilities on Maunakea: CMS.

11.4.2 SR-3: REQUIRE FUTURE FACILITIES TO CONSIDER DECOMMISSIONING DURING PLANNING

As outlined in Section 3.8.8.2 of the 2021 OAR, for many years UH has required the developers of new projects to address decommissioning during project planning and has included provisions for decommissioning funding in all subleases it has entered since the CMP was adopted. Accordingly, Item 10 in the "Sublease and Non-Exclusive Easement Agreement" between TMT International Observatory LLC and UH (which is the only new sublease that UH has issued since the CMP was adopted) deals specifically with what must be done as part of the decommissioning of that permitted facility. It specifies that upon termination the sublessee TMT must (at UH's sole option and at sublessee's sole cost and expense) either: (*i*) surrender the subleased area with all improvements existing or constructed thereon, or (*ii*) decommissioning Plan. UH will require entities seeking its approval for projects within the UH Management Areas to address decommissioning as part of their overall project planning and will require projects to commit to specific decommissioning terms in their subleases and/or other agreements.

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<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Reference the decommissioning provisions in the only sublease UH has entered since the CMP was approved and reinforce commitment that such provisions will continue to be a part of future agreements.

CHAPTER 12 CONSIDERING FUTURE LAND USE

12.1 INTRODUCTION

Section 7.3.4 of the 2009 CMP provided information and management actions related to future land use. Emphasizing that the CMP does not advocate or promote new telescope development but instead is aimed at managing resources, these recommended management actions are intended to proactively address issues related to the potential impacts that new land uses or activities could have on the resources. The term "future land use" is not confined solely to astronomy facility development but also encompasses such things as roadway improvements, additions to the Halepōhaku facilities, or a cultural facility such as a *hale* for Hawaiian navigation or astronomy. Information concerning the current status of future land use can be found in Section 3.9 of the 2021 OAR (Appendix A).

The CMP does not address development plan issues related to future astronomy facilities. Those, and other land use issues, are addressed in the 2022 Master Plan. The 2022 Master Plan also includes a proposal review process and design guidelines that are relevant to all land use proposals. Hence, the focus of this portion of the CMP is to guide the evaluation of proposed projects from the standpoint of potential impacts to the cultural landscape and natural resources, and to provide management actions that can be adopted by BLNR as special conditions in CDUPs that it may issue.

12.2 DESIRED OUTCOME RELATED TO FUTURE LAND USE

The "desired outcome" with respect to future land use is:

To protect the cultural landscape and natural resources in the assessment of future projects.

12.3 NEED

There is a need, during the project review process, for project proponents and UH to address siting and design considerations, so that proposed facilities have minimal impacts on the cultural landscape, natural resources, and on the astronomical value of the UH Management Areas. There is a concomitant need to ensure that the CMP and 2022 Master Plan are consistent and complementary when it comes to future land use scope, siting, design, review, and other considerations. The 2022 Master Plan takes the lead on setting land use guidance and the CMP management actions reflect provisions of the 2022 Master Plan and provide direction for entities that are developing land use proposals and direction for the UH management entity charged with reviewing and making recommendations and/or decisions related to land use proposals. Together, the CMP and 2022 Master Plan provisions are meant to ensure that new land uses result in minimal impacts to the cultural landscape, natural resources, and the astronomical qualities of the UH Management Areas.

12.4 MANAGEMENT ACTIONS

As discussed in Section 3.9 of the 2021 OAR and summarized in CHAPTER 2 of this document, six (6) of the seven (7) CMP management actions related to future land use are ongoing and one

(1) has been completed. 38 The six (6) ongoing management actions are listed in Table 12.1 and the nature of the work that is continuing is summarized in Sections 12.4.1 through 12.4.5.

Mgmt.		
Action	Description	Discussion
FLU-1	Address design guidelines presented in the 2022 Master Plan.	12.4.1
FLU-3	To facilitate future site restoration planning, require cataloging of site conditions prior	12.4.2
	to ground disturbance by the proposing entity.	
FLU-4	To facilitate assessment of potential visual impacts, require proposal-specific	12.4.4
	rendering.	
FLU-5	To facilitate assessment of potential impacts to the aeolian ecosystem, require airflow	12.4.4
	analysis on the design of structures proposed within or near wekiu bug habitat.	
FLU-6	Incorporate habitat mitigation plans into project planning process.	12.4.5
FLU-7	To minimize adverse impacts to the cultural landscape, require the use of zero-	12.4.1
	discharge waste systems for any future development and those facilities selected to	
	continue operating beyond 2033 in the MKSR.	
Note: 7	The exact wording of the management actions listed in the table has been revised from the 2009 CMP and the 202	
	the progress made to date, adaptation made based on the lessons learned, information collected, and input red	eived.
Source: A	Adapted from the 2021 OAR, Table 3.19.	

 Table 12.1 Ongoing Future Land Use Management Actions

12.4.1 FLU-1 AND FLU-7: 2022 MASTER PLAN DESIGN GUIDELINES

As described in Section 3.9.2.1 of the 2021 OAR, UH followed the design guidelines and proposal review process it established in the 2000 Master Plan in reviewing all the proposals that it has received to date. This includes the very detailed review of the TMT project.

The design guidelines and proposal review process have been updated and are found in Chapter 7 of the 2022 Master Plan. FLU-1 provides that UH will convey the design guidelines and the CMP to entities preparing proposals for land uses within the UH Management Areas and that UH and other entities proposing land uses there must address the 2022 Master Plan design guidelines in their proposals. They are also advised to carefully consider and address CMP management actions IM-11, IM-13, FLU-3, FLU-4, FLU-5, and FLU-6. Furthermore, FLU-7 specifically requires that UH and other entities proposing new facilities or continuing to operate existing facilities in the MKSR beyond 2033 follow the 2022 Master Plan design guideline concerning the use of zero-discharge waste facilities. The extent to which proposals address the design guidelines and are consistent with the CMP is a major factor in UH's evaluation of all proposals.

Overall, UH will continue to implement the 2022 Master Plan framework to minimize unnecessary habitat alteration and disturbance as new facilities and land uses are proposed (FLU-1). When it comes to astronomical facilities, UH will do this by: (*i*) limiting astronomy facilities within the MKSR to sites on which such facilities have already been developed and/or approved, and (*ii*) participating in each facility's site decommissioning process (SR-1 and SR-2), which addresses the restoration of previously disturbed areas.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). To maintain compatibility and consistency between the CMP and current Master Plan, this management action now references the 2022 Master Plan and its design guidelines. Because the 2022 Master Plan

³⁸ Only FLU-2, which called for UH to develop a map with land use zones in the Astronomy Precinct based on updated inventories of cultural and natural resources, has been completed, see Chapter 2.

design guidelines include the provision to use a zero-discharge waste system, FLU-1 and FLU-7 are now complementary and are discussed together.

12.4.2 FLU-3: CATALOGING SITE CONDITIONS

As discussed in Section 3.9.2.3 of the 2021 OAR, CMS maintains file copies of reports, permit applications, permit approvals, construction plans, and other documents related to the facilities that have been constructed within the UH Management Areas. Those constitute the best information available for use in establishing the original site conditions and provide a baseline for use during site restoration as called for in the site decommissioning process (SR-1 and SR-2).

As scientific and data recording techniques and methodologies have improved over the decades since the first astronomical facilities were constructed on Maunakea, pre-development site conditions are better known for the more recently developed sites than for the ones that were developed long ago. For example, in the case of the TMT project, which is the only astronomy facility permitted after the CMP was approved, its owner conducted high-resolution surface and aerial photography to document conditions prior to development and has also collected detailed geotechnical information for use in design. That information will be available when it is time to prepare a decommissioning plan for that project.

Because UH has, through the adoption of the 2022 Master Plan, committed to limiting astronomy facilities to sites that have already been developed and/or approved for astronomy use, the kinds of additional "baseline" information that can be gathered will be different from that available from locations that have never been disturbed. Nevertheless, UH will continue to require that entities proposing to develop new facilities or expand existing ones collect information regarding topography, substrate composition, surface features, and the presence/absence and densities of species present on the work area that may be relevant to decommissioning decisions and work. The entities submitting proposals are required to collect this information prior to conducting any ground-disturbing activity, to the extent possible. Such information must be generated by the proposing entity, submitted to UH, and retained by UH and the proposing entity for use when preparing site restoration plans.

Furthermore, UH will require all proposals that the 2022 Master Plan categorizes as "Type C" to conduct baseline surveys that consider the entire area of disturbance, including access and staging areas if they have not been utilized previously. It will recommend these inventories include a buffer area extending 500 meters (1,640 feet) away from all areas anticipated to be disturbed during construction.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time; however, greater specificity and examples have been added to the discussion and those measures in the NRMP that have been found to be effective/implementable have been incorporated.

12.4.3 FLU-4: REQUIRE VISUAL RENDERING

As described in Section 3.9.2.4 of the 2021 OAR, acting through the proposal review and approval process that has been in place since the 2009 CMP was adopted, UH has required visual renderings to be prepared for all new land use proposals that had the potential to affect view planes or other

aesthetics. It has then used this information in: (i) seeking input from advisory groups and the public and (ii) making project-related decisions as to the best means of minimizing adverse visual effects.

UH will continue to require parties submitting new land use proposals that have the potential to affect view planes or other aesthetics to provide with- and without-project visual renderings and analyses. It will also require that proposal proponents minimize adverse impacts to viewplanes and other aesthetics by using architectural designs, color schemes, and materials that address the 2022 Master Plan design guidelines and are sensitive to the surrounding landscape. Visual renderings are a required element of any Type C proposal and are included as part of the proposal review process for proposed land uses. Proposal-specific visual rendering and photographs of the existing view are required and will be used to facilitate analysis of potential impacts to the view-shed, including minimizing impacts to views from cultural areas and avoiding or minimizing views of facilities from down-slope communities (e.g., Waimea and Hilo). Thus, renderings should be prepared showing the proposal as it would be seen from, for example, (*i*) down-slope communities, (*ii*) the summit of Maunakea, (*iii*) the top of nearby pu'u, (*iv*) nearby areas of public gatherings, and (*v*) other locations identified by UH or the community as important viewpoints.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time.

12.4.4 FLU-5: REQUIRE AIRFLOW ANALYSIS

UH will continue to require that entities proposing to construct or substantially modify structures within or near wēkiu bug habitat analyze the effect that the proposed structure or earth modification would have on airflow and evaluate the effect (if any) that this is likely to have on aeolian ecosystems. Generally, such an analysis will be necessary when substantial new facilities or substantial modifications to existing facilities are proposed within or near cinder cone habitat within the MKSR, which is the preferred habitat of the wēkiu bug that feeds on insects that fallout of the aeolian winds. Thus, it is directed principally at proposals associated with Astronomy Sites 1 through 9.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time, but which proposals the requirement applies to is clarified.

12.4.5 FLU-6: INCORPORATE HABITAT MITIGATION PLANS INTO PROJECT PLANNING PROCESS

As discussed in Section 3.9.2.6 of the 2021 OAR, UH has incorporated a requirement for habitat conservation into its project planning process. This will continue and generally requires that areas disturbed during construction be restored to the extent possible.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time.

CHAPTER 13 OPERATIONS AND IMPLEMENTATION

13.1 INTRODUCTION

Section 7.4.2 of the 2009 CMP provides information and formulated management actions relating to operations and implementation of the CMP. While it recognizes that the CMP does not apply to other state lands on Maunakea, it notes that coordination with other entities will be required to implement the full range of management actions that it calls for, including emergency procedures. Information concerning the current status of operations and implementation can be found in Section 3.10 of the 2021 OAR (Appendix A).

13.2 DESIRED OUTCOME

The "desired outcome" with respect to operations and implementation is to:

Conduct effective operations to support management that is focused on resource protection, education, and public safety.

13.3 NEED

A strong operational foundation is needed to achieve management goals, including having sufficient funding, staffing, and facilities to implement the CMP management actions. Operations must comply with the various federal, state, and county laws and regulations that apply to the UH Management Areas and to the various activities and uses of the mountain. The importance of having a greater staff presence in the UH Maunakea Lands, as enforcers and resource managers, cannot be over emphasized. Day-to-day operations and implementation of the CMP will require that UH personnel and volunteers receive proper training in safety, emergency response, visitor orientation, and cultural landscape and natural resource protection.

13.4 MANAGEMENT ACTIONS

As outlined in Section 3.10 of the 2021 OAR and summarized in CHAPTER 2 of this document, work on two (2) operations and implementation management actions has been completed: OI-1, which called for maintaining local management, and OI-2, which called for a training plan to be developed. The three (3) other management actions are ongoing and listed in Table 13.1; the nature of the work that is continuing is summarized in Sections 13.4.1 through 13.4.3.

Mgmt.		
Action	Description	Discussion
OI-3	Maintain and expand regular interaction and dialogue with community members,	13.4.1
	surrounding landowners, and overseeing agencies to provide a coordinated approach	
	to resource management.	
OI-4	Address grievances through the established procedures.	13.4.2
OI-5	Update and implement emergency response plan.	13.4.3
Note:	The exact wording of the management actions listed in the table has been revised from the 2009 CMP and the 2019	
	the progress made to date, adaptation made based on the lessons learned, information collected, and input re	eceived.
Source:	Adapted from the 2021 OAR, Table 3.20.	

 Table 13.1 Ongoing Operations and Implementation Management Actions

13.4.1 OI-3: COORDINATE APPROACH TO RESOURCE MANAGEMENT

As discussed in Section 3.10.2.3 of the 2021 OAR, UH has worked and continues to work closely with neighboring landowners to coordinate its actions within the UH Management Areas with their activities. Specifically, it has: (*i*) formalized an agreement with DLNR-DOFAW and DLNR-NARS; (*ii*) coordinated closely with the Department of Hawaiian Home Lands; (*iii*) attempted to make its trail management efforts supportive of the Na Ala Hele Trail system's goals and objectives'; and (*iv*) coordinated with the Mauna Kea Watershed Alliance, whose members include the major adjacent landowners. These efforts will continue. This management action is a component of the "Outreach/Coordination Cluster" that is discussed in detail in Section 5.4.2 of this document.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action now recognizes that it is a component of the "Outreach/Coordination Cluster" which details coordination with the community, agencies, and non-government organizations, including any of those that are managing resources above 6,200 feet on Maunakea.

13.4.2 OI-4: ADDRESS GRIEVANCES

As outlined in Section 3.10.2.4 of the 2021 OAR, UH has established procedures that it believes allow everyone who is concerned with management of the mountain to air grievances and for UH to work constructively to resolve them. In addition to CMS' willingness to receiving written communications at any time, members of the public can inform UH of their grievances at the public MKMB meetings held monthly; those meetings are attended by the CMS Executive Director and the UH Hilo Chancellor, when they are available.

At the present time, the formal grievance procedure consists of the following:

- An individual or group makes their grievance known through written correspondence with CMS or through testimony at a public MKMB meeting.
- If the grievance concerns management issues or items within the jurisdiction of UH, the CMS Executive Director researches the issue; consults with UH leadership, staff, and advisory groups; and coordinates with the individual or group to bring the grievance to a resolution. If the grievance is not within UH's jurisdiction, UH informs the individual or group bringing the grievance and suggest they forward their grievance to the appropriate entity.
- If the grievance cannot be resolved within a month, updates are provided at subsequent MKMB meetings and CMS continues to seek input from MKMB until a decision/resolution is reached.
- The grievance and its resolution are documented in MKMB meeting minutes.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This action now specifies the process that has been used since the CMP was approved.

13.4.3 OI-5: UPDATE AND IMPLEMENT EMERGENCY RESPONSE PLAN

As outlined in Section 3.10.2.5 of the 2021 OAR, in cooperation with the various organizations that have facilities, activities, or responsibilities within the UH Management Areas, UH has established the *Maunakea Emergency Procedures* (OMKM, July 2019), a comprehensive set of emergency response procedures for Maunakea and will continue to implement those in its day-to-day management of the area. It will also continue to provide support for implementation of DLNR's 2011 *Wildfire Management Plan for Maunakea* (Beavers, June 2011).

The feedback received during preparation of the 2021 OAR did not indicate any dissatisfaction with the existing emergency response procedures. Accordingly, CMS will continue to follow them for the foreseeable future. As with other plans and guidelines, they may be updated from time to time based on lessons learned and new developments among the various organizations that have roles in the Maunakea Emergency Procedures.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action now references the plans that have been developed since the CMP was adopted.

CHAPTER 14 MONITORING, EVALUATION, AND UPDATES

14.1 INTRODUCTION

Section 7.4.2 of the 2009 CMP provided information and formulated management actions relevant to it monitoring, evaluation, and updates. The 2009 CMP was based on the state of knowledge as of December 2008 regarding the status of the resources, activity levels, and the most appropriate management actions. Recognizing that new information would become available, lessons would be learned during implementation, and that environmental conditions would likely evolve over time, it calls for the application of adaptive management principles that would allow resource managers to improve strategies and plans periodically. Information concerning the current status of monitoring, evaluation, and updates can be found in Section 3.11 of the 2021 OAR (Appendix A).

This document was prepared in part to fulfill the management actions in this chapter. As outlined below, it incorporates information learned, including information obtained through coordination with federal and state agencies and the local community in a way that is fully consistent with the adaptive management provisions of the CMP.

14.2 DESIRED OUTCOME

The "desired outcome" with respect to monitoring, evaluation, and updates is to:

Determine whether management actions are achieving the goals [desired outcomes] of the CMP and provide a process for improving and updating management strategies through evaluation and revisions of the CMP.

14.3 NEED

The CMP, like all management plans, needs to undergo regular review and update to reduce uncertainty and take advantage of (*i*) lessons learned during CMP implementation; (*ii*) new data and information from monitoring, ecosystem science, surveys, and traditional knowledge; and (*iii*) input from resource experts, Native Hawaiian cultural practitioners, agencies, and others familiar with particular resources. This is necessary to ensure that Maunakea's resources are afforded the best possible protection.

14.4 MANAGEMENT ACTIONS

As described in Section 3.11 of the 2021 OAR, all three of the CMP management actions related to monitoring, evaluation, and updates are "ongoing", meaning that guidelines and procedures are in place and are being implemented. The three management actions are list in Table 14.1 and the work that is continuing is summarized in Sections 14.4.1 and 14.4.2.

MONITORING, EVALUATION, AND UPDATES

Mgmt.		
Action	Description	Discussion
MEU-1	Post tracking and assessment metrics and provide annual Progress Reports to	14.4.1
	DLNR regarding management activities.	
MEU-2	Conduct regular evaluations and updates of the CMP utilizing adaptive	
	management means that address public input, incorporate lessons learned, and take	
	advantage of new data and information.	
MEU-3	Revise and update planning documents, including the master plan, leases, and	14.4.2
	subleases, to maintain compatibility and consistency between them and reflect	
	stewardship matters resolved with DLNR.	
Note: T	he exact wording of the management actions listed in the table has been revised from the 2009 CMP and the	
	the progress made to date, adaptation made based on the lessons learned, information collected, and inp	ut received.
Source: A	adapted from the 2021 OAR, Table 3.21.	

Table 14.1 Ongoing Monitoring, Evaluation, & Updates Management Action

14.4.1 MEU-1 AND MEU-2: CONDUCT CMP REPORTING AND UPDATING

As described in Section 3.11.2.1 of the 2021 OAR, UH has established and is implementing a comprehensive reporting system that provides the information needed to internally track and report to others the status of its efforts to fully implement the measures called for in the CMP. UH will continue this practice by:

- Developing, posting, and regularly updating tracking and assessment metrics (MEU-1). The following applies to these metrics:
 - Purpose: Keep those interested informed of UH's ongoing stewardship efforts.
 - Frequency: Information regarding each metric will be updated as warranted. Updates to each metric will occur at least every 6 months; however, it is envisioned that certain metrics will be updated nearly in real time.
 - Format: A "dashboard" will be developed and posted on the CMS website where each metric will be accessible.
 - Metrics: The metrics will be developed and refined based on the ability of the metric to (*i*) meaningfully illustrate stewardship progress or effort, (*ii*) relate to multiple aspects of CMP implementation, (*iii*) be readily measurable or otherwise scalable, (*iv*) address community input and interest, and (*v*) inform adaptations to management actions.

Examples of possible metrics include:

- The number of orientation video views.
- The number of vehicles entering the UH Management Areas.
- Number of facility, tours, and project inspections conducted that did/did not identify permit condition or sublease term violations.
- Pounds of invasive species and trash removed.
- Number of native species out planted.
- Number of vehicle and facility inspections conducted that did/did not identify the presence of invasive species.
- Number of stewardship events held that the community could participate in.

- Number of days access to the mauna was restricted for safety reasons or impossible due to weather conditions.
- Days since last incident that required emergency response.
- Preparing and submitting Progress Reports (MEU-1). The following applies to Progress Reports:
 - Purpose: Keep oversight agency (DLNR) informed of progress and future direction of the management program.
 - Frequency: Annually, submitted to DLNR by June 30 of each year, except on years that an OAR is prepared (the OAR will serve as the Progress Report the year it is prepared).
 - Content: Regarding the last calendar year, describe the management goals, objectives, and actions that go beyond UH's baseline/ongoing management actions and what progress was made toward meeting them. Describe the management goals, objectives, and actions for the coming year that go beyond UH's baseline/ongoing management actions; this will include a description of the goals, objectives, and actions carried forward from the previous year and the improvements planned to increase the likelihood of achieving/completing them over the following years. Report on the tracking and assessment metrics. The Progress Report is not intended to be a status report on the resources in the UH Management Areas nor is it meant to provide a detailed status update on every CMP management action.
 - Process: Prepared by UH with an opportunity for advisory groups to provide input, then UH submits to DLNR. If required by DLNR, UH will also make a presentation regarding its progress report to BLNR.
- Preparing, circulating, and submitting an Outcome Analysis Report (OAR) (MEU-2, evaluation step). The following applies to OARs:
 - Purpose: Same as the annual Progress Report but it is more comprehensive and is intended to objectively examine all aspects of the ongoing stewardship in a manner that informs adaptive management decisions related to the management actions.
 - Frequency: Roughly every five (5) years.
 - Content:
 - Part 1: Describe the state of the cultural landscape, natural resources, and astronomical resources by summarizing data collected and new information accumulated since the previous OAR was prepared; report on the tracking and assessment metrics and identify trends, if any, in the metrics and other data or information gathered; and summarize the apparent effects (positive, negative, neutral) that the management actions are having on the resources.
 - Part 2: Summarize the status of each management action (tabular summary acceptable).
 - Part 3: Summarize the progress toward meeting each of the desired outcomes; the UH management entity's strengths and weaknesses; relevant new laws, rules, regulations, and guidance documents that have come into effect since the last OAR; and concepts for how existing management actions may be adapted

and new management action may be added to make greater strides toward achieving the desired outcomes in the future.

- Process: UH prepare a Draft OAR; UH provide Draft OAR to advisory groups, DLNR, and neighboring landowners for review and comment; UH prepare a final OAR that addresses input received; and UH submit final OAR to DLNR.

Preparing, circulating, and submitting a CMP Supplement (MEU-2, updating step). The following applies to CMP supplements:

- Purpose: Implement an adaptive management approach to updating the CMP's management actions as informed by the OAR.
- Frequency: Immediately following the completion of an OAR.
- Content: Similar to this supplement, adapt the CMP management actions as informed by the information and analysis in the OAR. Native Hawaiian knowledge and methods as well as contemporary management tools will inform updates to existing and, potentially, the establishment of new management actions. Specifically, this will include knowledge accumulated through the implementation of NR-4 (Section 3.4.4) and the kānāwai principles discussed in the MKWG Report (Mauna Kea Working Group, December 2021). Other portions of the CMP will be supplemented as deemed appropriate. The OAR prepared before the supplement will be included as an attachment.
- Process: UH prepare a Draft CMP Supplement; UH announce the availability of the supplement for review to every entity on its mailing list; UH prepare a Final CMP Supplement that addresses input received; UH submits Final CMP Supplement to the BOR and then BLNR for approval/adoption.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Added a tracking and assessment metric program to address public and agency input. Also, provide a greater level of specificity regarding the various reports and the process for document development, review, and, when necessary, approval.

14.4.2 MEU-3: REVISE AND UPDATE PLANNING DOCUMENTS

As discussed in Section 4.10.1.2 of the 2021 OAR, UH has endeavored to keep the planning documents that govern land use within UH's Maunakea Lands consistent with the goals and objectives of the CMP, thereby promoting the responsible stewardship and use of UH Management Areas on Maunakea. Specifically:

• Provisions of the CMP have been a key element in formulating the 2022 Master Plan³⁹ and in negotiating terms of subleases.⁴⁰ These documents are consistent with, incorporate, and reference the CMP. If they are amended or updated, they should continue to be consistent with, incorporate, and reference the CMP.

³⁹ UH released the public review draft of the 2022 Master Plan on September 12, 2021, and the BOR approved the 2022 Master Plan on January 20, 2022; it will guide land use within the UH Maunakea Lands for 20 years.

⁴⁰ The only sublease approved since the adoption of the 2009 CMP has been the TMT sublease.

- Because UH and the other astronomy facility owners wish to continue astronomical activities on Maunakea beyond the end date of its current master lease, the BOR has informed the BLNR that it intends to seek a new land authorization. It anticipates that should a new land authorization be granted to UH, then all subsequent agreements between UH and the astronomy facilities will be consistent with, incorporate, and reference the CMP.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Specify the process that has been used since the CMP was approved and will continue.

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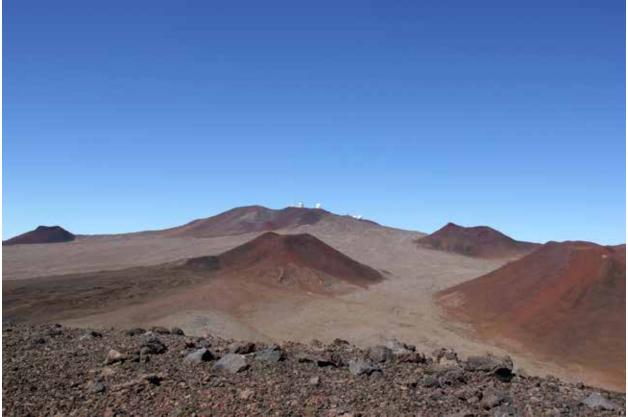
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Appendix A. 2021 Outcome Analysis Report

MAUNAKEA COMPREHENSIVE MANAGEMENT PLAN OUTCOME ANALYSIS REPORT

COMPREHENSIVE MANAGEMENT ACTION MEU-1



The summit region of Maunakea. Photo September 2013, J. Kirkpatrick, OMKM

AUGUST 2021

NOTE TO READERS

This report contains several hyperlinks that were created during the transition of management responsibility from the Office of Mauna Kea Management (OMKM) to the Center for Maunakea Stewardship (CMS). CMS is now in the process of updating the website where documents related to Maunakea management are kept. This will result in the OMKM hyperlinks used in this report becoming inactive once the files are migrated to the CMS website (see website note below).

The Office of Maunakea Management merged with Maunakea Support Services in August 2020, creating the <u>Center for</u> <u>Maunakea Stewardship</u>, which is responsible for UH-managed Maunakea lands. Please visit <u>the center's website</u> for more information. The migration of OMKM information to the Center for Maunakea Stewardship site is expected to be completed by the start of 2022.

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LIST OF ACRONYMS

ACT	Activities and Uses
AMOC	Atlantic meridional overturning circulation
AR	Astronomical Resources, Activities, and Uses
BLNR	Board of Land and Natural Resources
BMP	Best Management Practices
BOR	UH Board of Regents
BTP	Burial Treatment Plan
C	Construction Guidelines
CDUA	Conservation District Use Application
CDUP	Conservation District Use Permits
CIP	Capital Improvement Program
ClO	Chlorine monooxide
CMP	Comprehensive Management Plan
CMS	Center for Maunakea Stewardship
CPR	Cardiopulmonary resuscitation
CR	Cultural Resources
CSO	Caltech Submillimeter Observatory
CUA	Core Use Area
DBEDT	Department of Business, Economic Development & Tourism
DLNR	Department of Land and Natural Resources
DOFAW	Division of Forestry and Wildlife
DOCARE	Division of Conservation and Resources Enforcement
DoD	Department of Defense
EA	Environmental Assessment
EEV	Emergency Evacuation Vehicle
EIS	Environmental Impact Statement
EISPN	EIS Preparation Notice
EMS	Emergency Medical Service
ENSO	El Niño-Southern Oscillation
EO	Education and Outreach
ESA	Endangered Species Act
FLU	Considering Future Land Use
FR	Foraging range
GIS	Geographic Information Systems
HAR	Hawai'i Administrative Rules
HISC	Hawai'i Invasive Species Council
HP	Halepōhaku
HRS	Hawai'i Revised Statutes
HVO	Hawai'i Volcanoes Observatory
IfA	Institute for Astronomy

IM	Infrastructure and Maintenance
ISMP	Invasive Species Management Plan
ISS	International Space Station
KKM	Kahu Kū Mauna
LEED	Leadership in Energy and Environmental Design
LiDAR	Light Detection and Ranging
MCP	Management Component Plans
MEU	Monitoring, Evaluation and Updates
MKFR	Mauna Kea Forest Reserve
MKMB	Mauna Kea Management Board
МКО	Maunakea Observatories
MKSR	Mauna Kea Science Reserve
MKSS	Mauna Kea Observatory Support Services
MLS	Microwave Limb Sounder
NAR	Natural Area Reserve
NARS	Natural Area Reserve System
NHO	Native Hawaiian Organizations
NOI	Notice of Intent
NR	Natural Resources
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
OAR	Outcome Analysis Report
OCCL	Office of Conservation and Coastal Lands, DLNR
OHA	Office of Hawaiian Affairs
OI	Operations and Implementation
O&M	Operations and Maintenance
OMKM	Office of Mauna Kea Management
OMMP	Operations, Monitoring and Maintenance Plan
Р	Permitting and Enforcement
PCSI	Pacific Consulting Services, Inc.
PDO	Pacific Decadal Oscillation
PTA	Pōhakuloa Training Area, Army
RFI	Radio Frequency Interference
SHPD	State Historic Preservation Division, DLNR
SMILES	Superconducting Submillimeter-Wave Limb-Emission Sounder
SOP	Standard Operating Procedures
SPA	Site Plan Approvals
SR	Site Recycling, Decommissioning, Demolition, and Restoration
STEAM	Science Technology Engineering Art Math
STEM	Science Technology Engineering & Math
SUP	Special Use Permits
TCP	Traditional Cultural Property
TLS	Terrestrial Laser Scanning
TMT	Thirty Meter Telescope

Upper Atmosphere Research Satellite
University of Hawai'i
University of Hawai'i at Hilo
University Navstar Consortium
United States Geological Survey
Underground Storage Tank
Very Long Base Array

EXECUTIVE SUMMARY

In 2009, the Board of Land and Natural Resources (BLNR) approved the *Mauna Kea Comprehensive Management Plan* (CMP). The CMP, which is the principal guide for the management of the University of Hawai'i (UH) Management Areas, identifies 103 management actions related to the following four Management Component Plans (MCPs) and 12 "desired outcomes":

- Understanding and protecting Maunakea's resources (7.1)
 - Cultural resources (7.1.1; CR)
 - Natural resources (7.1.2; NR)
 - Education and outreach activities (7.1.3; EO)
 - Astronomical resources, activities, and uses (7.1.4; AR)
- · Managing access, activities, and uses
 - Activities and uses (7.2.1; ACT)
 - Permitting and enforcement (7.2.1; P)
- Managing the built environment (7.3)
 - Infrastructure and maintenance (7.3.1; IM)
 - Construction guidelines (7.3.2; C)
 - Site recycling, decommissioning, demolition, and restoration (7.3.3; SR)
 - Considering future land use (7.3.4; FLU)
- Managing operations (7.4)
 - Operations and implementation (7.4.1; OI)
 - Monitoring, evaluation, and updates (7.4.2; MEU)

This *Outcome Analysis Report* (OAR), which is based on the most current available data, provides the information called for in CMP management actions MEU-1 and MEU-2. It describes the status of the resources in the plan area, summarizes the work that has been conducted regarding each of the management actions in the CMP, and outlines the progress made toward meeting the CMP's stated goals (desired outcomes).

A draft of the OAR was circulated among stakeholders and agencies in order to: (*i*) inform them of the steps that UH has taken to date to implement the CMP's 103 management actions; (*ii*) solicit their opinions as to the success and value of those measures; and (*iii*) obtain their suggestions regarding any adjustments (i.e., revisions, deletions, or additions) to management actions they believe should be made moving forward. In general, UH attempted to consult with all the government agencies having direct responsibility for regulating uses on Maunakea and organizations that have operations within or immediately adjacent to UH's Maunakea lands. Because the focus was on parties having direct experience with management of activities on the mountain, the circulation was purposely kept narrower than the wide public distribution that is planned for the draft document outlining proposed updates to the CMP management actions which UH expects to issue in the fall of 2021.

All of the comments on the draft report that were received were reviewed and carefully evaluated, and revisions, where appropriate, are incorporated in this final report. CMS will use the information on program needs and recommended continuing and/or future management activities as UH finalizes its CMP progress report to DLNR and as the basis for adapting and/or adding CMP management actions in the years ahead.

This report is divided into the following chapters:

- · Chapter 1 presents background information and outlines the intended purpose of the OAR.
- Chapter 2 presents detailed information concerning the present state of the cultural and natural resources within the UH Management Areas and the implementation of the CMP management actions associated with the desired outcomes related to those two resource categories (CR and NR).
- Chapter 3 contains detailed discussion of the many other measures that UH has implemented in accordance with the CMP. Those measures are related to the other ten desired outcomes.
- Chapter 4 summarizes the extent to which the UH's efforts have been successful in achieving the CMP's stated goals and objectives (desired outcomes) and identifies areas where additional effort and/or a correction in course, i.e., adaptive management, may be appropriate.
- · Chapter 5 contains bibliographic references. This is followed by appendices which provide additional relevant information.

UH has made progress on nearly all the CMP's 103 management actions. Most importantly, in 2020 its efforts culminated in (*i*) the adoption of Hawai'i Administrative Rules (HAR) Chapter 20-26, *Public and Commercial Activities on Mauna Kea Lands* (the "UH Maunakea Rules" or "HAR Chapter 20-26"), and (*ii*) the recent creation of the Center for Maunakea Stewardship (CMS). As a result, UH is now in a better position to implement the CMP.

Overall, UH has made good progress toward achieving most of the CMP goals (desired outcomes) over the last ten years, including the governor's adoption of HAR Chapter 20-26, the Board of Regent's (BOR's) creation of CMS, and CMS's substantial progress in ongoing observatory decommissioning efforts. UH understands that some stakeholders believe that progress towards achieving management actions related to Native Hawaiian cultural resources and education and outreach are still inadequate, and the BOR, the President, and CMS are taking specific actions to address these issues.

As discussed in detail in this OAR and summarized in the table below, some management actions are complete after an express or implied action (e.g., preparation of a specific report) while other management actions (e.g., those requiring periodic and/or continuing action) are necessarily ongoing. UH has completed 15 of the CMP's management actions; no further action is needed for these.

Catagory	No. of	Status			D'		
Category	Actions	С	C/O	0	Discussion		
Cultural Resources (CR)		8	1	5	2.1		
Natural Resources (NR)	18	1	2	15	2.2		
Education and Outreach (EO)	8	-	1	7	3.2.2		
Astronomy Resource (AR)	2	-	-	2	3.3.2		
Activities and Uses (ACT)	12	1	6	5	3.4.2		
Permitting and Enforcement (P)	8	2	-	6	3.5.2		
Infrastructure and Maintenance (IM)	14	-	3	11	3.6.2		
Construction Guidelines (C)	9	-	-	9	3.7.2		
Site Recycling, Decommissioning, Demolition and	3	-	-	3	3.8.2		
Restoration (SR)							
Future Land Use (FLU)	7	1	-	6	3.9.2		
Operations and Implementation (OI)	5	2	1	2	3.10.2		
Monitoring, Evaluation, & Updates (MEU)	3	-	-	3	3.11.2		
All Actions	103	15	14	74			
Key: "C" = Completed: "C/O" = Program framework completed: implementation is ongoing: "O" = ongoing							

Status of Management Actions by Category

As indicated in the "C/O" column of the table above, fourteen (14) of the management actions required UH to first <u>establish</u> an implementation framework and/or detailed procedures and then <u>implement</u> those procedures over the long term. The framework and procedures for all of these are now in place, i.e., the "establishment" part has been completed, and all are now being implemented (hence their "ongoing" nature).

All the remaining management actions (74) have from the outset involved ongoing implementation effort (see the "O" column in table above). The staff and facilities needed to accomplish this are generally in place, although some have been adversely affected by constraints related to the ongoing COVID-19 pandemic and/or the need for input from other agencies. UH will continue to implement these measures, adapting them as appropriate when it determines that the desired outcome that each one targets could be better achieved through a modified approach that is informed by its experience to-date.

1 INTRODUCTION

1.1 BACKGROUND AND PURPOSE OF THIS REPORT

1.1.1 BACKGROUND

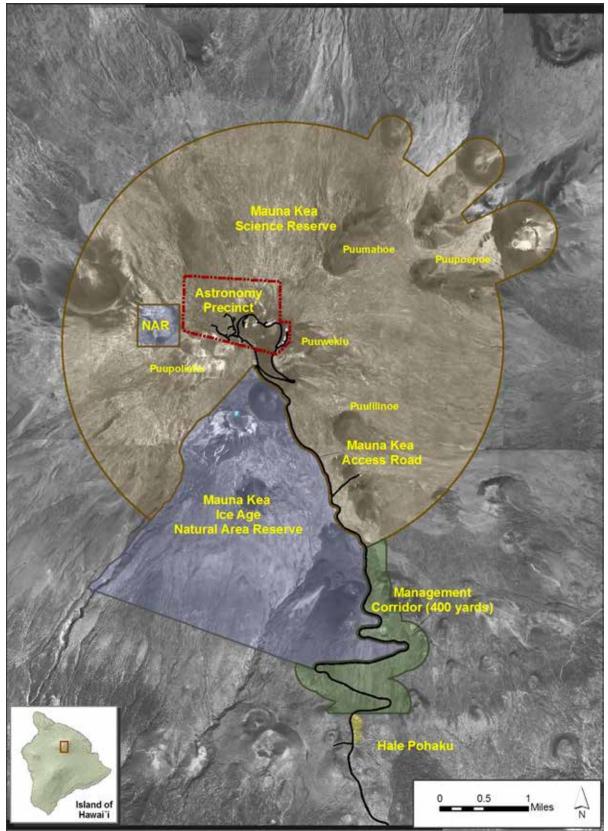
In April 2009, the Board of Land and Natural Resources (BLNR) approved, subject to conditions, the *Mauna Kea Comprehensive Management Plan* (CMP), an exhaustive and overarching plan guiding UH's administration of the "UH Management Areas." On March 25, 2010, the BLNR approved the four sub-plans (together, the "Sub-Plans") on which its approval of the CMP had been conditioned, thereby bringing the CMP into full effect. The CMP and Sub-Plans provide a framework for ensuring proper stewardship of the UH Management Areas. As used in this *Outcome Analysis Report* (OAR), "CMP" is inclusive of all five documents approved by the BLNR:

- The Mauna Kea Comprehensive Management Plan, UH Management Areas document dated April 2009.
- The Natural Resources Management Plan for the UH Management Areas on Mauna Kea document dated September 2009.
- The A Cultural Resources Management Plan for the University of Hawaii Management Areas on Mauna Kea, Ka'ohe Ahupua'a, Hāmākua District, Hawai'i Island, State of Hawai'i document dated October 2009.
- The *Public Access Plan for the UH Management Areas on Mauna Kea* document dated January 2010.
- The Decommissioning Plan for the Mauna Kea Observatories document dated January 2010.

The Office of Mauna Kea Management (OMKM) was the entity performing day-to-day implementation of the CMP during most of the period covered by this document, i.e., until the UH Board of Regents (BOR) approved the creation of the Center for Maunakea Stewardship (CMS) on August 20, 2020, at which time the transition from OMKM to CMS began. UH Management Areas during the period this document covers consisted of the following lands (see Figure 1-1):

- TMK 4-4-015:009, designated the Mauna Kea Science Reserve (MKSR) and leased to UH. The parcel is roughly 11,288 acres in size.
- TMK 4-4-015:012, known as Halepōhaku or the mid-level facilities and leased to UH. The parcel is roughly 19 acres.
- A portion of TMK 4-4-015:001, which is part of the Mauna Kea Forest Reserve, over which UH has a non-exclusive easement for the Mauna Kea Access Road. The easement encompasses roughly 71 acres.





Source: Figure 3-1, Maunakea Comprehensive Management Plan

A 400-yard-wide corridor on either side of the Mauna Kea Access Road (except for portions of this corridor which fall within the Mauna Kea Ice Age Natural Area Reserve), which amounts to a roughly 670-acre portion of TMK 4-4-015:001 over which UH does not have any lease or easement. This corridor was originally included in the UH Management Areas in the Revised Management Plan for the UH Management Areas on Mauna Kea, dated March 10, 1995, and approved by the BLNR.

The CMP does not apply to areas not defined as UH Management Areas, although UH has actively sought coordination and consultation with neighboring landowners such as BLNR, DHHL, and others, since species and cultural resources, for example, know no boundaries.

<u>1.1.2</u> <u>PURPOSE OF THIS OAR</u>

The CMP recommends management actions related to cultural resources; natural resources; education and outreach activities; astronomical resources, activities, and uses; permitting and enforcement; infrastructure and maintenance; construction guidelines; site recycling, decommissioning, demolition and restoration; future land use; operations and implementation; and monitoring, evaluation and updates. As stated on page 2-4 of the CMP, all the management actions were formulated in recognition that:

- 1. Mauna Kea is a culturally significant site.
- 2. The high elevation areas of Mauna Kea represent a unique global resource that should be preserved for future generations.
- 3. Management activities will be focused on limiting the impacts of human activities on cultural and natural resources.
- 4. The planning and execution of resource management programs will involve input from the larger community (e.g., managers, scientists, educators, cultural practitioners, and the public).

This OAR, which is based on the latest information available to its authors, provides the information called for in CMP management action MEU-1. It describes the status of the resources in the plan area, summarizes the work that has been conducted regarding each of the management actions in the CMP, and outlines the progress made toward meeting the CMP's stated goals (the "desired outcomes"). As required by the CMP, this OAR synthesizes information contained in the annual reports that the Office of Mauna Kea Management (OMKM), and in 2021 the Center for Maunakea Stewardship (CMS), has submitted to the BLNR each year since the CMP was adopted, with some additional information being included as appropriate.¹

CMS will use the information contained in this report to decide: (*i*) how best to adapt the measures it is presently implementing to better accomplish the desired outcomes of the CMP and (*ii*) to determine what, if any, additional actions it may be appropriate to implement.

¹ On August 20, 2020, the Board of Regents approved the creation of CMS which replaces OMKM. CMS is responsible for OMKM activities prescribed in governing plans and documents in addition to other responsibilities.

1.2 MANAGEMENT REPORTING

CMP management action MEU-1 calls for both annual reports and this periodic OAR (which the CMP also refers to as a "Progress Report" or a "Resource Status and Management Progress Report"). As summarized in Table 1.1, UH has submitted a total of eleven annual reports to the BLNR to date (see http://www.malamamaunakea.org/management/comprehensive-management-plan). Each annual report is cumulative, building on the previous year's report. Thus, for example, the 2020 Annual Report, which is reproduced in Appendix A, discusses all the CMP management activities conducted between the time the CMP was approved and the end of the previous calendar year (i.e., December 31, 2019).

Report Title	Report Date
2010 Annual Report	April 8, 2011
2011 Annual Report	April 8, 2012
2012 Annual Report	April 9, 2013
2013 Annual Report	April 9, 2014
2014 Annual Report	April 9, 2015
2015 Annual Report	April 30, 2016
2016 Annual Report	September 2017
2017 Annual Report	August 2018
2018 Annual Report	August 2019
2019 Annual Report	June 2020
2020 Annual Report	February 2021
OAR (2021 Annual Report)	August 2021

 Table 1.1
 Annual CMP Status Reports to BLNR

This OAR was prepared in accordance with the following guidance contained in the portion of the CMP that describes the updating and revision process (see MEU-1 on page 7-65). This is the first OAR prepared and approved by the University; it builds on the cumulative annual reports listed above and serves as the 2021 Annual Report.

Five-Year Outcome Analysis Report

In preparation for the CMP five-year revision, OMKM shall prepare a Five-Year Progress Report that describes the state of the resources, the status of the various management programs, progress towards meeting CMP goals, and other relevant information. This report should be based on information obtained from Progress Reports, and any other pertinent sources.

The first section of the Five-Year Progress Report will discuss the state of the cultural and natural resources in the UH Management Areas. This section will summarize data collected during monitoring, research, restoration, and threat prevention and control activities conducted over the preceding five years.

This portion of the report will analyze trends in cultural and natural resources, and the impacts (positive, negative, or neutral) that management actions have had on them. It will also summarize what future management actions are needed to protect, enhance, or restore Mauna Kea's natural resources.

The second section of the Five-Year Progress Report should include a summary of the progress of the programs towards meeting management goals, objectives, and actions, as outlined in the CMP. This analysis will be based on information in the annual progress reports from the last five years.

The report will be reviewed and approved internally and will then be submitted to the stakeholders and agencies participating in the review process, allowing ample time before the meeting for the agencies to review it. This report, along with feedback received from stakeholders, will be used to conduct the five-year update of the CMP.

As noted above, the CMP mandates that this progress report contain two specific sections. The first of these, which discusses the state of cultural and natural resources in the UH Management Areas, is presented in Chapter 2 of this OAR. The second, which describes the progress that has been made towards meeting the CMP's management goals, is addressed in Chapter 4 of this OAR. In addition to these two required sections, this OAR contains an additional chapter, Chapter 3, that summarizes UH programs and assesses UH's work on CMP management actions other than those related directly to cultural and natural resources. Chapter 5 contains bibliographic references.

Management action MEU-2 of the CMP details the update and revision process for the CMP. It calls for stakeholders to be given a copy of this OAR so that they are aware of the current status of the mountain's resources and of the successes, failures, and ongoing activities, of the CMP-related programs and activities. Comments received on program needs and recommended continuing and/or future management activities will then be addressed as UH continues to adaptively manage implementation of the CMP.

Finally, UH submits an annual report to the State Legislature on the Mauna Kea Lands, pursuant to HRS § 304A-1905. This annual legislative report addresses land activities, current and pending lease agreements and fees, the status of current and pending administrative rules, income and expenditures of the Mauna Kea Lands special fund established in HRS § 304A-2170, and other issues that may impact the activities on Maunakea. Content from these annual legislative reports is included in this OAR only where it is relevant to the CMP.

2 STATE OF RESOURCES

As part of the CMP review process, CMS has reviewed the results of the monitoring, research, and studies that OMKM and its contractors have conducted since the CMP was prepared so that it could consider any new information regarding the state of the resources that might warrant changes (e.g., adaptations and additions) in management approaches and activities. This chapter summarizes the results of that review. Each of the major sections is divided into the following three subsections that address MEU-1's requirements:

- New information obtained, via monitoring, research, restoration, and threat prevention and control activities, since the CMP was approved.
- · Discernable trends and management impacts since related CMP management actions began.
- Future management actions related to the topic. Changes to the management approach and activities are touched on here but will be the subject of a separate document, which is the next step in the CMP update process.

The major subsections in this chapter are related to the resources (cultural, physical, biotic) and the management actions that specifically address them (i.e., the "CR-" and "NR-" coded actions in the CMP). Other management actions, including (but not limited to) those related to education and outreach (EO) and activities and uses (ACT), have the potential for wide-ranging secondary beneficial and adverse effects on these resources. For instance, education and outreach actions that inform people how to respect, protect, and conserve the resources should reduce adverse impacts to all resources discussed in this chapter. While there is limited pre-CMP data against which to compare the post-CMP situation, overall, it is believed that the totality of the management actions has benefitted and continues to benefit the resources discussed in this chapter.

Future management actions in non-CR and NR-coded categories, such as (but not limited to) future actions stemming from an update of the managed access policy (ACT-1), will also have secondary effects on the resources discussed in this chapter. Future non-CR and non-NR-coded management actions are addressed in other chapters of this report. UH will adjust, adapt, and potentially add management actions in coordination with stakeholders during the next step in the CMP update process.

2.1 NATIVE HAWAIIAN CULTURAL RESOURCES

The CMP summarizes cultural resources (historic properties and archaeological resources) that were known to be situated within the UH Management Areas at the time it was prepared. It then recommends 14 management actions related to cultural resources (CR-1 through CR-14). The remainder of this section describes new information related to native Hawaiian cultural resources that has emerged since the CMP was adopted (see sub-section 2.1.1), discusses discernible trends related to cultural resources (sub-section 2.1.2), and describes the status of the implementation of management measures related to native Hawaiian cultural resources (sub-section 2.1.3). As indicated in sub-section 2.1.4, while management actions related to cultural resources will continue to evolve in response to changing circumstances, no entirely new management actions are needed at this time.

2.1.1 NEW INFORMATION RELATED TO NATIVE HAWAIIAN CULTURAL RESOURCES

Archaeological surveys, monitoring reports, and other reports or publications dealing with historic resources that have become available since the CMP was adopted are listed in Table 2.1. A few of the most significant products are the *Long-Term Historic Property Monitoring Plan*, which DLNR's State Historic Preservation Division (SHPD) approved in 2014, and a *Burial Treatment Plan* (BTP), which SHPD approved on July 11, 2014.²

Report	Author	Year
Archaeological Inventory Survey of the Astronomy Precinct in the Mauna Kea	PCSI	2010
Science Reserve, Ka'ohe Ahupua'a, Hāmākua District, Island of Hawai'i.		
Archaeological Inventory Survey of the Mauna Kea Access Road Management	PCSI	2010
Corridor, Kaʻohe Ahupuaʻa, Hāmākua District, Island of Hawaiʻi.		
Historic Resources Inventory of the Comfort Station (Stone Outhouse) at	PCSI	2010
Halepōhaku, Site # 50-10-23-9076		
Historic Resources Inventory of the Halepōhaku Rest Camp (Stone Cabins) at	PCSI	2010
Halepōhaku, Site # 50-10-23-9074		
Historic Resources Inventory of the Halepōhaku Rest Camp (Stone Cabins) at	PCSI	2010
Halepōhaku, Site # 50-10-23-9075		
Archaeological Inventory Survey of the Hale Pohaku Rest Houses 1 and 2 and	PCSI	2010
Comfort Station, Kaʻohe Ahupuaʻa, Hāmākua District, Hawaiʻi Island, Hawaiʻi.		
230Thorium Dating of Toolstone Procurement Strategies, Production Scale and	McCoy, P.C.,	2012
Ritual Practices at the Mauna Kea Adze Quarry Complex, Hawai'i. Journal of the	Nees, R.,	
Polynesian Society, Vol 121 (4): 407-420. https://doi.org/10.15286/jps.121.4.407-	Weisler, M.I.,	
420.	Zhao, J.	
2012 Assessment of Historic Properties Within Three University of Hawai'i	PCSI	2013
Management Areas on Maunakea, Ka'ohe Ahupua'a, Hāmākua District, Hawai'i		
Island, State of Hawai'i. Prepared for OMKM: Hilo, HI.		
Final Report Archaeological Inventory Survey of the Mauna Kea Ice Age Natural	PCSI	2013
Area Reserve, Kaʻohe Ahupuaʻa, Hāmākua District, Island of Hawaiʻi, Vol. 1-4.		
[(Not OMKM Sponsored, but funded using the Mauna Kea Lands Special Fund)]		
Revised Draft Report: 2012 Assessment of Historic Properties Within Three	PCSI	2013
University of Hawai'i Management Areas on Maunakea, Ka'ohe Ahupua'a,		
Hāmākua District, Hawai'i Island, State of Hawai'i. Prepared for OMKM: Hilo, HI.		
Long-Term Historic Property Monitoring Plan for the University of Hawaii	PCSI	2014
Management Areas on Mauna Kea, Ka'ohe Ahupua'a, Hāmākua District, Hawai'i		
Island, State of Hawai'i.		
2013 Assessment of Historic Properties Within Three University of Hawai'i	PCSI	2014
Management Areas on Maunakea, Kaʻohe Ahupuaʻa, Hāmākua District, Hawaiʻi		
Island, State of Hawai'i. Prepared for OMKM: Hilo, HI. Yearly Monitoring Report		
#2 (2013)		
Burial Treatment Plan for Burial Sites in the Mauna Kea Science Reserve and the	PCSI	2014
Mauna Kea Access Road Corridor, Ka'ohe Ahupua'a, Hāmākua District, Island of		
Hawai'i.		

² The *BTP* provides long-term preservation guidance on the 34 known, suspected, or potential burial sites found on the UH Management Areas. The plan also recommends 200-foot buffer zones and restoration guidelines should human remains become exposed and provides guidelines for the treatment of newly discovered burials or reburials sites to ensure consistency with state mandates and to addresses cultural concerns. Protocols identified in this OAR have been implemented on several occasions when human remains were uncovered through natural erosion processes.

Report	Author	Year
A Re-examination of Kenneth P. Emory's Theory of Necker Type Marae in the	P.C. McCoy, &	2014
Summit Region of Mauna Kea, Hawaii: Many Marae or Shrines Later. Hawaiian	R. Nees	
Archaeology, 27-50.		
Geochemistry and Technology of Basaltic Glass Artifacts from an Embedded	McCoy, P.C.,	2015
Source and Two High-altitude Base Camps in the Mauna Kea Adze Quarry	M.I. Weisler,	
Complex, Hawai'i. Journal of Pacific Archaeology, Vol. 6 (2): 1-20.	E.J. St Pierre,	
http://pacificarchaeology.org/index.php/journal/article/view/153.	R. Holhar, Y.	
	Feng.	
2014 Assessment of Historic Properties Within Three University of Hawai'i	PCSI	2015
Management Areas on Maunakea, Ka'ohe Ahupua'a, Hāmākua District, Hawai'i		
Island, State of Hawai'i. Prepared for OMKM: Hilo, HI.		
2015 Assessment of Historic Properties Within Three University of Hawai'i	PCSI	2016
Management Areas on Maunakea, Kaʻohe Ahupuaʻa, Hāmākua District, Hawaiʻi		
Island, State of Hawai'i. Prepared for OMKM: Hilo, HI.		
2016 Assessment of Historic Properties Within Three University of Hawai'i	PCSI	2017
Management Areas on Maunakea, Ka'ohe Ahupua'a, Hāmākua District, Hawai'i		
Island, State of Hawai'i. Prepared for OMKM: Hilo, HI.		
Proceedings of a 2013 USGS workshop on combining traditional Hawaiian	Kauahikaua and	2017
knowledge with scientific thought published. Focus is on Kīlauea volcano, although	Babb (eds.)	
examples from Maunakea are included.		
2017 Assessment of Historic Properties Within Three University of Hawai'i	PCSI	2018
Management Areas on Maunakea, Ka'ohe Ahupua'a, Hāmākua District, Hawai'i		
Island, State of Hawai'i. Prepared for OMKM: Hilo, HI.		
2018 Assessment of Historic Properties Within Three University of Hawai'i	PCSI	2019
Management Areas on Maunakea, Ka'ohe Ahupua'a, Hāmākua District, Hawai'i		
Island, State of Hawai'i. Prepared for OMKM: Hilo, HI.		
2019 Assessment of Historic Properties Within Three University of Hawai'i	PCSI	2020
Management Areas on Maunakea, Ka'ohe Ahupua'a, Hāmākua District, Hawai'i		
Island, State of Hawai'i. Prepared for OMKM: Hilo, HI.		
2020 Assessment of Historic Properties Within Three University of Hawai'i	PCSI	2020
Management Areas on Maunakea, Ka'ohe Ahupua'a, Hāmākua District, Hawai'i		
Island, State of Hawai'i. Prepared for OMKM: Hilo, HI.		
Source: Office of Maunakea Management		

Annual monitoring of historic properties, which began in 2012 and is ongoing, has documented the alteration to certain sites and recorded new find spots.³ The monitoring results are summarized in Table 2.2. Annual reports detailing these efforts have been submitted to SHPD after consultation with the Kahu Kū Mauna Council on management action recommendations.

In addition to the new information that has been gained through the monitoring summarized in the "Assessment" reports listed in Table 2.1, other new information related to archaeological resources has been gathered since the CMP was approved.⁴ For example, an archaeological inventory survey of the 400-yard wide easement along the Mauna Kea Access Road undertaken by PCSI for OMKM in 2009 (McCoy et al. 2010b) identified one previously recorded site (50-10-23-10314) and three new sites (see Table 2.3 below); forty-four (44) find spots were also recorded during the survey.

³ "Find spots" are defined as "anthropogenic features that are either obviously modern (e.g., camp sites with tin cans, pieces of glass and other modern material culture items), or features that cannot be classified with any level of confidence as historic sites because of their uncertain age and function (e.g., a pile of stones on a boulder)" (McCoy 1999).

⁴ This information is obtained from the items listed in Table 2.1.

About half of the find spots were on top of a cinder cone just above Halepōhaku, which is not surprising given the proximity of that area to locales frequented by the public.

	No.	No.	Changes Observed		
Year	Sites Visited	Sites w/ Changes	Human Impact	Natural Processes	
2012	52	10	• 3 sites, features rearranged, all <0.3 mile from road (VLBA area)	 5 sites, natural erosion, all at Pu'umakanaka 	
2013	51	7	 3 sites, features rearranged, all <0.3 mile from road (Park2/VLBA) 	• 2 sites, lithics not found, <0.4 miles from road (VLBA)	
2014	49	10	 2 sites, features rearranged, all <0.3 mile from road (VLBA) 	• 6 sites, 2 bldgs @ HP, 4 natural erosion – 1 @ HP, 3 @ VLBA	
2015	199	5	 3 sites, features rearranged, all <0.9 mile from road (VLBA and N. Plateau) 	 2 sites, 1 bldg @ HP, 1 natural erosion @ Pu'umakanaka 	
2016	112	10	 4 sites, features rearranged/ removed, all <0.3 mile from road (VLBA and Pu'uwēkiu) 	 6 sites, 3 bldgs @ HP, 3 natural erosion @ Pu'umakanaka 	
2017	61	12	 4 sites, features rearranged/ added; all <0.3 miles from road (CSO, Park 2, VLBA) 	 8 sites, 3 bldgs @ HP, 5 natural erosion @ Pu'umakanaka 	
2018	57	7	 2 sites, features rearranged/ added, all <0.3 miles from road (CSO, VLBA) 	 5 sites, 3 bldgs @ HP, 2 natural erosion @ VLBA & Pu'umakanaka 	
2019	16	2	• 2 sites, features rearranged/ offerings left, all <0.3 miles from road (TMT, Pu'uwēkiu)	• 0 sites	
2020	95	0	• 0 sites	• 0 sites	
Note:	Number of	sites visited in	2019 reduced due to road blockages.		

Table 2.2. Changes Observed During Annual Monitoring of Historic Properties

Source: Reports summarizing annual assessment of historic properties within the UH Management Areas by PCSI.

Table 2.3 Historic Properties Recorded in the Mauna Kea Access Road Corrid	Table 2.3	Historic Properties	s Recorded in the Mauna	Kea Access Road Corrido
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		Number of	
Site No.	Site Type	Features	Site Function
50-10-23-10314	Lithic scatter	1	Adze and octopus lure sinker workshop
50-10-23-27867	Mounds	4	Possible burial
50-10-23-27868	Mound	1	Possible burial
50-10-23-27869	Mounds	2	Possible burial

During the large-scale protests that took place on Maunakea in reaction to the start of the Thirty Meter Telescope (TMT) project construction, protesters erected many temporary ahu and other structures. Most of these were removed following the protest period in accordance with approved, CMP-identified guidelines and policies, and no formal documentation of them exists.

2.1.2 DISCERNABLE TRENDS RELATED TO CULTURAL RESOURCES⁵

2.1.2.1 General

The CMP recognizes that Maunakea is a living resource and that Native Hawaiians exercise customary and traditional practices within the UH Management Areas. It also identifies the valued

⁵ As used here, the term "cultural resources" has the same meaning as is laid out in the Chapter 5 of the CMP, which contains an extensive discussion of the term. It includes principles of Hawaiian Cultural Resource Management, cultural land use practices,

cultural, historical, and natural resources, including rights customarily and traditionally exercised for subsistence, cultural, and religious purposes within the UH Management Areas. The CMP describes the threats or impacts to these valued resources by uses and activities within the UH Management Areas and identifies the management actions to be taken by the stewards of the land to reasonably protect these valued resources.

Management of Maunakea has improved greatly since the Hawai'i State Auditor's 1998 *Audit of the Management of Mauna Kea and the Mauna Kea Science Reserve* (Report No. 98-6) as shown in follow-up audits by the State Auditor in 2005 (Report No. 05-13), 2014 (Report No. 14-07), 2017 (Report No. 17-06), and 2019 (Report No. 19-15). The adoption and implementation of the CMP and creating OMKM, MKMB, and KKM spurred many of these improvements. However, for many Native Hawaiians, Maunakea's sacredness and perceived disrespect from past actions on Maunakea have grown. In addition, Maunakea has become a symbol for larger social movements aimed at restoring Native Hawaiian self-determination.

The activities conducted on Maunakea and perception of its relevance to larger social movements have changed in many ways since the CMP was adopted, which affects stewardship and management. For example:

- For many, Maunakea has become the focal point of longstanding historical injustice experienced by Native Hawaiians. Larger issues have entered the discourse, including social equity and the place of cultural 'ike (knowledge) and practice in land use decisions and stewardship activities statewide that integrate the held value for sanctity of place. This has led to movements arguing the inequity and inappropriateness of specific projects. The most notable being the physical blockade of the Mauna Kea Access Road in protest against the TMT project in 2014, 2015, and again during 2019 and early 2020. Activities aimed at stopping the construction of TMT in 2019 included daily protocols at a blockade that stopped entry to UH Management Areas and frequent protocols within the UH Management Areas.
- This increased attention has led to a modest but measurable increase in cultural activities on Maunakea. It is not always clear that these activities are specifically customary and traditional practices. Still, it appears that the voices emphasizing the sanctity of place may be contributing to the exercise of spiritual practice within the UH Management Areas more generally.⁶
- Maunakea Rangers report that the number of Native Hawaiian individuals and groups accessing the summit area to participate in ceremonies and leave offerings is notably greater than it was at the time the CMP was adopted.

Providing further context to our ongoing and future planning regarding Maunakea stewardship is the Department of Land and Natural Resources' report entitled, *Independent Evaluation of the Implementation of the Mauna Kea Comprehensive Management Plan*, dated December 2020. The report concludes that UH "has made progress in implementing most of the CMP MAs, and in many regards ... is effectively managing the activities and uses on Mauna Kea to better protect the natural

sources of information about cultural practices, and the "cultural landscape". While the term defies a simple definition, it is clear that it encompasses all the interwoven physical, ecological, and spiritual factors that made Hawai'i a distinctive place.

⁶ Note that in the case of *Matter of Conservation Dist. Use Application HA-3568*, 143 Hawai'i 379, 396 n.16 (2018), the Hawai'i Supreme Court opined that "recent construction of ahu to protest the TMT Project itself . . . was not found to be a reasonable exercise of cultural rights."

and cultural resources." However, the report also concludes that UH needs to improve consultation with the Native Hawaiian community "on cultural issues, including removal of family shrines, stacking of Pohaku, and identification of cultural sites," and on "education and outreach efforts, including decision-making process related to the management of Mauna Kea." These conclusions are qualified by the report's observation that individuals' "assessment of how effectively UH has implemented the CMP has primarily varied depending on whether they are in favor or opposition of telescope development on Mauna Kea."

In summary, despite the many positive steps that have been taken, disagreement about the appropriateness of the permitted astronomical uses on Maunakea remains strong. Moreover, some positions are polarized to the point where the hope of finding a middle ground for the sharing of Maunakea's unique cultural, natural, and scientific resources is significantly challenged. Nonetheless, there is still common ground to work from.

2.1.2.2 Ranger Report Items

The Maunakea Rangers have kept records of the new cultural resource items that they have found in the UH Management Areas since 2004. Those finds are summarized in Table 2.4.⁷

Year	Rock pile/ stack	Offerings	Ashes	Mixed	Total
2004	0	0	1	0	1
2005	2	5	0	0	7
2006	4	1	0	0	5
2007	0	6	0	0	6
2008	1	0	0	0	1
2009	14	2	0	0	16
2010	8	3	0	4	15
2011	9	19	1	4	33
2012	3	11	2	2	18
2013	8	10	0	5	23
2014	15	28	0	6	49
2015	21	35	0	1	57
2016	34	54	2	4	94
2017	28	29	2	1	60
2018	25	23	7	2	57
2019	23	28	7	10	68
2020	13	21	0	1	35
Total	208	275	22	40	545
Rock pile	column headings are as fo <u>/Stack</u> : A gathering or set : Includes organic materia	ting of rocks that appears		ations are of varied forms (, leaf, fruit, flower); and	

 Table 2.4
 Cultural Resources Observed on UH Managed Land

including glass, crystals, metals; which appear to have been placed/arranged by humans.

Ashes: Cremains, including hair, teeth, and bone fragments; dry substance may vary from powdery to coarser-grain; color appears to be beige/off-white/grey.

Mixed: A combination of apparently manipulated rocks, offerings and/or ashes appearing together in one locality. Center for Maunakea Stewardship, February 19, 2021

⁷ The categorization used in the table is based on OMKM staff's careful review of the entries in the Ranger reports. However, it is important to note that it has not been reviewed by the Kahu Ku Mauna, MKMB, or others. The categories also may not wholly reflect the original cultural resources - for instance, the observer filing the report might have seen and reported a lone ho'okupu, but it could have been blown away from a larger, original feature.

A review of the data reveals several clear changes over time in the number and type of culturally related items being found. The following are among the more important:

- The average number of items reported each year from 2012 through 2020 was five times the average number counted each year from 2004 through 2011.
- More features (94) were reported during 2016 alone than had been reported in the first nine years of the monitoring (2004 through 2012). This peak coincides with the first wave of public protests that were conducted in opposition to the TMT project.
- Roughly half (261) of all the features reported were "offerings" and 40% (207) were rock piles or stacks.
- Whereas no ashes were reported from between 2004 and 2010, and only three sets of ashes were reported over the following five years (2011 to 2015), 16 sets of ashes were reported over the following four years (2016 to 2019).

2.1.2.3 Archaeological Monitoring Items

The archaeological monitoring results are summarized in Table 2.2. Taken together, they indicate that changes to historic properties by humans have been predictable based on such factors as accessibility (distance from known roads and trails) and visibility. The most common human-induced changes include the construction of new features as well as the re-positioning of upright stones at shrines. Natural changes, such as fallen uprights, have usually occurred at sites in vulnerable condition, while some low-visibility sites such as stone tool debitage scatters have been impacted by natural erosion. Finally, the monitoring results make it clear that most sites that are disturbed by human activity are within a short distance of the Mauna Kea Access Road.

2.1.3 STATUS OF MANAGEMENT ACTIONS RELATED TO CULTURAL RESOURCES

Table 7-1 in the CMP identifies 14 "management actions" to address the needs related to native Hawaiian cultural resources that it had identified. Those actions, and the extent to which they have been completed, are listed in Table 2.5 below. Additional information regarding the status of each measure is presented in subsections 2.1.3.1 through 2.1.3.14.

Measure	Description	Status	Discussion
CR-1	Kahu Kū Mauna (KKM) shall work with families with lineal	Ongoing	2.1.3.1
	and historical connections to Maunakea, cultural practitioners,		
	and other Native Hawaiian groups, including the MKMB's		
	Hawaiian Culture Committee, toward the development of		
	appropriate procedures and protocols regarding cultural issues.		
CR-2	Support application for designation of the summit region of	Ongoing	2.1.3.2
	Mauna Kea as a Traditional Cultural Property, per the National	(awaiting	
	Historic Preservation Act of 1966, as amended, 16 U.S.C. 470	opportunity)	
	et seq. in consultation with the larger community.		
CR-3	Conduct educational efforts to generate public awareness about	Ongoing	2.1.3.3
	the importance of preserving the cultural landscape.		
CR-4	Establish a process for ongoing collection of information on	Ongoing (process	2.1.3.4
	traditional, contemporary, and customary cultural practices.	established)	
CR-5	Develop and adopt guidelines for the culturally appropriate	Completed	2.1.3.5
	placement and removal of offerings.		

 Table 2.5
 Status of Measures Related to Native Hawaiian Cultural Resources

Measure	Description	Status	Discussion
CR-6	Develop and adopt guidelines for the visitation and use of ancient shrines.	Completed	2.1.3.6
CR-7	Kahu Kū Mauna shall take the lead in determining the appropriateness of constructing new Hawaiian cultural features.	Completed	2.1.3.7
CR-8	Develop and adopt a management policy for the UH Mgt. Areas on the scattering of cremated human remains.	Completed	2.1.3.8
CR-9	A management policy for the culturally appropriateness of building ahu or "stacking of rocks" will need to be developed by Kahu Kū Mauna who may consider similar policies adopted by Hawai'i Volcanoes National Park.	Completed	2.1.3.9
CR-10	Develop and implement a historic property monitoring program to systematically monitor the condition of the historic district and all historic properties, including cultural sites and burials.	Completed	2.1.3.10
CR-11	Complete an archaeological survey of the portions of the Mauna Kea Access Road corridor that are under UH management.	Completed	2.1.3.11
CR-12	Consult with Kahu Kū Mauna about establishing buffers (preservation zones) around known historic sites in the Astronomy Precinct, to protect them from potential future development.	Completed	2.1.3.12
CR-13	Develop and implement a burial treatment plan for the UH Management Areas in consultation with Kahu Kū Mauna Council, MKMB's Hawaiian Culture Committee, the Hawai'i Island Burial Council, recognized lineal or cultural descendants, and SHPD.	Completed	2.1.3.13
CR-14	Immediately report any disturbance of a shrine or burial site to the rangers, DOCARE, Kahu Kū Mauna Council, and SHPD.	Ongoing	2.1.3.14
	status of "Completed/Ongoing" means that the needed procedures and systems have on an ongoing basis. auna Kea Comprehensive Management Plan, Table 7-1.	been completed and are	being implemented

2.1.3.1 CR-1: Develop Appropriate Procedures and Protocols Regarding Cultural Issues

Management action CR-1 calls on Kahu Kū Mauna to work with families with lineal and historical connections to Maunakea, cultural practitioners, and other Native Hawaiian groups, including the MKMB's Hawaiian Culture Committee, toward the development of appropriate procedures and protocols regarding cultural issues. As discussed below, this has been ongoing.

In the Fall of 2013, the Hawai'i Island Burial Council officially recognized several individuals as cultural descendants of Ka'ohe Ahupua'a. Identification of lineal and historical connections was part of the development and State Historic Preservation Division's approval (2014) of the BTP (see CR-13). Solicitations were made through announcements in the daily newspapers and the Office of Hawaiian Affairs (OHA) newsletter. There were no responses to the solicitations but first OMKM and now CMS have continued to seek out individuals as part of its interaction and relationship-building with the community.

In October 2010 OMKM and Kahu Kū Mauna met with representatives of the Royal Order of Kamehameha regarding care taking of the summit lele. In October 2011 OMKM made a presentation to OHA trustees and staff visiting Maunakea regarding OMKM's stewardship role and responsibilities, and Kahu Kū Mauna subsequently met with OHA representatives to discuss ahu-building and ahu-removal on Maunakea.

On May 21, 2016, Kahu Kū Mauna hosted a talk story session on matters related to CMP management actions that was attended by representatives from DLNR, DHHL, OHA, and members of the Native Hawaiian community. During late 2016 and the first half of 2017, OMKM placed ads over a period of several months in the *Hawaii Tribune Herald*, *West Hawaii Today*, *Honolulu Star Advertiser* and OHA's *Ka Wai Ola* inviting community members to participate in talk-story sessions.

The outcome of UH's work has been the formulation of several detailed policies (see <u>http://www.malamamaunakea.org/hawaiian-culture/policies</u>) that address the procedures and protocols that are to be followed in addressing cultural issues on Maunakea. As outreach to and consultation with the Native Hawaiian community continues, a need for additional procedures and protocols may arise.

2.1.3.2 CR-2: Support Application for Designation of Summit as TCP

According to National Register Bulletin 38 (Parker and King 1990), a traditional cultural property (TCP), is defined generally as one that is eligible for inclusion in the National Register of Historic Places (NRHP) because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history and (b) are important in maintaining the continuing cultural identity of the community. CR-2 calls for UH to <u>support</u> [emphasis added] a nomination for including the summit region of Maunakea as a TCP in the NRHP. If a nomination is submitted, UH will support it.

2.1.3.3 CR-3: Conduct Educational Efforts to Generate Public Awareness About the Importance of Preserving the Cultural Landscape

Section 5.1.5 of the CMP describes the "Hawaiian cultural landscape" relevant to Maunakea as "[w]ahi pana, which are sacred sites such as heiau, shrines, burial caves and graves and geographic features associated with deities and significant natural, cultural, spiritual or historical phenomenon or events." CR-3 calls for educational efforts to generate public awareness about the importance of preserving the cultural landscape. UH has for many years undertaken significant efforts and devoted sizable resources towards this goal. For example, as outlined in its most recent progress reports:

- Rangers, which have been present on Maunakea since 2001, through their interactions with the visiting public help to educate and raise awareness about Maunakea.
- In 2014 UH developed an informational brochure on cultural and natural resources and has made periodic updates since then. A copy of the current version of the brochure may be found at http://www.malamamaunakea.org/visitor-information/Resource-Brochure.
- OMKM sent out eNewsletters informing the public about OMKM and its activities and Maunakea's resources for many years, and CMS has now assumed responsibility for this. As of April 2020, over 100 newsletters had been released, and many of them can be found at http://www.malamamaunakea.org/about-us/news-archives).
- · Resource orientation of those who work on the mountain including astronomy personnel, Visitor Information Station (VIS) and MKSS staff, Rangers, commercial tour operators and

staff, and construction workers is required by the CMP.⁸ An online version of the orientation is available at [http://www.malamamaunakea.org/about-us/maunakea-orientation]. Those wishing to attend an orientation session in person are referred to the calendar at: <u>http://www.malamamaunakea.org/about-us/calendar</u>. Section 3.1.4 discusses the orientation in more detail and summarizes the number of people that have received it.

• In 2014 UH initiated the "Maunakea Speaker Series," a regular, scholar-focused presentation offered as a partnership between the Office of Maunakea Management, 'Imiloa Astronomy Center, and the University of Hawai'i at Hilo Department of Physics & Astronomy. A venue for scholars to share their stories and learn from discussion, the series promotes understanding and collaboration across all sectors of the community, while addressing the goals of the University of Hawai'i at Hilo.

2.1.3.4 CR-4: Establish a Process of Ongoing Collection of Information on Traditional, Contemporary, and Customary Cultural Practices

CR-4 calls for the collection of information on traditional, customary, and contemporary cultural practices. Noting that there are several methods that could be used to establish a process for the ongoing collection of information on traditional and customary cultural practices and their significance, the CMP recommended establishing an oral history program that would memorialize the traditional and customary practices associated with Maunakea. It suggested that Native Hawaiian families or communities that have a connection to Maunakea be invited to collaborate with UH to identify traditional and customary practices associated with Maunakea and to ensure that those practices are appropriately protected and respected. Management action CR-4 in the CMP attempts to implement this measure by calling on UH to collect information on traditional and customary practices on Maunakea.

As reported in its 2020 Annual Report to the BLNR, UH has collected extensive archival and oral history and reported these in various reports and other documents (e.g., *Mauna Kea-Ka Piko Kaulana o Ka 'Āina*; *Cultural Resources Management Plan*; and various cultural analyses completed as part of environmental review requirements associated with HRS Chapter 343. Similar third-party materials, such as the USGS Open File Report 2017-1043 "Conversing with Pelehonuamea: A workshop combining 1,000+ years of traditional Hawaiian knowledge with 200 years of scientific thought on Kīlauea Volcanism" also incorporates knowledge on traditional and customary practices. The final EnVision Maunakea report ("Report of the Hui Ho'olohe") also draws together significant archival and oral histories of Maunakea. Finally, UH continues to seek additional information through other partnerships within the UH-system and other State-agencies.

2.1.3.5 CR-5: Develop and Adopt Guidelines for the Culturally Appropriate Placement and Removal of Offerings

CR-5 calls for the establishment of an official University policy for the placement and removal of offerings. In 2016, Kahu Kū Mauna reviewed the wording of draft policy guidelines for the

⁸ To receive credit for the Maunakea User Orientation with the Office of Maunakea Management (OMKM), individuals can: (1) Watch the video at <u>https://www.youtube.com/watch?v=k6hu2JFAgA8</u> (last visited, April 7, 2021); (2) Complete the assessment quiz that is linked, answering at least 75% of the questions correctly; and (3) allow time for OMKM staff to score the quiz score and either issue a certificate or notify you if the assessment needs to be retaken.

culturally appropriate placement and removal of offerings.⁹ The MKMB advised that the policy be established and implemented early in 2018 after additional consultation by Kahu Kū Mauna. The policies may be found at http://www.malamamaunakea.org/uploads/culture/CulturalDocuments/CR-5_PlacementRemovalOfferings_2018.pdf.

2.1.3.6 CR-6: Develop and Adopt Guidelines for the Visitation and Use of Ancient Shrines

CR-6 calls for the creation of an official policy regarding the visitation and use of ancient shrines. In 2016, Kahu Kū Mauna drafted, MKMB reviewed, and OMKM began implementing such a policy, see <u>http://www.malamamaunakea.org/uploads/culture/CulturalDocuments/CR-6_VisitationUseShrines_2016.pdf</u>.

2.1.3.7 CR-7: Determining the Appropriateness of Constructing New Hawaiian Cultural Features

CR-7 calls for UH to adopt a formal policy regarding the construction of new Hawaiian features. In accordance with this, in 2012 OMKM prepared and Kahu Kū Mauna reviewed a draft of a process for determining the appropriateness of constructing new Hawaiian cultural features. OMKM reevaluated the policy in 2016 and held a consultation session that included representatives from the Office of Hawaiian Affairs. MKMB reviewed the process in early 2018 after additional consultation by Kahu Kū Mauna and advised OMKM that it be implemented. This guidance, which may be seen at http://www.malamamaunakea.org/uploads/culture/CulturalDocuments/CR-

<u>7_NewFeatures_2018.pdf</u>, supplements but does not replace, other existing statutes and agency rules governing this type of activity.

2.1.3.8 CR-8: Develop and Adopt a Management Policy on the Scattering of Cremated Human Remains

The CMP notes that the scattering of the ashes of cremated human remains and the burial of urns in the summit area of Maunakea is an on-going cultural practice and that while these private affairs are not well-known or documented, they may impact historic properties. Accordingly, CR-8 calls for UH to establish a formal policy for dealing with such activities.

In 2012, Kahu Kū Mauna developed and reviewed a draft policy regarding the scattering of cremated human remains. It reevaluated the policy in 2016 and held a consultation session that included representatives from the Office of Hawaiian Affairs. MKMB reviewed the process in early 2018 after additional consultation by Kahu Kū Mauna and advised that OMKM implement it. The process may be seen at: http://www.malamamaunakea.org/uploads/culture/CulturalDocuments/CR-8_ScatteringRemains_2018.pdf.

⁹ CR-5 overlaps with CR-7 (constructing new Hawaiian cultural features) being that offerings are usually associated with the construction of new features.

The adopted policies are consistent with HAR § 20-26-40, which provides that "The scattering of cremated human remains is allowed within the UH Management Areas, consistent with this chapter and policies and procedures established by the president."¹⁰

2.1.3.9 CR-9: Develop Management Policy for the Culturally Appropriateness of Building Ahu or Stacking of Rocks

The CMP reports that most of the "find spots" recorded in the 2005–2007 archaeological surveys were piled and stacked rocks. It notes that some of these features may have as their basis a traditional and customary cultural practice but that there is reason to believe that a large number of the single rock features and small concentrations of piled or stacked rocks on Maunakea are modern and that many were constructed by non-Hawaiian visitors in the last decade or so. Accordingly, it recommended that UH develop a policy related to the piling and stacking of rocks within the UH Management Areas.

As discussed in Section 2.1.3.7, in 2012 Kahu Kū Mauna reviewed a draft policy for the building of features such as ahu.¹¹ It reevaluated the policy in 2016 and held a consultation session that included representatives from the Office of Hawaiian Affairs. MKMB reviewed the process in early 2018 after additional consultation by Kahu Kū Mauna and advised OMKM to implement it (http://www.malamamaunakea.org/uploads/culture/CulturalDocuments/CR-

<u>7_NewFeatures_2018.pdf</u>; note, ahu are new features and therefore addressed in the CR-7 policy statement).

2.1.3.10 CR-10: Develop and Implement Historic Property Monitoring Program

Following completion of the archaeological inventory survey of the MKSR and Mauna Kea Access Road, UH prepared and submitted to the SHPD its proposed *Long-Term Historic Property Monitoring Plan.* The plan provides for systematically monitoring the condition of the historic district and all historic properties, including cultural sites and burials. The State Historic Preservation Division reviewed the plan and approved it in 2014.

UH is continuing to implement the approved historic properties monitoring program. This includes an annual assessment of historic properties in the Astronomy Precinct and alongside the Mauna Kea Access Road and assessment of the more remote sites on a three- and five-year rotational basis. It continues to submit annual reports regarding the status of these efforts to SHPD after consultation with the Kahu Kū Mauna Council on management action recommendations.

2.1.3.11 CR-11: Complete an Archaeological Survey of the Access Road Corridor

An archaeological survey of the portions of the Mauna Kea Access Road corridor that are under UH management was completed in 2009, and the survey report was submitted to the SHPD that year. SHPD approved the survey report in February 2010.

¹⁰ OMKM, now CMS, operates under the Chancellor of the University of Hawai'i at Hilo. The president delegated implementation of the HAR Chapter 20-26 to Chancellor of the University of Hawai'i at Hilo, Executive Director of Maunakea Stewardship, and 'Imiloa Astronomy Center, pursuant to University Executive Policy 10.104, available at https://www.hawaii.edu/policy/index.php?action=viewPolicy&policy&policySection=ep&policyChapter=10&policyNumber=104.

¹¹ CR-7 was combined with CR-9 under the guidance of Kahu Kū Mauna who pointed out that the "stacking of rocks" may be a cultural feature.

2.1.3.12 CR-12: Establish Buffers Around Known Historic Sites

To protect historic sites within the Astronomy Precinct, the CMP recommends that a specified buffer be established around a site if development is proposed near it. It directed OMKM and Kahu Kū Mauna to work with DLNR, including SHPD and appropriate divisions, to establish protective buffers, where appropriate. The CMP emphasized that each buffer would vary in size based on the area of potential effect, and that to minimize potential visual impacts associated with buffers, their use will be limited to historic sites threatened by a specific activity.

In accordance with this recommendation, UH consulted with Kahu Kū Mauna and others about establishing buffers (preservation zones) around known historic sites in the Astronomy Precinct, to protect them from potential future development. In 2012 Kahu Kū Mauna determined that buffers should be reviewed on a case-by-case basis and identified criteria for when to consult for routine (minimal impact) project proposals and when, and how, to consult for more substantial future development. In 2016, Kahu Kū Mauna revised its policy. MKMB subsequently reviewed the process after additional consultation by Kahu Kū Mauna and advised that OMKM would implement process it. The may be seen at: http://www.malamamaunakea.org/uploads/culture/CulturalDocuments/CR-12 BufferZones 2016.pdf.

2.1.3.13 CR-13: Develop and Implement a Burial Treatment Plan for UH Management Areas

UH developed a BTP for the UH Management Areas in consultation with Kahu Kū Mauna Council, MKMB's Hawaiian Culture Committee, the Hawai'i Island Burial Council, recognized lineal or cultural descendants, and SHPD. It formally submitted the BTP to the SHPD in the Spring of 2014. After reviewing it, SHPD approved the Plan on July 11, 2014.

2.1.3.14 CR-14: Report any Disturbance of a Shrine or Burial Site

CR-14 calls on UH to immediately report any disturbance of a shrine or burial site to the Rangers, DOCARE, Kahu Kū Mauna Council, and SHPD. UH is fully implementing this measure. The Rangers monitor activities in the UH Management Areas daily. When all Ranger positions are filled, it is generally possible to schedule three Rangers for duty and ensure a minimum of two Rangers on duty should one Ranger be sick or on vacation. Because the Rangers are consistently present in all accessible areas of Maunakea, they are in a good position to monitor for/observe any disturbance of a shrine or burial site and/or to take reports from others who have seen such actions. The Rangers and OMKM/CMS immediately report their findings to DOCARE, Kahu Kū Mauna Council, and SHPD.

2.1.4 ADDITIONAL MANAGEMENT ACTIONS RELATED TO CULTURAL RESOURCES

Based on the information presented above, UH anticipates that the five CMP management actions related to Cultural Resources that are ongoing will continue to adapt, but it does not believe any entirely new measures are needed. The principal adaptations that CMS anticipates making are outlined below.

2.1.4.1 Adjustments in Historic Properties Monitoring Procedures

Based on ten years of intensive historic properties monitoring (and an additional 30 years of passive data collected during archaeological surveys), CMS believes that it is appropriate to adjust

the monitoring in a way that adapts stewardship of cultural resources while at the same time better utilizing the finite financial resources that are available for this purpose. It would do this by focusing the monitoring on the cultural resources that are demonstrably the most vulnerable, while limiting monitoring of the least vulnerable resources to ad-hoc surveillance. Specifically, the monitoring program will (with SHPD approval):

- Continue the current annual assessment program for sites on the 1-year list (including sites on Pu'umākanaka [per the BTP] and all sites within the Astronomy Precinct in the summit area.
- Reduce the number of sites requiring visits during the 3-year and 5-year assessments (possibly excluding shrine sites with no upright/erect stones or surface lithic scatters).
- Propose conducting a full assessment once every ten years rather than once every five years (as is now the case).
- Propose a plan that links ad-hoc visits to cultural resources (not assessed annually) to work conducted as part of other projects or studies (e.g., biological and geological surveys).

2.1.4.2 Additional Data Recovery Efforts

Archaeological data recovery usually occurs as part of a mitigation effort during a construction project or other activity that will intentionally and irreversibly alter one or more historic properties and thus diminish their integrity and significance. The simple objective of such efforts is to collect data before they are irretrievably lost.

Within the framework of the CMS' ongoing Long-Term Historic Properties Monitoring Program, there are no active construction projects requiring data recovery. However, there are several historic properties that, because of the effects of human impact and natural processes are losing integrity. Annual reports since 2012 have identified sites where some type of data recovery is appropriate to collect base-line information before the sites' integrity diminishes to a point where they are no longer considered significant. The types of data recovery efforts considered appropriate vary from archaeological excavation to archaeological mapping. Specific recommendations from the archaeological reports include the following:

- <u>Site 50-10-23-16204</u>. In consultation with SHPD and Kahu Kū Mauna, develop a data recovery plan as a proactive response to collect baseline data before the likely loss of data due to continued alteration at the site. The plan should include: (*i*) a subsurface testing strategy for features with likely subsurface deposits (i.e., the enclosures and lithic scatters) and (*ii*) detailed mapping of the site (potentially using technologies such as LIDAR and 3-dimensional scanning) that not only records archaeological features, but non-feature-related rocks within the site complex.
- <u>Site 50-10-23-25766</u>. Develop a data recovery plan, in consultation with SHPD and Kahu Kū Mauna to determine whether a subsurface component to the site exists and whether that deposit retains any significance; and upon completion of the subsurface excavations, re-evaluate the significance of Site 25766.
- <u>Sites 50-10-23-9074 and -9075</u>. Consult with Architectural historian or engineer to determine the proper level of conservation for Sites 9074 and 9075.
- <u>Site 50-10-23-25770</u>. In consultation with SHPD and Kahu Kū Mauna, develop a plan to append site map for Site 25770 and track possible movement of surface artifacts.

- <u>Site 50-10-23-10314</u>. In consultation with SHPD and Kahu Kū Mauna, develop a data recovery plan to collect baseline data for Site 10314. The plan should include a research design, planned analyses, as well as a review of the site's known history of research; upon completion of the subsurface excavations, re-evaluate the significance of Site 10314.
- <u>Sites 18683, 25768, 25769, 21214, 21452, 25807, and newly recorded lithic scatters</u>. In consultation with SHPD and Kahu Kū Mauna, develop a plan to map sites and track possible movement of surface artifacts.

CMS will request the funds needed to implement these data recovery efforts in the 2022-2023 fiscal year.

2.2 NATURAL RESOURCES

Section 7.1.2 of the CMP contains information and management recommendations intended to ensure the protection, preservation, and enhancement of the natural resources of the UH Management Areas. The CMP is based on a comprehensive review of existing scientific studies, biological and physical resource inventories, and historical documentation. It addresses the protection and preservation of natural resources and also examines human uses of the area, with particular emphasis on their current and potential impacts on natural resources. It lists the following precepts as among its guiding concepts:

- The high-elevation areas of Maunakea represent a unique global resource that should be preserved for future generations.
- Management activities should be focused on limiting the impacts of human activities on natural resources.
- The planning and execution of natural resources management programs should involve input from the larger community, including scientists, educators, volunteers, and the public—as well as from natural resource managers.
- · Long-term global environmental factors such as climate change must be considered when planning natural resource management activities.
- · Natural resources management planning will use an ecosystem approach.
- · Adaptive management techniques will be used.
- The biological and physical resources found in high elevation areas of Maunakea and the unique ecosystems that encompass them deserve further study by researchers and managers.

The "desired outcome" that the CMP seeks to achieve with respect to natural resources is as follows:

Increase understanding of the status of natural resources (biotic and abiotic), and identify threats to these resources in order to better protect and preserve unique geological features, ecosystem functions, subalpine and alpine habitats, and biological communities through adaptive management of stressors and threats.

In explaining the need for management of natural resources on Maunakea, the CMP notes that there are many unique geological features and biological communities within the UH Management

Areas. The summit region consists of an alpine stone desert with scattered pu'u (cinder cones) that support a unique aeolian invertebrate community including the wēkiu bug. Below the stone desert lie the subalpine shrublands where the Maunakea silversword is found. Remnant subalpine māmane woodlands in the area of Halepōhaku could support the Palila and other native birds, as well as unique arthropod communities.

Section 6.3 of the CMP reviews resources found in the UH Management Areas. It concludes that at the time it was prepared the threats to natural resources considered to be of the highest priority for management action included habitat alteration, invasive species, population decline, and climate change. Observing that these threats are not all the same magnitude and that not all threats have been confirmed to be currently impacting resources on the mountain, the CMP acknowledges that this could change with time, and so, for completeness, it addresses all known <u>potential</u> threats. Table 7-2 in the CMP lists the resources, known threats, and sections in the CMP that address each threat.

The CMP goes on to note that natural resources are subject to actual and potential degradation and that without planned protections and a commitment to implement those plans, irreversible damage to Maunakea's natural resources is likely to continue. It then presents guidelines for the long-term management of those natural resources and outlines a range of strategies and activities for their protection.

The CMP first cautions that sustainable management of the UH Management Areas should allow for multiple uses and activities including astronomy and other scientific research, education, recreation, and cultural practices. It then goes on to advise that such management requires establishment of programs that protect, preserve, and enhance Maunakea's natural resources and lists five types of management actions as necessary to accomplish this goal: (*i*) preservation of sensitive habitats and unique high-elevation ecosystems in the UH Management Areas, including within the Astronomy Precinct¹²; (*ii*) enhancement of existing native communities and unique habitats; (*iii*) mitigation for planned damage to sensitive ecosystems; (*iv*) rehabilitation of damaged ecosystems; and (*v*) restoration of damaged ecosystems. Finally, the CMP states that natural resource management activities and policy development should be conducted to protect the rights of Native Hawaiian cultural practitioners and involve continuing consultation with Kahu Kū Mauna on cultural issues related to site access and permitted activities.

The CMP then identifies three management actions related to natural resources that the BLNR had previously identified and adopts those "where appropriate." They are:

- 1. The education of all persons involved with construction activities, about environmentally appropriate behavior while on the summit area for the protection for the natural resources.
- 2. The inspection/certification of all construction materials, equipment, crates, and containers carrying materials and equipment as being free of all flora and fauna that may potentially have an impact on the Maunakea summit ecosystem.

¹² The CMP concludes that this objective has been largely met by limiting development to the Astronomy Precinct at the summit and at Halepōhaku.

3. The presence of a trained entomologist, selected by OMKM and approved by DLNR whenever construction activities include earth movement or disturbance on site to monitor any impacts, real or potential, of construction activity on the wēkiu bug.

The natural resource-related measures in the CMP (i.e., all the "NR"-coded management actions) are listed in Table 2.6. Because of the great breadth of the information regarding natural resources that was presented in the CMP, UH's annual status reports have presented new information under individual topical areas (e.g., geology, hydrology, climate, etc.) and this OAR continues that practice. The work that has been done relating to each of the individual measures is discussed in Sections 2.2.1 through 2.2.10. The extent to which each measure has been fully implemented or is ongoing is noted in the right-hand column of the table and is summarized in Section 4.1.2.

Measure	Description	Status
THREAT	PREVENTION AND CONTROL	
NR-1	Limit threats to natural resources through management of permitted activities and uses.	Completed/ Ongoing
NR-2	Limit damage caused by invasive species through creation of an invasive species prevention and control program.	Completed/ Ongoing
NR-3	Maintain native plant and animal populations and biological diversity.	Ongoing
NR-4	Minimize barriers to species migration to help maintain populations and protect ecosystem processes and development.	Ongoing
NR-5	Manage ecosystems to allow for response to climate change.	Ongoing
NR-6	Reduce threats to natural resources by educating stakeholders and the public about Maunakea's unique natural resources.	Ongoing
ECOSYST	TEM PROTECTION, ENHANCEMENT, AND RESTORATION	
NR-7	Delineate areas of high native diversity, unique communities, or unique geological features within the Astronomy Precinct and at Halepōhaku and consider protection from development.	Ongoing
NR-8	Consider fencing areas of high native biodiversity or populations of endangered species to keep out feral ungulates (applies to areas below 12,800 ft elevation).	Ongoing
NR-9	Increase native plant density and diversity through an outplanting program.	Ongoing
NR-10	Incorporate Mitigation Measures into Plans for New Development	Ongoing
NR-11	Conduct habitat rehabilitation projects following unplanned disturbances.	Ongoing
NR-12	Create restoration plans and conduct habitat restoration activities, as needed.	Ongoing
PROGRA	M MANAGEMENT	
NR-13	Increase communication, networking, and collaborative opportunities, to support management and protection of natural resources.	Ongoing
NR-14	Use the principles of adaptive management when developing programs and methodologies. Review programs annually and revise any component plans every five years, based on the results of the program review.	Ongoing
INVENTO	DRY, MONITORING, AND RESEARCH	
NR-15	Conduct baseline inventories of high-priority resources, as outlined in an inventory, monitoring, and research plan.	Completed
NR-16	Conduct regular long-term monitoring, as outlined in an inventory, monitoring, and research plan.	Ongoing
NR-17	Conduct research to fill knowledge gaps that cannot be addressed through inventory and monitoring.	Ongoing

 Table 2.6
 CMP Measures Related to Natural Resources

Measure	Description	Status
NR-18	Develop geo-spatial database of all known natural resources and their	Ongoing
	locations in the UH Management Areas that can serve as baseline	
	documentation against change and provide information essential for decision-	
	making.	
Note: A	status of "Completed/Ongoing" means that the needed procedures and systems have been completed	and are being implemented
	on an ongoing basis.	
Source: M	auna Kea Comprehensive Management Plan, Table 7-3.	

<u>2.2.1</u> GEOLOGY

None of the NR-coded CMP management actions are solely related to geologic resources. However, as discussed below, several of them, including NR-1, -6, -7, -17, and -18, have some relationship to geologic resources within the UH Management Areas.

2.2.1.1 New Information Regarding Geology

Reports documenting the results of the geological research and monitoring conducted since the CMP was adopted are listed in Table 2.7. A number of these were sponsored by OMKM. Those include: N. Schorghofer's permafrost research and monitoring work between 2012 and 2018 (which is also related to hydrology); R. Perroy Surficial Geomorphology and Erosion Monitoring between 2014 and 2018; and R. Perroy & N. Stephenson's High Resolution Habitat Suitability Modeling for a Narrow-Range Endemic Alpine Hawaiian Species conducted in 2015 and 2016 (which is also related to invertebrates).

 Table 2.7 Reports Documenting the Ongoing Geological Research and Monitoring Conducted Since the CMP Was Adopted

Information Summary Reference		
The most recent update to the USGS Geological Survey National Volcanic	Ewert, J.W., Diefenbach, A.K.,	
Threat Assessment ranks Maunakea as 106 th (out of 161) based on an overall	and Ramsey, D.W., 2018. U.S.	
threat score of 30. In comparison, Kīlauea (with an overall threat score of 263)	Geological Survey Scientific	
is ranked 1 st , Mauna Loa (with an overall threat score of 131) is ranked 16 th , and	Investigations Report 2018–	
Hualālai (with an overall threat score of 45) is 23 rd . Haleakalā on Maui is 86 th .	<i>5140</i> , 40 p.,	
No new lava tubes or caves have been identified within the Management Areas.	https://doi.org/10.3133/sir20185140	
NASA's Jet Propulsion Laboratory, California Institute of Technology and the	NASA, 2016 (GPS Time Series)	
U.S. Geological Survey analyze high-resolution GPS data collected on the	USGS Earthquake Hazards	
mountain, tracking tectonic plate movement and seismic events. The data	Program	
indicate that seismic activity on Maunakea remains limited with no imminent		
signs of a potential eruption.		
The Hawai'i Volcano Observatory (HVO) characterizes seismic activity	Global Volcanism Program,	
beneath Maunakea has as "in frequent and sparse." However, elevated	2013.	
seismicity during October-December 2011 resulted in 30 felt earthquakes.	https://doi.org/10.5479/si.GVP.BG	
Approximately 570 people reported the M 4.5 earthquake that occurred on 20	<u>VN201312-332030</u>	
October 2011 and also ten of the aftershocks that followed. HVO reported that,		
these earthquakes were "most likely caused by structural adjustments within the		
Earth's crust due to the heavy load of Mauna Kea."		
A 2012 study on cinder cone morphometry highlighted the variability of	Eff-Darwich et al., 2010	
volcanic cones due to cone material properties, eruption conditions, local	Kervyn, Matthieu & Ernst, G &	
setting, and method of cone height estimation.	Carracedo, Juan & Jacobs,	
	Patric. (2012).	

Information Summary	Reference
The overall topographical features of Maunakea have changed little since the	UNAVCO, 2015 & 2017
CMP was written. However, small-scale topographical changes have been	(LiDAR data)
observed and have been studied in depth by Dr. Ryan Perroy (UH Hilo) in	Okal, 2014
partnership with the University Navstar Consortium (UNAVCO). Dr. Perroy	Stephenson, 2016
has monitored erosion and geomorphology using high resolution 3-D mapping	Perroy, February 2021
and visualization methods. Dr. Perroy's graduate student, Nathan Stephenson,	1 choy, 1 coldary 2021
also produced high resolution mineral maps of the summit region, while	
studying wēkiu bug habitat suitability. Dr. Perroy's February 2021 report on	
surficial geomorphology and erosion in the Maunakea Summit area carefully	
documents the changes that have occurred over time and concludes that	
roadway improvements increased the potential for erosion but that this can be	
managed adequately so long as continued attention is paid to road maintenance	
and cinder replenishment efforts. The report notes that improvements to the	
roadways and surface runoff infrastructure that minimize and redirect flow	
accumulation pathways would help reduce new gully formation and starve	
existing gullies of the concentrated runoff that causes erosion.	
A recent study on Maunakea deglaciation revealed that Maunakea glaciers re-	Anslow et al., 2010
advanced about 15,400 years ago after previous recessions. Paleontologists	Anslow et al., 2010
studied a helium isotope in glacial boulders and discovered that this glacial	
reemergence aligned with the major slowdown of the Atlantic meridional	
overturning circulation (AMOC). This AMOC slowdown allowed for colder	
conditions and increased precipitation from frequent cyclonic storms.	
Permafrost research results show that certain cinder cones crater temperatures	Schorghofer et al., 2013
can drop to temperatures of -20°C, which facilitates permafrost persistence.	Leopold et al., 2016
These low temperatures are due in part to crater topography and its influence on	Yoshikawa, 2013
shadows, cold air pools, and temperature. A 2016 study determined the	Schorghofer et al., 2017
subsurface architecture of Pu'uwai'au and Pu'upōhaku did not suggest	Schorghofer et al., 2018
permafrost presence, but rather impermeable sediment layers that result in the	20101g.10101 00 all, 2010
perched water bodies. Researcher Dr. Norbert Schorghofer will continue	
monitoring of permafrost bodies on Maunakea as a part of his long-term	
research to understand environmental factors responsible for permafrost health	
or deterioration. His project also supports research in astrobiology, planetary	
exploration, and climate change.	
A 2014 study highlighted pu'u influence on wind speeds and direction, which	Eaton & Businger, 2014
leads to moisture and nutrient (aeolian debris, e.g. bugs) collection within pu'u.	
This study also provided topographical influenced snowdrift models, which can	
be used to detect areas of high moisture and potential food sources, which	
supports wēkiu bug research.	
The Global Mountain Biodiversity Assessment inventories mountainous terrain	Körner et al., 2017
across the globe and provides a framework for understanding biodiversity and	http://www.gmba.unibe.ch
conducting regional and larger scale (bio)diversity assessments.	
The U.S. Geological Survey released updated 1:24,000-scale topographic maps	https://viewer.nationalmap.gov/basi
for the State of Hawai'i, including for Maunakea. These maps are part of the	<u>c/</u>
U.S. Topo map series, use the familiar 7.5-minute grid, were published in	https://nationalmap.gov/ustopo/quic
September 2017, and can be downloaded from The National Map download	<u>kstart.pdf</u>
client.	
Source: OMKM records	

2.2.1.2 Discernable Trends and Management Impacts Regarding Geological Resources

Daily monitoring by the Rangers and staff has documented various small-scale human-related changes to the mountain's landscape, including development of social trails, construction of new features (piling and stacking rocks), and vandalism. It is unknown whether the incidence of these undesirable events has decreased since the CMP management actions were initiated. Records also

reveal occasional natural events that have impacted geological resources, e.g., heavy rains that have damaged roadways. Additional information and discussion related to this topic may be found in the discussion of surface features and soils that is presented in Section 2.2.2 of this OAR.

Recent permafrost research suggests that two ice bodies of permafrost still exist in the summit area of Maunakea. However, one has shrunk considerably since 1973 when its boundaries were first estimated and is expected to disappear soon due to the ongoing and gradual climate warming trend. A permafrost monitoring plan is underway and UH will monitor permafrost bodies to better understand this natural process.

In summary, the additional information that has been assembled since the CMP was prepared indicates that there are some impacts to geological resources resulting from natural processes and human activity both globally and on the mountain. Ongoing monitoring will help to better understand these processes and will inform adjustments to management actions aimed at preserving geological resources.

2.2.1.3 Future Management Actions Related to Geological Resources

OMKM largely completed the work called for in NR-7 (delineating areas requiring specific protections), but CMS expects to conduct some additional research related to this as funding permits. Similarly, because scientists regularly identify new issues and collect additional data, NR-17 (conducting research needed to fill data gaps) and NR-18 (developing a geospatial database of known natural resources) are necessarily ongoing. CMS will continue to implement NR-1 (limiting threats by managing permitted activities and uses) and NR-6 (educating stakeholders and the public about Maunakea's unique natural resources).

2.2.2 SURFACE FEATURES & SOILS

None of the CMP management actions are related solely to surface features and soil resources. However, several, including NR-1, -6, -17, and -18, apply to these resources within the UH Management Areas.

2.2.2.1 New Information Regarding Surface Features & Soils

Reports documenting the ongoing research and monitoring related to this topic that have been conducted since the CMP was adopted are listed in Table 2.8. The results of these studies, as well as some of the work related to permafrost that is described in Section 2.2.1, provide some additional details regarding specific aspects of a few surface features. While the work done to date suggests that there has been little change in the surface features or soils since the CMP was prepared, it is possible that this could change in the future. The stability is consistent with the fact that the low rates of precipitation and generally cool temperatures characteristic of the summit region mean that rock weathering is slow and is predominately mechanical in nature.

OMKM's 2013 placement of signs asking hikers to stay away from Pu'uwēkiu has helped reduce the number of people on the pu'u and, therefore, the amount of physical disturbance that the foot-traffic formerly caused.

Table 2.8 Reports Documenting the Ongoing Surface Features/Soil Research and Monitoring Conducted Since the CMP Was Adopted

Information Summary	Reference
Data collected at the summit weather stations from 2008 through 2010	Eaton & Businger, 2014
were used in SnowModel to assess snowfall and summit aeolian debris	http://www.bioone.org/doi/abs/10.1657/
accumulation across the summit of Maunakea in order to better	<u>1938-4246-46.4.719</u>
understand the weather of the summit area and its relationship to the	
distribution and population health of the wēkiu bug.	
Dr. Ryan Perroy (UH Hilo) used high resolution topographic, spatial	UNAVCO, 2015 and 2017 (<u>LiDAR</u>
imagery, and soils field data to map and quantify topographic changes	<u>data</u>)
over time relating to natural and anthropogenic disturbance and erosion	Perroy, Ryan L, February 8, 2021
events (establishing baseline erosion rate). Sub- objectives were to	
identify locations of greatest concern for erosion and disturbance,	
determine how erosion rates in disturbed areas compare to erosion rates	
on undisturbed cones, and determine how these rates compare to other	
cinder cones globally.	
In 2016, Nathan Stephenson, a graduate student studying under Perroy	Stephenson, 2016
completed his study on high-resolution habitat suitability modeling for the	Stephenson et al., 2017
endemic alpine wēkiu bug. As a part of his research he was able to create	
high-resolution surface minerology and wekiu bug habitat suitability	
maps.	
Source: OMKM records	

2.2.2.2 Discernable Trends and Management Action Impacts Related to Surface Features & Soils

The additional information that has been assembled since the CMP was prepared, particularly Dr. Perroy's 2021 work, shows that the topographic changes that have been made in the summit area have created an increased (relative to natural) potential for erosion and emphasizes the importance of continuing active road maintenance activities in order to maintain stable conditions. While the need for continuing maintenance was understood at the time the CMP was completed, subsequent studies have better-quantified the required effort and the magnitude of the material that must be handled in order to maintain the stability of the access road and the terrain through which it passes. That, in turn, points to the importance of continuing to adequately fund road and drainage facility maintenance.

In addition to the meso-scale changes discussed in the preceding paragraph, daily monitoring by the Rangers and staff have documented various small-scale impacts on the mountain's landscape, including development of social trails, construction of features, and vandalism. It is thought that these conditions have decreased since the management actions were implemented (primarily the non-NR coded actions); however, there is no pre-CMP data against which to compare the current situation and the ongoing observational data are not standardized sufficiently to allow trend analysis. Overall, it is believed that the management actions have and continue to benefit surface features and soils.

2.2.2.3 Future Management Actions Related to Surface Features and Soils

OMKM made progress towards the surface feature and soils-related work called for in NR-17 (conducting research needed to fill data gaps) and NR-18 (developing a geospatial database of known natural resources). CMS is continuing to implement two management actions related to this topic. They are NR-1 (limiting threats by managing permitted activities and uses) and NR-6 (educating stakeholders and the public about Maunakea's unique natural resources).

2.2.3 HYDROLOGY

None of the CMP management actions are related solely to hydrology resources, but several, including NR-1, -6, -17, and -18, apply to hydrology within the UH Management Areas.

2.2.3.1 New Information Regarding Hydrology

Reports documenting the ongoing research and monitoring related to this topic that have been conducted since the CMP was adopted are listed in Table 2.9. The results of these studies provide additional details regarding specific aspects of a few features, they show that there has been little change in the water resources of the area since the CMP was prepared.

Table 2.9 Reports Documenting Hydrologic Research and Monitoring Conducted Since the CMP Was Adopted

Information Summary	Author, Reference
While acquiring baseline hydrologic data along Saddle Road between Kaūmana wells	Pierce, H.A., and
and Pohakuloa Training Area, the authors of this report conducted a series of	Thomas, D.M., 2009,
geophysical surveys that suggested the depth to saturated rock in places are 400 to 600	https://pubs.er.usgs.gov/
meters (1,300 to 2,000 feet) above mean sea level beneath the surveyed region.	publication/ofr2009113
Therefore, at the Saddle Road-Mauna Kea Access Road intersection, saturated rock	<u>5</u> .
would be roughly 4,000 feet below the ground based on this survey. The results of	
these studies did not change what had previously been reported regarding conditions	
beneath the UH Management Areas.	
In 2011 the U.S. Geological Survey completed a water budget model and estimates for	Engott, 2011
groundwater recharge rates on the island of Hawai'i. The report concluded that most	https://pubs.usgs.gov/sir
aquifer systems have higher baseline mean annual recharge than recharge estimates	/2011/5078/
used in the 2008 State of Hawai'i Water Resource Protection Plan, but that recharge in	
several Maunakea aquifer sectors (including Waimea, Honoka'a, and Pa'auilo) was	
lower. It also concluded that changes in rainfall associated with climate change	
suggest annual recharge in the late 21st century will be higher than baseline estimates	
for every aquifer system, except 'Anaeho'omalu.	
This USGS report describes the hydrogeologic framework, groundwater budgets	Izuka et al., 2018
(inflows and outflows), conceptual models of groundwater occurrence and movement,	https://pubs.er.usgs.gov/
and the factors limiting groundwater availability for Kaua'i, O'ahu, Maui, and	publication/sir20155164
Hawai'i Island. It confirms that groundwater recharge on the UH Management Areas	
is naturally low.	
This paper reports that an ongoing drilling project in the Humu'ula area along the	Thomas & Haskins,
Saddle road has uncovered groundwater at depths of 500', 700', and 1,800'. These	2013
findings indicate that groundwater is present at much higher elevations (i.e., closer to	
the ground surface) than had previously been thought.	
In 2015, the U.S. Geological Survey documented the major changes in Lake Wai'au	Delparte et al., 2014;
from 2010-13. They report that the lake's typical surface area of $5,000-7,000 \text{ m}^2$	Patrick & Delparte,
shrunk to just over 100 m ² . This is thought to be a potentially unprecedented	2014; Patrick &
shrinkage in the level of Lake Wai'au and it corresponds to drought conditions as lake	Kauahikaua, 2015;
levels began to rise again after later winter snowstorms in 2013-2014. OMKM	OMKM, 2016 (<u>Lake</u>
Rangers continue to conduct monthly photo-monitoring efforts of Lake Wai'au.	Wai'au time series)

Information Summary	Author, Reference
Concern over declining water levels in Lake Wai'au led researchers to explore the	Delparte et al., 2014
most accurate and cost-effective combination of new approaches to enable long-term	www.bioone.org/doi/pd
monitoring with minimal disturbance to the lake and its environs. As detailed in this	<u>f/10.1657/1938-4246-</u>
report, three strategies were used to construct 3D models of the lake: soft-copy stereo	<u>46.4.709</u>
photogrammetry from aerial photography, image-based 3D reconstruction from	
overlapping photographs (Structure from Motion), and terrestrial laser scanning	
(TLS). To supplement these detection methods, side scan sonar was used to collect	
bathymetric data. The results were three high-resolution 3D models that were used to	
calculate volumetric and areal changes over time using Geographic Information	
Systems (GIS) to analyze and visualize the lake body.	
This report documents the results of the first ever geophysical survey of the area	Leopold et al., 2016
around Lake Wai'au and establishes the existence of a second body of standing water	https://agupubs.onlinelibra
in a nearby cinder cone, Pu'upōhaku (~4000m above sea level), which has a sporadic	ry.wiley.com/doi/epdf/10.
pond of water. Together, the available information now indicates that perched	<u>1002/2016JF003853</u>
groundwater resides both in Pu'uwaiau (Lake Wai'au) and in Pu'upōhaku crater. The	
researchers conclude that ground temperatures are too high and specific electric	
resistivity values are too low to be consistent with either ice-rich permafrost or	
massive rock. They conclude that the presence of fine-grained material such as ash	
and its clay-rich weathering products are likely responsible. At Pu'uwaiau, a	
significant groundwater reservoir may be present outside of the lake and further be	
responsible for perching the water toward the lake.	
Source: OMKM Records	

2.2.3.2 Discernable Trends Related to Hydrology

The additional information that has been assembled since the CMP was prepared has not revealed any discernable trends related to hydrology.

2.2.3.3 Future Management Actions Related to Hydrology

OMKM made considerable progress regarding the hydrology-related work called for in NR-17 (conducting research needed to fill data gaps) and NR-18 (developing a geospatial database of known natural resources). CMS will continue the and update the database as appropriate. It will also continue to implement two other management actions related to this topic. They are NR-1 (limiting threats by managing permitted activities and uses) and NR-6 (educating stakeholders and the public about Maunakea's unique natural resources).

<u>2.2.4</u> <u>CLIMATE</u>

None of the CMP management actions are related solely to climate, but CMS believes that most of the NR-coded measures can help ecosystems within the UH Management Areas be more resilient to climate change.

2.2.4.1 New Information Regarding Climate

Reports documenting the ongoing research and monitoring related to this topic that have been conducted since the CMP was adopted are listed in Table 2.10. The results of these studies provide additional details regarding specific aspects of a few factors but indicate that most of these do not fundamentally alter any of the information on which the CMP was based. An ongoing climate project by Dr. Thomas Giambelluca (UH Mānoa) involves the development of *MaunakeaNet*, which is being designed as a climate monitoring network that will aid research in mountain

climatology, extreme weather occurrences, ecological climate influences, and public safety. More information concerning that is presented below in Section 2.2.4.3.

Table 2.10 Reports Documenting Climate Research and Monitoring Conducted Since the CMP Was Adopted

Information Summary	Reference
This master's thesis describes climatological observations at the summit of Maunakea from 1982 through 2010. The author concludes that altitude and topography of the summit of Maunakea are major climate influences and that Maunakea can also be characterized by its low monthly temperature means, a large dew point depression, a weak wind speed diurnal cycle, infrequent rainfall, and large wind speed extremes. The report observes that during El Niño, winters are typically warmer, relative humidity is lower, rainfall is decreased, and the wind is weaker.	Da Silva, 2012
In their article entitled "Climatic Changes in Mountain Regions of the American Cordillera and the Tropics: Historical Changes and Future Outlook", the authors conclude that observed changes in the climate of Hawai'i are generally consistent with expectations from the Intergovernmental Panel on Climate Change (IPCC) projections. They state that results from these studies indicate a significant warming trend over the past 80 years, but they also point to an amplification of the warming signal at higher elevations. They also find that indicators of enhanced upper elevation warming include a reduction in the frequency of freezing temperatures on the upper slopes of Maunakea.	Diaz et al., 2014
This report documents changes in surface air temperature between 1916 and 2006 that show a long-term increase for Hawai'i and enhanced warming in the more recent decades (1975– 2015), particularly at high elevations. The results indicate that mean air temperature has a statistically significant (p=0.01) upward trend of 0.042°C/decade over the past 100 years, with 2015 as the warmest year on record, 0.794°C above the 100-year average. The warming is largely attributed to increases in nighttime mean minimum temperature (Tmin) rather than increased mean maximum temperature (Tmax), which remained stable. Positive correlations were found between Hawai'i Temperature Index (HTI) and the Pacific Decadal Oscillation (PDO) and the Multivariate ENSO (El Niño-Southern Oscillation) Index (MEI) suggesting that natural climate variability has a significant impact on temperature variability in Hawai'i. High elevation temperature trends in Hawai'i were similar to those on another tropical island in the Atlantic.	McKenzie, 2016
The <i>Rainfall Atlas of Hawaii</i> shows that the summit region receives less than 10" of rain annually, while the subalpine environment receives less than 35" of rain annually. This corroborates the low evapotranspiration rate on Maunakea, which is also due to limited biomass. The average annual evapotranspiration on the summit is less than 300 mm and subalpine levels are less than 450 mm a year. The UH Management Areas contain some of the lowest average numbers of heavy rainfall events in the State, with 0-5 days annually.	Chu et al., 2009; Giambelluca et al., 2013; Giambelluca et al., 2014; MKWC, 2017 (Archive)
There appears to be a decreasing trend in snow events on Maunakea, both in intensity and frequency as noted anecdotally from historical reports and literary use. Researchers concluded the summit did not have a perpetual mantle of snow in recent history. Scientific evidence of snowfall, snowpack, and ice formation cannot confirm historical accounts as there is little to no data before 1972.	Mayer, 2012; Schorghofer et al., 2014
Snow precipitation predictions by The Asian-Pacific Data-Research Center, using the Hawaii Regional Climate Model simulation, show that by the late 21st century significant snow cover on the Hawai'i island mountains may disappear.	Zhang et al., 2012; Zhang et al., 2017
Climate modelling research led by Dr. Steven Businger using nested downscaled climate models focusing on Hawai'i, Hawai'i Island, and Maunakea provides detail forecasts regarding climate change including changes in the trade wind inversion altitude and potential for increasing moisture (relative humidity) at higher altitudes while simultaneously increasing the potential for drought. This work builds on Lauer et al. and Zhang et al. which identified the likelihood of increasing frequency in trade wind inversion and fewer days with the possibility of deep convection (related to rainfall) over the island of Hawai'i, including at high elevations.	Pattantyus, in review Downscaled Data archive; Lauer et al., 2013; Zhang et al., 2016a; Zhang et al., 2016b

Information Summary	Reference
Research on unique microclimates in the alpine stone deserts of Maunaloa and Maunakea	Schorghofer et al,
documented a new temperature extreme for Hawai'i (-20°C).	2018
Source: OMKM records	

2.2.4.2 Discernable Trends Related to Climate

The additional information that has been assembled since the CMP was prepared is too limited to allow precise forecasts to be made about climate changes within the UH Management Area. However, when considered together with information from measurements made elsewhere, they support the notion that the microclimate in the UH Management Areas is tending towards more temperature extremes and increasing moisture (humidity) combined with more frequent droughts. While there is a very limited amount that UH can do to alter the course of these changes, CMS believes that the continued implementation of natural resource actions can help to increase the ecosystem's resilience to the adverse effects of climate change. It also believes that the University's system-wide effort to reduce its own greenhouse gas emissions and to motivate its staff and students to do their best to reduce their individual emissions is important and will be beneficial in this regard.

2.2.4.3 Future Management Actions Related to Climate

Climate Monitoring. Experience to-date points to the value of continuing to make University resources available to entities wishing to collect climate-related data from within UH's Management Area, and CMS will continue to be supportive of such endeavors. Specifically, CMS will continue to encourage the further implementation of climate monitoring and modeling that has been initiated under the auspices of MaunakeaNet. As presently conceived, that program includes a master climatological monitoring station at the summit and satellite stations at lower elevations and the fostering of user communities willing to help contribute in effort or time. The instrumentation would continuously monitor the climate of the upper elevations of Maunakea with possible transects from Windward-Leeward and North-South that would provide data relevant to the trade wind inversion (~2,000 m), an intermediate elevation to the summit (~3,000 m), and the summit (~4,000 m). Both the master station at the summit and satellite stations at lower elevations would include solar radiation, radiation balance, temperature, humidity, wind speed and direction, turbulent fluxes of heat, moisture and momentum, precipitation including snow and soil moisture and temperature. Satellite stations would be analogous to HaleNet (Maui), with a standard suite of sensors and likely solar powered. Installation and operation of most of these facilities is subject to review and approval of the University, the issuance of one or more CDUPs, and compliance with the environmental impact evaluation requirements of Chapter 343, HRS.

<u>*Climate-Related Actions.*</u> NR actions 1 through 12 and NR actions 15 through 18 are all important in regard to climate change (NR actions 13 and 14 are indirect actions, but are still useful to guide climate change resilience). Examples of the kinds of actions that UH intends to take include, but are not limited to the following:

- Limiting the further incursion of/removing existing invasive species so that native species are able to adapt to climate change without added pressures from competition, predation, etc.
- Increasing native plant density by outplanting and conducting habitat restoration in order to enhance native ecosystems and help maintain ecosystem interactions.

- · Collecting seeds from various individuals to increase genetic diversity, thereby helping ecosystems adapt to climate change.
- Continuing to implement regular long-term monitoring as called for in NR-16, including the monitoring of certain climatic parameters (e.g., temperature, precipitation, wind, etc.).

CMS anticipates that carefully observing and evaluating the results of the management actions will allow it to adapt those measures in ways that enhance ecosystems and make them more resilient to climate change.

2.2.5 AIR QUALITY & SONIC ENVIRONMENT

None of the CMP management actions pertain solely to air quality or the sonic environment, but certain ones, including NR-16 and -17, relate to these topics within the UH Management Areas.

2.2.5.1 New Information Regarding Air Quality & Sonic Environment

Air pollutants have continued to be emitted in the region from eruptive activity and from anthropogenic sources such as electrical power generation and internal combustion enginepowered vehicular traffic. However, nearly all of that occurs in areas that are both distant from and at much lower elevations than the UH Management Areas, which is above the trade-wind inversion.

No new astronomy-related noise sources have been established since the CMP was adopted. Vehicular traffic volumes have changed over time as the number of astronomy personnel working at the summit has decreased and visitor numbers have increased. Overall, these changes have increased vehicular traffic and had a small effect on ambient sound levels adjacent to the Mauna Kea Access Road. However, the effect on sound levels is localized both spatially and temporally and is a function of ongoing public access. No new information is available that is relevant to the management of noise levels.

Reports documenting the ongoing research and monitoring related to air quality and sound levels that have been conducted since the CMP was adopted are listed in Table 2.11. The results of these studies do not fundamentally alter any of the science on which the CMP was based.

Table 2.11 Reports Documenting Air Quality and Noise Research and Monitoring Conducted Since the CMP Was Adopted¹³

Summary	Sources
Chlorine monoxide (ClO), a catalyst in the destruction of the ozone layer, has been measured	Nedoluha et
with a ground-based millimeter wave instrument on the summit of Maunakea since 1982. This	al., 2011
article, titled "Ground-based measurements of ClO from Maunakea and intercomparisons with	
Aura and UARS MLS" compares measurements of upper stratospheric ClO, made with a	
ground-based millimeter wave instrument at Maunakea with Upper Atmosphere Research	
Satellite MLS CIO measurements. It concludes that the measurements by the two are	
comparable and that both instruments show similar seasonal variations over Maunakea.	

¹³ In 2015 the CIO instrumentation was relocated to Maunaloa to test the site given anticipated CSO decommissioning. Because subsequent experience showed that the Maunaloa site was not viable, the instrumentation was returned to Maunakea in 2018.

Summary	Sources
Other data analysis related to chlorine monoxide (ClO) measurements on Maunakea has been	Sagawa, et
undertaken. The authors of this article entitled "Comparison of SMILES CIO profiles with	al., 2013
satellite, balloon-borne and ground-based measurements" evaluated the quality of ClO profiles	
derived from the Superconducting Submillimeter-Wave Limb-Emission Sounder (SMILES) on	
the International Space Station (ISS) relative to other data sources, including the ground-based	
radiometer at Maunakea. They conclude that the SMILES data is as accurate as that from other	
available sources.	
In an article entitled "Re-analysis of ground-based microwave ClO measurements from	Connor et al.,
Maunakea, 1992 to early 2012", the authors present a re-analysis of upper stratospheric CIO	25 July 2013
measurements from the ground-based millimeter-wave instrument from January 1992 to	
February 2012. They used daytime and nighttime measurements together to form a day–night	
spectrum, from which they determined difference in the day and night profiles and then	
compared to the day-night difference profiles from the Upper Atmosphere Research Satellite	
(UARS) and Aura Microwave Limb Sounder (MLS) instruments. The authors concluded that	
the reanalyzed data set has less short-term variability and exhibits a more constant long-term	
trend that is more consistent with other observations and that the data from 1995 to 2012	
indicate a linear decline of mid-stratospheric ClO.	
Source: OMKM records	

2.2.5.2 Discernable Trends Related to Air Quality and Noise

The increase in vehicular traffic that has occurred since the CMP was prepared is likely to have caused a very small, temporal increase in ambient sound levels and in the concentrations of certain air pollutants adjacent to the Mauna Kea Access Road. While the extent of the change has not been quantified, it is undoubtedly small as traffic volume above Halepōhaku remains light.

Observatories have not reported any noticeable changes to air quality in the summit area, something that is of great concern to them as excellent air quality is a favorable condition for astronomical observations. Neither have they reported any noise-related issues that affect their work. The current management actions and review processes appears to be effective for managing air quality and the sonic environment.

2.2.5.3 Future Management Actions Related to Air Quality and Noise

Although no new data gaps related to air quality and noise have been identified, CMS will consider additional work on these topics as the need arises. UH will continue to require activities that are conducted within the UH Management Areas to use the best available control technologies related to emissions. That, together with the measures it is considering that will reduce the number of vehicles accessing the mountain are expected to reduce air pollutant and noise emissions over the long term. In addition, since the passage of HAR Chapter 20-26, additional tools are available for managing vehicular traffic.

2.2.6 VISUAL ENVIRONMENT

None of the "NR"-coded measures in the CMP directly address the visual environment, but some of the elements that are covered do affect the appearance of the landscape within the UH Management Areas.

2.2.6.1 New Information Regarding the Visual Environment

The visual environment of Maunakea has changed very little since the CMP was completed as no major structures have been constructed. The TMT project complied with FLU-4 by providing visual renderings of the future facility from several viewpoints. Decommissioning projects have been announced, but none have as yet been implemented.

2.2.6.2 Discernable Trends and Management Impacts Related to the Visual Environment

There has been no substantial change in the visual environment since the CMP was completed.

2.2.6.3 Future Management Actions Related to the Visual Environment

CMS will continue to require project-specific visual renderings of both pre- and post-project settings to facilitate analysis of potential impacts to view planes.

2.2.7 BOTANICAL RESOURCES

Several of the NR-coded CMP management actions specifically address botanical resources and others apply generally to botanical resources. Those that specifically address the resource include:

- NR-2: Limit damage caused by invasive species through creation of an invasive species prevention and control program.
- NR-3: Maintain native plant and animal populations and biological diversity.
- NR-8: Consider fencing areas of high native biodiversity or populations of endangered species to keep out feral ungulates (applies to areas below 12,800 ft elevation).
- NR-9: Increase native plant density and diversity through an out-planting program.

2.2.7.1 New Information Regarding Botanical Resources

Reports documenting the ongoing research and monitoring related to botanical resources that have been conducted since the CMP was adopted are listed in Table 2.12. The results of these studies do not fundamentally alter any of the science on which the CMP was based.

Table 2.12 Reports Documenting Botanical Research and Monitoring Conducted Since the CMP Was Adopted

Summary	Sources
This article examined variation in life history in an invading temperate weed, Verbascum thapsus,	Ansari and
across an elevation gradient (5,540 - 8,920 feet; 1,690 - 2,720 m) along the montane and subalpine	Daehler,
slopes of Maunakea. While the study area barely reached the elevation of the lowest land covered	2010
by the CMP, it does contain some information that may be relevant to management of the area	
around Halepohaku. It concluded that compared to plants at lower elevations, those at higher	
elevation sites (>6,500 feet; >2,000 m) had lower early seedling survival, higher established	
rosette survival, higher vegetative growth rates, higher threshold sizes for flowering, and	
commonly lived more than 3 years before flowering. The authors found that the abundance of	
competing vegetation generally decreased with elevation and speculate that this may drive	
variation in V. thapsus survival and growth.	

Summary	Sources
This article, entitled "High-resolution carbon mapping on the million-hectare Island of Hawai'i"	Asner et al.,
discusses the way in which field measurements, airborne light detection and ranging (LiDAR)-	2011
based observations, and satellite-based imagery, were used to develop a 30-meter-resolution map	
of aboveground carbon (C) density spanning 40 vegetation types found on Hawai'i Island. It	
concludes that the approach reveals fundamental ecological controls over C storage, including	
climate, introduced species, and land-use change, and provides a fourfold decrease in regional	
costs of C measurement over field sampling alone. The results of the mapping confirm that the	
vegetative density in the area covered by the CMP is low.	
This baseline botanical survey documents specific plant species and distributions within the area	Gerrish,
covered by the CMP. The study also provides recommendations for invasive species control,	2013 (Data)
habitat restoration, and vegetative impact mitigation. It documents the way in which the	
vegetation composition has been altered due to long-term human use. It reports that roadside	
surveys show that native shrubs and trees are more frequent along the roadway than they are in	
similar areas farther from the right-of-way, while native herbaceous species were less frequent,	
most likely due to dust particulates resulting from vehicular traffic. Importantly, it identifies 3	
ecosystems on UH managed lands instead of the 4 that had been identified by Daehler previously.	
The authors' study of substrate-plant relationships indicates that plants within the alpine	
ecosystems prefer lava flow, while subalpine plants prefer cinder or disturbed substrates. It	
documents the presence of the endangered Maunakea silversword (Argyroxiphium sandwicense	
sandwicense) but no other endangered species were observed. No candidate species under the	
Endangered Species Act were observed. The survey found State Species of Concern, Douglas'	
bladderfern (Cystopteris douglasii) and the Maunakea dubautia (Dubautia arborea).	
In an article entitled "Overview of Habitat History in Subtropical Oceanic Island Summit	Fernandez
Ecosystems", the authors review the geological and climatic processes that explain the spatial and	et al, 2014
temporal dynamics of mountain summit ecosystems in (sub)tropical islands and explore how these	
dynamics may influence species diversity and affect the balance between speciation and extinction	
in this unique biota.	
The University's Maunakea Invasive Species Management Plan (ISMP) identifies invasive	Vanderwou
species, potential pathways in which invasive species can become introduced, and assesses their	de et al.,
impacts to Maunakea resources. The ISMP outlines efforts to prevent, detect, monitor, control,	2015
and rapidly respond to invasive plant species; it also includes standard operating procedures	ISMP SOPs
(SOPs) for specific invasive species implementation. OMKM has completed 9 SOP's which	D, -01, -02,
include invasive species inspection and cleaning requirements and procedures, identification	-03, & -12
guides for plants, vertebrates, and invertebrates and procedures for monitoring	
The authors' OMKM-sponsored 2013 Invasive Species & Native Arthropod Monitoring Report	Kirkpatrick
documents all management monitoring activities regarding invasive and native species. The	& Klasner,
expansion of invasive weed populations have been documented within the UH Management	2015
Areas. It concludes that aside from road-related influences, the spread seems most closely linked	
to wind patterns that can transport seeds to higher elevations even with efforts from the Rangers	
that remove weeds alongside roads and facilities in the MKSR. It also reports that fireweed and	
mullein species (Verbascum thapsus & virgatum) are prevalent within the Halepōhaku parcel, but	
volunteer weed removal events and future native out-planting events are expected to facilitate	
mechanical control of these invasive populations. As part of the annual monitoring of historic	
properties, OMKM staff conduct botanical surveys in and around historic properties.	Deeuera
DLNR prepared a <i>Wildfire Management Plan</i> for Maunakea in 2011. As the UH Management	Beavers,
Areas are sparsely vegetated and wildland fire is likely to only be sustainable, in part, in the	2011
vicinity of Halepōhaku, the University role emphasizes supporting DLNR actions.	Comment of
Camp et al. (2018) discuss the potential impacts of climate change on Maunaloa's subalpine and	Camp et al.,
alpine vegetation, with similar implications for Maunakea.	2018

The quantitative botanical survey information gap has been filled for both native and invasive species with the 2013 Gerrish botanical survey for Halepōhaku, the MKSR, and the Mauna Kea Access Road. Additional invasive plant species analyses were incorporated in the 2015 *Invasive*

Species Management Plan (ISMP) (Vanderwoude et al., 2015). Ongoing management programs such as volunteer weed-pull events and invasive weed removal by Rangers have been implemented to monitor and control invasive plants. The 2013 Gerrish botanical survey also filled the protected-species information gap, resulting in maps of native species including *Argyroxiphium sandiwicense sandwicense*, *Cystopteris douglasii*, and *Dubautia arborea*.

In addition to the reports detailed above, OMKM/CMS has continued its regular efforts to remove invasive weeds such as fireweed (*Senecio madagascariensis*) and protect native plants within the UH Management Areas. Maunakea Rangers are constantly on the lookout for and remove nonnative species that they observe as part of their regular duties. Information regarding this is logged in their daily reports. In the spring of 2012, OMKM-initiated volunteer weed-pulls in the vicinity of Halepōhaku. Since that time, it has hosted nearly five-dozen Mālama Maunakea Volunteer Weed Pulls and been responsible for planting approximately 300 native plants.

Finally, OMKM conducted ongoing efforts to monitor for invasive and native flora from 2007 through 2019, and CMS is continuing that work. Since 2012, first OMKM and now CMS have also conducted invasive species inspections for deliveries and equipment for all Maunakea users that hold a CDUP. Data resulting from these efforts is maintained in CMS' files, and CMS is continuing this monitoring and inspection work.

2.2.7.2 Discernable Trends Related to Botanical Resources

Gerrish's baseline botanical survey report noted that ecosystems are dynamically changing rather than at static equilibrium and that because of this modern conservation management does not have the goal of static preservation of a rigidly defined community or ecosystem. Instead, the achievable conservation goal is to see that the changes are driven primarily by natural factors rather than predominantly human interventions.¹⁴

The baseline botanical survey report identified three "trends" within what it referred to as the Natural/Cultural Preservation Area (which generally included most of the summit area above an elevation of 11,500 feet). However, the observations related more to patterns than to changes in those patterns which could constitute a trend. The report identified a general pattern of: (*i*) higher frequency and species diversity on lava flows than on unconsolidated materials and (*ii*) the ancient Hāmākua lava flows possibly being more conducive to diverse plant life than are the more recent Laupāhoehoe flows. The additional botanical information that has been assembled since the CMP was prepared has not yielded any discernable trends.

The efforts that UH has made to control and prevent invasive plant species appears to be working as new invasive plants have not become established in the UH management area. Invasive weed removal has helped to reduce habitat for invasive ants, prevented or slowed the spread of other unwanted invasive species, and preserved the potential for future native plant restoration projects. These are all considered beneficial impacts of the invasive species management actions conducted to date.

¹⁴The report recommended that managers of Mauna Kea consider defining their conservation goal to match that which was adopted for Hawai'i Volcanoes National Park, i.e., maintaining or restoring the ecosystem that existed before western contact, accepting any influence of the indigenous people as a "natural" part of this ecosystem.

2.2.7.3 Future Management Actions Related to Botanical Resources

OMKM completed much of the botanical resources-related work called for in the CMP. Specifically, OMKM:

- · Limited damage by establishing an invasive species prevention and control program (NR-2).
- Delineated areas of high native diversity and unique communities within the Astronomy Precinct and at Halepōhaku and protected them from development (NR-7).
- Constructed a greenhouse within Halepōhaku for use as a nursery for native plants. The plant propagation work is ongoing and the plants are being used on Maunakea (NR-9).
- · Completed baseline inventories of high-priority resources, as outlined in its inventory, monitoring, and research plan (NR-15).
- Completed research that has filled knowledge gaps (NR-17).
- Developed a geo-spatial database of all known natural resources and their locations in the UH Management Areas that can serve as baseline documentation against change and provide information essential for decision-making (NR-18). New information is added to the database as it becomes available.

In addition to the work that OMKM completed, CMS is continuing to implement the following management actions related to this topic:

- Continue to provide support to DLNR for its implementation of its 2011 *Wildfire Management Plan for Maunakea*. As the UH Management Areas are sparsely vegetated and wildland fire is likely to only be containable, in part, in the vicinity of Halepōhaku, the UH role emphasizes supporting DLNR actions.
- Do what it can to maintain native plant and animal populations and biological diversity (NR-3). This includes training Rangers and staff to recognize new introduced plants and remove known invasive plants visible near observatories, roads, or other facilities, and in pavement cracks and retaining walls along the Mauna Kea Access Road.
- Fence areas of high native biodiversity or populations of endangered species to exclude feral ungulates (NR-8) should any be found.
- Continue to incorporate mitigation plans into project planning and ensure that mitigation measures are implemented as necessary following new development (NR-10).
- Formulate and implement habitat restoration plans if there are unplanned disturbances or it becomes evident that they are needed (NR-11 and NR-12).
- · Continue regular long-term botanical monitoring and studies(NR-16 and NR-17).

2.2.8 INVERTEBRATES

Several of the NR-coded CMP management actions specifically address invertebrates and others apply generally to them. The following management actions of the CMP address invertebrate resources specifically, particularly those related to the wēkiu bug:

• NR-2: Limit damage caused by invasive species through creation of an invasive species prevention and control program.

- NR-3: Maintain native plant and animal populations and biological diversity.
- NR-7: Delineate areas of high native diversity, unique communities, or unique geological features within the Astronomy Precinct and at Halepōhaku and consider protection from development.
- · NR-12: Create restoration plans and conduct habitat restoration activities, as needed.

2.2.8.1 New Information Regarding Invertebrate Resources

Reports documenting the ongoing research and monitoring related to invertebrate resources that have been conducted since the CMP was adopted are listed in Table 2.13. Data from the vehicle, construction materials, equipment, and supplies inspections that have been conducted since 2013 are summarized in Table 2.14.¹⁵ The results of these studies increase understanding of the ecological interrelationships within the summit area and they, together with the data from the inspections, provide insights into the best means of managing the area and conducting site restoration during the decommissioning process. They do not fundamentally alter the science on which the CMP was based.

Table 2.13 Reports Documenting Invertebrate Research and Monitoring Conducted Since the CMP Was Adopted

Summary	Reference
This publication documents the complete life history of the Wekiu bug (Nysius wekiuicola,	Eiben, J and D.
Lygaeidae), an alpine carnivore endemic to Maunakea that is one of only two obligate	Rubinoff, 2010
carnivore scavengers of the family. The results demonstrate the importance of behavior,	
rather than pure physiological adaption, in an insect's persistence in a harsh environment.	
The Wekiu bug's shift to carnivory from a suite of herbivorous congeners is a remarkable	
adaptive shift in an aeolian system bereft of vascular plants.	
To determine which insects are at risk, how insect populations fluctuate in natural areas, and	Medeiros et al.,
which management actions are most beneficial to Hawaiian ecosystems, this publication	2013
proposes that insects be monitored whenever possible. Insect monitoring should be broad,	
generating community-based metrics such as species richness, rather than focusing on	
individual species. Resultant data should be entered into a stable, central database. The	
authors emphasize that measures of insect diversity can provide an assessment of restoration	
efforts and serve as a metric for prioritizing areas for conservation.	
This PhD dissertation investigated the wēkiu bugs life history, genetic analyses of mtDNA	Eiben, 2012
haplotype diversity, and the evolution of the wekiu bug within the Nysius lineage. The study	
found that wekiu bugs have a low reproductive output in captivity, develop most quickly at	
30-42°C, and require 622 degree-days for one generation; this development requirement is	
only achieved for a maximum of 8.5 hours of solar heating on Mauna Kea. The wekiu bugs	
closest relatives are seed feeding Nysius on Maui and Hawai'i Island.	
This publication investigated growth parameters and environmental models for wekiu bug	Eiben and
phenology and demographic change. Experiments were made in the laboratory by	Rubinoff, 2014
manipulating rearing temperatures of lab colonies. Wekiu bugs developed optimally from 26	
to 30°C, confirming a physiological reason why the wekiu bug is only found on cinder cones.	
These results can help guide population monitoring and inform habitat restoration and	
conservation. The developmental parameters quantified in this study were used to determine	
the species would not be listed as endangered or threatened.	

¹⁵ The bump in the number of inspections in 2017 and 2019 noted in the table is the result of construction work that took place in those years at Halepõhaku and in the summit area.

Summary	Reference
These OMKM produced reports describe all invasive species management activities conducted for the year and include native species monitoring. Species lists and data analyses are provided from the various management activities.	Kirkpatrick & Klasner, 2015; Kirkpatrick et al. 2019
OMKM initiated an Arthropod Biodiversity Study in 2012. The investigations expand on information in Eiben & Rubinoff's baseline study of arthropods within the UH Management Areas emphasizing community assemblages in subalpine and alpine ecosystems. The final report is still in progress.	2011 – 2017. J. Eiben
Annual invasive species and wēkiu bug monitoring reports continue to be generated by OMKM staff with the same general procedures established by the Hawaii Biological Survey in 2007-2008. General trends within the reports show wide variability in summit arthropod populations for both native and non-native species. Annual surveys continue to function as native species monitoring and early detection of any new threats.	Englund et al., 2009, 2010, and 2012; Preston et al., 2012 and 2013; Kirkpatrick & Klasner, 2015
This master's thesis assesses the efficacy of OMKM's Invasive Species Management plan procedures and evaluates the potential pathways through which species can arrive at UH managed lands. The study documents the occurrence of non-native arthropod threat species associated with regulated human activities and assesses the ability to detect non-native species threats, evaluates the risks posed by these species, and tests the recommendations to mitigate risks posed by non-native arthropods to alpine and subalpine habitats on Maunakea. It includes an evaluation of practices to prevent transport of species between lower and upper elevation sites. The results identify that regular vehicle washing as required by the Maunakea Invasive Species Management Plan is more effective than other alternatives, and also suggest that further study and refinement of invasive arthropod monitoring protocols is needed.	Zarders, 2018
Determining potentially suitable habitat is critical for effective species conservation and management but can be challenging in remote or sensitive areas. This publication describes an approach using two habitat suitability models for the endemic wēkiu bug that combines non-intrusive spatial data collection techniques and supporting field data that can lead to a better understanding of landscape-scale species distributions. The modeling results show that elevation and surficial mineralogy were the strongest predictors of suitable habitat, with lesser contributions from aspect and slope. They indicate that the wēkiu bug has a high degree of habitat specificity and represents a classically rare species.	Stephenson et al., 2017
This master's thesis evaluated wēkiu bug populations and habitat use over time on two cinder cones (high elevation and low elevation cinder cone) to inform habitat restoration efforts and conservation management decisions. Results indicate that wēkiu bugs had a highly aggregated distribution on cinder cones and the density of bugs changed within and between cinder cones throughout the year. A generalized linear mixed model indicated that sample month, topographic aspect, and elevation on a cinder cone influences wēkiu bug distributions and abundance; bug abundance increase with elevation within a cinder cone year-round. Thermal conditions on cinder cone habitats at any given time, and the ash layer could provide an important habitat refuge for the wēkiu bug, as this layer rarely freezes. Preserving contiguous cinder cone habitats and monitoring populations in a random sample design was recommended. This information can be used to recreate habitat that is most favorable for the bugs, help estimate population densities, and measure the success of restored populations.	Kirkpatrick, 2018
Several new non-native arthropod species were reported within the Mauna Kea Forest Reserve (MKFR), which is lower in elevation than the UH Management Areas, except for Halepōhaku which shares the same elevation as the highest boundaries of the MKFR. New threat species within the Orders Araneae, Coleoptera, and Hymenoptera will be monitored for movement upslope during annual surveys.	Krushelnycky et al., 2014

Summary	Reference
The Native Hawaiian Insect Microbiome Initiative is an effort intended to develop a	Poff et al., 2017
framework for informing evolutionary and biological studies in Hawaii. The bacterial	
microbes of thirteen species representing iconic, endemic Hawaiian insect groups were	
sequenced. The wekiu bug exhibit unique ecological transitions that are correlated with shifts	
in their microbiomes (transitions from carrion feeding from plant-feeding <i>Nysius</i>).	
The Maunakea Invasive Species Management Plan (ISMP) identifies invasive invertebrate	Vanderwoude et
taxa and their impacts on natural resources. The ISMP outlines efforts to prevent, detect,	al., 2015; SOP's
monitor, control, and rapidly respond to non-native and invasive arthropod and plant species.	C, -01, -02, -03,
The ISMP also includes various Standard Operating Procedures (SOPs) that provide methods for invasive species management activities. Nine SOPs have been completed across all areas	-10, -11, 12, 20, and
of the ISMP and represent the continued need for invasive species management on Maunakea.	-31.
For example, invasive species inspections of large equipment, vehicles and construction	-51.
materials are identified in SOP02, and quarterly invasive species monitoring and monthly	
monitoring of Halepõhaku facilities are identified in SOP10. All SOPs are implemented and	
are ongoing.	
This master's thesis and peer-review journal article describes the ecology of the weaking bug's	Eaton, 2011;
environment with particular attention paid to potential food distribution for the wekiu bug	Eaton &
derived from wind and snow deposition. It uses data from 12 weather stations on the summit	Businger 2014.
ridges and various cinder cones. The results of the research provide a better understanding of	Ŭ
the areas on the summit of Maunakea that are affected by deposition and erosion of	
snowpack, food deposits, and how the wind's direction and velocities are influenced by the	
variable terrain. It indicated that snow-fall and bug fall accumulations are fairly well	
collocated with previous Wēkiu Bug trapping sites.	
This master's thesis describes the results of a climatological investigation of observations	Da Silva, 2012
taken at the Mauna Loa Observatory from 1958 through 2010 and observations taken at the	
summit of Maunakea from 1982 through 2010. In addition to diurnal and annual cycles, and	
the inter-annual variability associated with ENSO, the extremes in temperatures and wind are	
also presented. The information was, among other things, designed to improve understanding of how some animal life, including the Wēkiu Bug, are sustained.	
This master's thesis conducted a baseline inventory of the arthropod diversity associated with	Stever, 2016
three endemic Hawaiian plants in Maunakea's subalpine region; 'Āweoweo, Hinahina, and	510 (01, 2010
Māmane. Over 13,000 arthropods were collected within the University of Hawai'i	
Management Areas and Mauna Kea Forest Reserve between July and November 2015. The	
community composition between plant species and various arthropod sampling techniques	
were also identified. The results of this study increase knowledge and awareness of Hawaiian	
arthropods and their ecological interactions and help OMKM and other land management	
entities minimize the cost and effort required to conserve native arthropods on Maunakea.	
This master thesis completed a habitat suitability map. MaxEnt habitat suitability models	Stephenson,
were generated from fifteen years of species occurrence data and a variety of spatial datasets,	2016
including high resolution digital elevation models, surface mineralogy based on hyperspectral	
remote sensing, and climate variables. A trapping experiment based on surface mineralogy	
and geomorphic position affirmed that both elevation and surface mineralogy play significant	
roles in the spatial patterns of wekiu bugs, but observed presence upslope on a cinder cone	
and absence downslope, even within the same predominant surface mineral, suggests that other habitat variables may be at play such as competition or predation. The methods	
developed in his research can also be applied to habitat suitability modelling for other species	
of interest on Maunakea such as the endemic summit wolf spider (<i>Lycosa hawaiiensis</i>) and	
native Noctuid moths.	
This study described two new endemic Hawaiian Agrotis (Noctuidae) moth species: A.helela	Medeiros et al.
and A.kuamauna. Both species are day-flying and occur at high elevations on Hawai'i Island.	2019
Observations of adult and larval morphology and biology are described, and illustrations of	
adult moths and genitalia for both sexes are included. This information helps land managers	
put a name to these moth species that have been captured and observed on Maunakea and	
Maunaloa since the early 1980's.	
Source: OMKM records	

Facility	2013	2014	2015	2016	2017	2018	2019	2020
Keck	2	0	14	11	15	21	51	28
Subaru	3	8	17	11	30	16	10	10
JCMT	0	0	0	0	0	0	1	0
UKIRT	0	0	0	0	0	2	5	0
UH88	0	0	1	1	57	2	8	9
IRTF	2	0	0	1	1	9	2	9
CFHT	11	0	3	0	4	10	0	6
SMA	0	0	0	10	19	16	21	14
CSO	0	0	4	0	0	0	0	0
UH24	0	0	0	0	0	3	0	0
VLBA	0	0	4	0	0	2	1	0
Gemini	4	12	9	13	12	10	6	0
TMT*	0	14	18	0	0	0	75	0
MKSS/VIS	6	11	5	4	8	3	150	3
All Inspection	28	45	75	51	146	94	330	79
Remediation	4	12	20	7	15	10	58	14
No Remediation	24	33	55	44	131	84	272	65
Approved	28	43	72	51	145	90	316	74
Rejected	0	2	3	0	1	0	11	1
Non-compliance	0	0	0	0	0	4	3	4
"Approved/ Reje and loads th concern wa	': Not recorded o remediation' ost remediation cted/ Non-com nat could not b	until 2019. R : Remediation actions entail pliance": Veh e remediated o Non-complian	Rush inspection n occurred wh ed pressure-wa icles and load quickly with p ice was docum	ns = those not en there was a ashing or vacu s that were cle ressure washin nented when v	requested four a cleanliness o numing. ean and free of ng or vacuumi vehicles or loa	days prior to the days prior t	he scheduled d ies concern wi es were appro- d, and re-insp	lelivery. ith the load ved. Vehicl ected after t
Source: OMKM Records		ie UH Manage	ement Areas w	anout approv	aı.			

 Table 2.14 Vehicle, Construction Materials, Equipment, & Supplies Inspections

2.2.8.2 Discernable Resource Trends Related to Invertebrates

Threats to native invertebrates include habitat alteration, invasive species, human use impacts, and climate change. Habitat alteration remains minimal due to no major construction or removal of structures within the UH Management Areas since the CMP was adopted in 2009. Invasive species threats continue to be monitored, managed, and controlled through OMKM/CMS's preventative invasive species protocol. Through these actions, OMKM/CMS has, to the best of its knowledge, been able to prevent the establishment of new alien invertebrate species within the management area.

Regarding wēkiu bugs, OMKM annual monitoring data (see Figure 2-1) shows that wēkiu bug abundance varies greatly from year to year. During the 14 years covered by the dataset, the lowest count was in 2008, when only 70 were observed, and the highest was in 2013, when 5,290 were counted. There is no clear long-term trend in abundance. Most importantly, OMKM surveyors find all life stages on all cinder cones in wēkiu bug habitat which suggests that they are growing and reproducing.

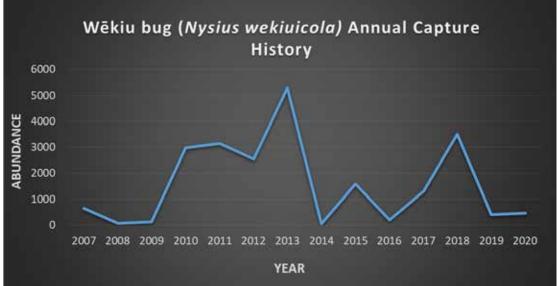


Figure 2-1 Wēkiu Bug Monitoring Annual Capture Abundance, 2007 to 2020

Source: OMKM

Although not a trend in the natural resources, Table 2.14 indicates that the number of inspections conducted has fluctuated, and reached its maximum in 2019. The number of inspections is proportional to the number of maintenance and construction projects occurring in the UH management areas. The number of inspections in 2019 was elevated because UH was implementing the ingress/egress project at Halepōhaku. Importantly, Table 2.14 also shows that in 2019 the proportion of remediation to no remediation outcomes remained within historic ranges.

2.2.8.3 Future Management Actions Related to Invertebrates

OMKM/CMS has completed much of the invertebrate resources-related work called for in the CMP. Specifically, it has:

- Created an invasive species prevention and control program designed to limit damage caused by invasive species (NR-2).
- · Worked to maintain native plant and animal populations and biological diversity (NR-3).
- Delineated areas of high native diversity, unique communities, or unique geological features within the Astronomy Precinct and at Halepōhaku and protected them from development (NR-7).
- · Created restoration plans and conducted habitat restoration activities, as needed (NR-12).
- · Prepared baseline inventories of high-priority resources, as outlined in its inventory, monitoring, and research plan (NR-15).
- · Conducted research to fill knowledge gaps that cannot be addressed through inventory and monitoring (NR-17).
- Developed a geo-spatial database of all known invertebrate resources and their locations in the UH Management Areas that can serve as baseline documentation against change and provide information essential for decision-making (NR-18). New information is added to the database as it becomes available.

Because successful management of the invertebrate resources requires an ongoing effort many of the existing efforts will be continued, and others will be initiated as existing facilities are decommissioned and/or sites redeveloped. Specifically, UH will:

- · Continue to implement the invasive species prevention and control program that it has established (NR-2).
- Continue efforts to maintain native plant and animal populations and biological diversity (NR-3).
- Conduct habitat restoration activities called for in decommissioning/redevelopment plans and as the need arises (NR-12).
- · Continue to conduct regular long-term monitoring, as outlined in an inventory, monitoring, and research plan (NR-16).
- Continue funding research to fill knowledge gaps that cannot be addressed through inventory and monitoring. Much of this effort is directed towards knowledge that will be useful in site restoration.

<u>2.2.9</u> BIRDS

As documented in the CMP, most of the birds that inhabit the higher slopes of Maunakea thrive in māmane woodlands. This forest type, which is generally found at elevations from 6,000 to 9,500 feet above sea level, has been degraded by non-native ungulate grazing for over 100 years. In recent history, the palila (*Loxioides bailleui*), 'amakihi (*Hemignathus virens*), 'apapane (*Himatione sanguinea*), and 'i'iwi (*Vestiaria coccinea*) are the only forest birds that have been observed at Halepōhaku; none of these Hawaiian forest birds have been observed within the MKSR, because there is no native forest habitat within it. Non-native game birds and non-native passerines are common throughout Halepōhaku and occasionally seen in the MKSR.

Several bird species that the CMP identified as being present, or potentially present, on Maunakea are listed under the State and Federal Endangered Species Act (ESA) as endangered or threatened. These include: Nēnē (*Branta sandvicensis*, endangered), 'Io or Hawaiian Hawk (*Buteo solitarius*, endangered), Pueo or Hawaiian Owl (*Asio flammeus sandwichensis*, State endangered [O'ahu only]), Palila (*Loxioides bailleui*, endangered), 'Ua'u (*Pterodroma sandwichensis*, endangered), and 'I'iwi (*Drepanis coccinea*, threatened). While Palila are rarely detected within the UH Management Areas, the area around Halepōhaku is within the area that has been designated as critical habitat for Palila, and CMS is supporting ongoing restoration efforts through such things as cat-trapping and Māmane tree planting.

There are no NR-coded CMP management actions that specifically address birds; however, several of the 18 NR management actions have some relevance to birds.

2.2.9.1 New Information Regarding Birds

Reports documenting the ongoing research and monitoring related to birds that have been conducted since the CMP was adopted are listed in Table 2.15. Ongoing CMS-sponsored research and program activities in this topical area includes work intended to expand the existing inventory of seabirds, forest birds, and bats in the region. If additional threatened and endangered wildlife

resources are found in the MKSR, appropriate measures (e.g., predator control, predator-proof fencing, etc. will be implemented per the adaptive management provisions of the CMP.

Table 2.15 Reports Documenting Avian Research and Monitoring Conducted Since the CMP Was Adopted

Summary	Sources
This report uses information obtained from surveys conducted in 2012 to update	Camp, Richard and
population estimates for the Palila (<i>Loxioides bailleui</i>). The report concludes that Palila	Paul Banko,
numbers fluctuated widely between 1998 and 2003, peaked in in 2003, then declined	October 2012
steadily through 2011, increasing only slightly in 2012. The average rate of decline from	October 2012
2003 to 2012 was 519 birds per year for a 66% decline over ten years. The paper	
estimated that there were approximately 2,100 Palila present within the survey area on	
Maunakea 2012.	Dente De Lend
This report summarizes results of Palila Restoration Project research from December 1996	Banko, Paul, and
to December 2012 to assist government agencies mitigate the effects of realigning Saddle	Chris Farmer
Road. The document synthesizes the existing body of ecological knowledge concerning	(eds.), 2014
the Palila and provides guidance regarding the species' demography and breeding ecology,	
habitat use and food ecology, vegetation ecology, and predator ecology and management.	
The results of the research inform efforts to reintroduce the Palila to a portion of its former	
range.	
This report summarizes the results of annual surveys of the Palila population during	Camp, R. et al,
1998–2014. In 2013 the population was estimated at 1,492–2,132 birds (point estimate:	May 2014
1,799) and the 2014 population was estimated at 1,697–2,508 (point estimate: 2,070). No	
Palila were detected at Halepõhaku or other areas outside the core survey area in 2013 or	
2014, suggesting that most if not all Palila inhabited the western slope (the core survey	
area) during the survey period. Since 2003, the size of the area containing all Palila	
detections has not indicated a significant change among years, suggesting that the range of	
the species has remained stable; although this area represents only about 5% of its	
historical extent. After peaking in 2003, population estimates declined steadily through	
2011; since 2010, estimates have fluctuated moderately above the 2011 minimum (CV =	
0.18). Over the 16-year monitoring period, the estimated rate of change equated to a 68%	
decline in the population.	
This report summarizes the results of annual surveys of the Palila population during	Camp, Richard, et
1998–2016. These surveys were designed to determine abundance, population trend, and	al., May 29, 2016
spatial distribution of the species on Maunakea. In the latest surveys, the 2015 population	
was estimated at 852–1,406 birds (point estimate: 1,116) and the 2016 population was	
estimated at 1,494–2,385 (point estimate: 1,934). Five Palila were detected on	
supplemental survey stations in the Ka'ohe restoration area, outside the core survey area	
but still within Palila Critical Habitat (one in 2015 and four in 2016), suggesting that Palila	
are present in habitat that is recovering from cattle grazing on the southwest slope. The	
average rate of decline during 1998–2016 was 150 birds per year. Over the 18-year	
monitoring period, the estimated rate of change equated to a 58% decline in the	
population.	
This report describes the habitat and food preferences of the Palila on Maunakea. It	Hess, Steven, et al.,
emphasizes the extent to which the species is behaviorally adapted to consume māmane	2014
seeds, a degree of single-species dependency rare among birds. It concludes that	
protecting and restoring māmane in woodlands adjacent to the current range of Palila will	
benefit their recovery, allowing them to exploit increased food availability in areas of their	
former range.	

Summary	Sources
This article presents the results of tracking the Hawaiian goose (Nēnē) in five areas on	Leopold, Christina
Hawai'i Island, including Maunakea, during migrations in 2010–2012. The results	R. and Steven C.
indicated that breeding areas were at Hakalau Forest NWR and Big Island Country Club	Hess, January 2014
golf course; non-breeding areas included Kīpuka 'Ainahou Nēnē Sanctuary (Kīpuka	-
'Ainahou), Kūlani Correctional Facility, and the Kahuku unit of Hawai'i Volcanoes	
National Park. Migration corridors that were mapped based on Brownian bridge	
utilization distributions indicate that the species overfly the saddle area between Mauna	
Loa and Maunakea but do not appear to be present in significant numbers at the elevations	
within the U.H. Management Area.	
The objectives of this research were to identify habitats preferred by two subpopulations of	Leopold, Christina
the Hawaiian goose (Nēnē) and determine how preferences shift seasonally at both meso-	R. and Steven C.
and fine scales. Data were collected from ten ganders outfitted with satellite transmitters	Hess, 2013
with GPS capability. The authors then used binary logistic regression to compare habitat	
use versus availability and an information-theoretic approach for model selection. Meso-	
scale habitat modeling revealed that preferred exotic grass and human-modified	
landscapes during the breeding and molting seasons and native subalpine shrubland during	
the nonbreeding season. Fine-scale habitat modeling further indicated preference for	
exotic grass, bunch grass, and absence of trees. The results showed that Nēnē make	
pronounced seasonal movements between existing reserves and use distinct habitat types;	
understanding annual patterns has implications for the protection and restoration of	
important seasonal habitats.	
Bird monitoring on Maunakea still consists of qualitative records of both native and non-	SOP-B Vertebrate
native species. Reports typically include game bird species in the Halepohaku area and	Threat
occasional sightings in the summit region. Rangers also occasionally report dead native	Identification,
and non-native birds on the summit. An identification, collection and processing guide	Collection, and
was developed by OMKM for easier field detection and to provide proper collection and	Processing Guide
reporting techniques if dead birds are found.	
Source: OMKM records	

In addition, in May 2019 the University of Hawai'i Hilo (UH Hilo) bio-acoustics researchers announced that, thanks to research funded by OMKM, scientists working for the UH Hilo Listening Observatory for Hawaiian Ecosystems Bioacoustics Laboratory had heard calls of the 'Ua'u or Hawaiian Petrel (*Pterodroma sandwichensis*) on Maunakea at many locations near Pu'ukanakaleonui (approximately 9,000 feet above sea level) for the first time in over 50 years. The first documented 'Ua'u call was in 2018 and since that time a dead 'Ua'u was found in the forest reserve on the eastern slope of Red Hill indicating the species likely continues to use some areas on the mountain for breeding.

All the areas where Hawaiian Petrel have been detected are outside the UH Management Areas. The results of the studies that have been conducted since the CMP was completed do not fundamentally alter any of the science on which the CMP was based.

2.2.9.2 Discernable Trends Related to Birds

Anecdotal information indicates that the Palila populations in some areas close to the UH Management Areas may have stabilized, possibly as a result of efforts to reverse the decline of the Māmane forest, but the data are insufficient to establish a definitive trend. There are no well-documented changes in the abundance of Nēnē in the region. University of Hawai'i at Hilo researchers located a Hawaiian Petrel ('ua'u) nesting site in 2021 on DHHL-managed Maunakea lands planned for māmane forest restoration. Hawaiian Petrel nesting has not been identified within the UH Management Areas and data are insufficient to identify any trends on Maunakea.

Management actions performed by OMKM/CMS, including its invasive species program and management of human activities, are believed to be beneficial to native birds. While few native birds visit the UH Management Areas, the management actions help to maintain the environment in a condition that potentially supports bird range expansion into the area.

2.2.9.3 Future Management Actions Related to Avian Resources

OMKM completed much of the bird resources related work called for in the CMP. Specifically, it has:

- Worked to maintain native plant and animal populations and biological diversity (NR-3).
- Delineated areas of high native diversity, unique communities, or unique geological features within the Astronomy Precinct and at Halepōhaku and protected them from development (NR-7).
- Developed a geo-spatial database of all known invertebrate resources and their locations in the UH Management Areas that can serve as baseline documentation against change and provide information essential for decision-making (NR-18). New information is added to the database as it becomes available.

Because successful management of the avian resources requires an ongoing effort many of the existing efforts will be continued, and others will be initiated as existing facilities are decommissioned and/or sites redeveloped. Specifically, UH will:

- Continue efforts to maintain native plant and animal populations and biological diversity (NR-3).
- Conduct habitat restoration activities called for in decommissioning/redevelopment plans and as the need arises (NR-12).
- · Continue to conduct regular long-term monitoring, as outlined in an inventory, monitoring, and research plan (NR-16).
- Conducted research to fill knowledge gaps that cannot be addressed through inventory and monitoring (NR-17). Examples includes:
 - Seabird, forest bird, and bat surveys by Dr. Patrick Hart.
 - Acoustical monitoring by the UH Hilo Listening Observatory for Hawaiian Ecosystems Bioacoustics Lab that detected the sound of the Hawaiian petrel at many locations near Maunakea's Pu'ukanakaleonui, an indication that the species likely continues to use the mountain as a nesting site.
- Continue funding research to fill knowledge gaps that cannot be addressed through inventory and monitoring. Much of this effort is directed towards knowledge that will be useful in site restoration.

2.2.10 MAMMALS

As detailed in the CMP, the only native land mammal is the endangered ōpe'ape'a or Hawaiian hoary bat (*Lasiurus cinereus semotus*). At the same time, non-native mammals (e.g., ungulates, cats, dogs, and rodents) and other animals (i.e., arthropods) have negatively impacted native biota, including the hoary bat, and the CMP note that such invasive mammals must be carefully

monitored and controlled to ensure species and ecosystem protection within the UH Management Areas.

None of the 18 NR-coded CMP management actions specifically address mammals. However, because of the negative effects that introduced mammals can have on native flora and fauna, several actions have some relevance to them.

2.2.10.1 New Information Regarding Mammals

Reports documenting the ongoing research and monitoring related to mammals that have been conducted since the CMP was adopted are listed in Table 2.16. The numbers of mammals that have been observed and/or trapped in and immediately around the UH Management Areas from 2012 to 2019 are shown in Table 2.17. It is important to note that because the data summarized in Table 2.17 consists of "observations" that were not made according to a well-established protocol that was followed by all those reporting, they cannot be used to establish trends in vertebrate abundance over time. CMS is using the experience gained to begin to develop additional guidance that will lead to greater standardization of observations and reporting in the future.

Table 2.16 Reports Documenting Mammalian Research and Monitoring Since the CMP Was Adopted

Summary	Sources
This report documented the nightly movements of 28 radio-tagged Hawaiian hoary bats on the	Bonaccorso et
island of Hawai'i. It found that the mean foraging range (FR) was 230.7 hectares and the core	al., 2016
use area (CUA) was 25.5 ha. The CUAs of 4 adult males neighboring each other had almost	,
no overlap when tracked simultaneously or within a 90-day window of each other. CUAs of	
subadults partially overlapped with multiple adult males or with one other subadult. The	
concentration of feeding activity, low values of individual overlap, and agonistic chasing	
behavior within CUAs all demonstrate a structured use of individual space by the bats.	
The authors used acoustic recordings of the vocalizations of the endangered Hawaiian hoary	Gorresen et al.,
bat (Lasiurus cinereus semotus) collected over a five-year period (2007–2011) from 25 survey	2013
areas across Hawai'i Island to model the relationship between habitat attributes and bat	
occurrence. Their data support the conclusion that bats concentrate in the coastal lowlands of	
Hawai'i during the breeding season, May through October, and migrate to interior highlands	
during the winter non-breeding season. Occupancy peaked on September 15th, which is	
during the fledging season, across the five-year average. Although the Hawaiian hoary bat is	
a habitat generalist species and occurs from sea level to as high as 10,000 feet above sea level,	
they are most abundant in areas where there is mature forest cover. Trends in occupancy	
identified in this study were stable to slightly increasing during the breeding season over the	
five years of our surveys. The report did not include any monitoring stations within the UH	
Management Areas.	
Source: OMKM records.	

						-			
Name	2012	2013	2014	2015	2016	2017	2018	2019	2020
Coqui frogs	1	3	1	0	1	0	1	0	0
Mouflon & Sheep	4	0	0	0	3 +2	0	4 &	Bones	23
					skel.		bones		
Cats sighted	2(1)	3(3)	1(1)	2(2)	5(3)	2, 1 skel.	0	(5)	1(2)
(trapped)									
Dogs	0	0	0	2	1	2	2	0	1
Mongoose	0	0	1	0	0	0	0	0	0
Mice & Rats	0	0	7	1	2	1	5	1	134

Name	2012	2013	2014	2015	2016	2017	2018	2019	2020
Red-billed leothrix	0	unk	0	3	1	0	0	0	3
Mynah bird	0	0	0	1 dead	0	0	0	0	0
Chukars	0	0	3	6	17	1 egg	11+1	19	52
							egg		
Erkel Francolin	0	0	0	0	0	1	2	1	3
Kalij pheasant	0	0	1	1	0	0	0	0	0
Iʻiwi	0	0	1		0	0	1	0	0
'Apapane	0	0	0	3+1	0	0	1	0	10
				dead					
'Amakihi	0	0	0	0	0	0	1	0	0
'Iwa bird	0	0	0	0	0	0	1	0	0
Native Pueo	0	0	0	0	0	0	0	1	0
Anole lizards	0	0	1	0	0	0	0	0	0
Madagascar gecko	0	0	0	1	2	1	1	0	1
Feral Pig	0	0	1	1 dead	0	0	0	0	0
 Note: The numbers reported in the table are reflective of the amount of observational effort and other factors and do not necessarily reflect the abundance of the species. Hence, for example, the relatively high numbers of mice & rats reported in 2020 reflects the increased trapping efforts by MKSS and VIS staff and improved record-keeping. Similarly, the increase in chukar observations is probably a function of increased Ranger presence at the Halepõhaku soft gate near the VIS where they are in a position to see more chukars than they did before COVID when they were more often patrolling the summit road. The increase in sheep observations could be a function of a few things, including: (i) decreased human activity leading them to come closer to facilities than they otherwise would) (ii) DLNR's aerial shootings driving some sheep closer to Halepõhaku; and (iii) greater Ranger presence at the Halepõhaku "soft gate" increasing the observational time/effort there. Source: OMKM Records updated Jan 2021. 									

Ongoing CMS research and program activities in this topical area continue to provide additional information on the following topics:

- Anecdotal reports documented by on-mountain staff and visitors in an activity log, and reported to DLNR's Division of Forestry and Wildlife (DOFAW). This allows for limited examination of trends of observed mammalian wildlife, but does not provide a quantitative inventory of mammal populations present in or around the Management Area.
- Traps are set for mice and rats within facilities such as those at Halepōhaku and the observatories in the summit region, while occasionally traps for dogs, cats, and mongoose are set outside when these non-native mammals are observed.
- There are no control procedures for observed ungulates other than notification to DLNR as CMS does not have authority to manage game animal populations.

2.2.10.2 Discernable Trends and Management Impacts Related to Mammals

The new information that is available indicates that while Hoary bat distribution and use of Maunakea has not been precisely established, their known habitat preferences strongly suggests that their numbers are quite low even near Halepōhaku and are probably absent from the summit area. The additional information that has been assembled since the CMP was prepared has not yielded any discernable trends related to mammals.

Management actions performed by OMKM/CMS, including its Invasive Species Management Program and management of human activities, are believed to help control non-native mammals and be beneficial to native bats. While few native bats likely visit the UH Management Areas, management actions in the CMP that are designed to help restore the native forest will tend to promote bat range expansion into the Halepōhaku area. Although not believed to indicate a trend in vertebrate activity, there was a substantial increase in the number of vertebrates identified during 2020 (Table 2.17). The reason more vertebrates were identified in 2020 is because CMS personnel were regularly present at Halepōhaku making observations as they performed out-plantings and other activities associated with the ingress egress project.

2.2.10.3 Future Management Actions Related to Mammals

There are no NR-coded CMP management actions that specifically address mammals; however, two of the 18 NR management actions that have some relevance to them have been completed. Specifically, UH has:

- Delineated areas of high native diversity, unique communities within the Astronomy Precinct and at Halepōhaku and prohibited development within them (NR-7).
- Developed a geo-spatial database that includes known natural resources and their locations in the UH Management Areas that can serve as baseline documentation against change and provide information essential for decision-making (NR-18). New information is added to the database as it becomes available.

Because successful management/control of non-native mammals and management for bats requires an ongoing effort, many of the existing efforts will be continued and others will be initiated as existing facilities are decommissioned and/or sites redeveloped. Specifically, UH will:

- · Continue to implement its Invasive Species Management Program, specifically, SOP-B.
- Conduct habitat restoration activities called for in decommissioning/redevelopment plans and as the need arises (NR-12).
- · Continue to conduct regular long-term monitoring, as outlined in an inventory, monitoring, and research plan (NR-16).

Conduct research to fill knowledge gaps that cannot be addressed through inventory and monitoring (NR-17) that will be helpful in developing management programs for the bat. The bird and bat study will fulfill the quantitative and protected bat species information gaps and provide direction for additional management efforts if those are called for.

Under HAR § 20-26-21(2), "[i]ntroducing any form of plant or animal life, except dogs when permitted by the hunting rules of the department of land and natural resources and legally authorized service animals when accompanying their handlers," is prohibited.

3 MANAGEMENT & OUTREACH ACTIVITIES

Many of the goals and objectives of the CMP have to do with the way the UH Management Areas are administered and managed. This chapter begins (Section 3.1) with an overview of its outreach and education efforts. That is followed by a topic-by-topic discussion of the extent to which its efforts have resulted in UH meeting the CMP's goals and objectives for each category. Specifically:

- Education and outreach ("EO"-coded measures) are discussed in Section 3.2.
- Astronomical resources ("AR"-coded measures) are covered in Section 3.3.
- · Activities and uses ("ACT"-coded measures) are covered in Section 3.4.
- Permitting and enforcement ("P"-coded measures) are addressed in Section 3.5.
- · Infrastructure and maintenance ("IM"-coded measures) are described in Section 3.6.
- · Construction guidelines in the CMP ("C"-coded measures) are covered in Section 3.7.
- Site recycling, decommissioning, demolition, & restoration ("SR"-coded measures) are discussed in Section 3.8.
- · Future land use considerations ("FLU"-coded measures) are addressed in Section 3.9.
- · Operations and maintenance ("OI"-coded measures) are discussed in Section 3.10.
- Monitoring, evaluation, and plan updates ("MEU"-coded measures) are addressed in Section 3.11.

3.1 OVERVIEW OF OUTREACH AND EDUCATION ACTIVITIES

3.1.1 COMMUNITY ADVISORY GROUPS

OMKM has been, and CMS is now, supported and assisted by the community, including its volunteer advisory board (MKMB), Kahu Kū Mauna Council, and committees (e.g., Environmental Committee). The makeup and responsibilities of these organizations are explained in the *Mauna Kea Science Reserve Master Plan* (2000 Master Plan), adopted by the BOR on June 16, 2000, and summarized below.

<u>Mauna Kea Management Board</u>. The MKMB provides the community with a sustained direct voice for the management of the Maunakea. It is comprised of seven members from the community who are nominated by the UH Hilo Chancellor and approved by the BOR. The MKMB has advised OMKM and now advises CMS and the UH Hilo Chancellor on matters relating to management of Maunakea. It provides input on proposed projects, management policies, and other matters. Meetings are open to the public and well-publicized in advance.

<u>Kahu Kū Mauna Council</u>. The Kahu Kū Mauna Council is composed of seven members from the Hawai'i Island native Hawaiian community who serve in a volunteer capacity. The Council advises the UH Hilo Chancellor, MKMB, and CMS on Maunakea cultural matters. CMS also consults with the Council on project proposals and draft policies. Kahu Kū Mauna submits names of prospective new Council candidates to the MKMB; after reviewing the recommendations, the

MKMB either endorses the nominees or returns the recommendation to the Council for further consideration.

<u>Environment Committee (EC)</u>. The EC was one of several special advisory committees created by the MKMB at its meeting on October 10, 2000. The MKMB appoints volunteers to the EC. Members have included persons with environmental expertise from state and federal agencies, staff and faculty within UH, past and current MKMB and Kahu Kū Mauna Council members, and other persons from the community with subject area expertise. The EC provides its recommendations to the MKMB regarding environmental impacts of proposed uses on UH Management Areas and has taken the lead on issues related to environmental issues as assigned by MKMB. The EC meets as needed.

<u>3.1.2</u> DATA REPOSITORIES

UH recognizes that documentation and record keeping of day-to-day operational activities as well as long-term oversight are required as part of sound stewardship and management. Moreover, recognizing that it is a prerequisite for sound management and is the basis for community engagement, UH also places a high priority on proactive public dissemination of educational information on Maunakea's resources, community values, and management activities. Accordingly, it has established and maintains the following data repositories that are relevant to the ongoing management of Maunakea.

<u>CMS Library</u>. Since 2003, the OMKM (now CMS) Library has collected and maintains more than 2,000 publications about or pertinent to Maunakea, which include monographs, journal articles, and theses on: (*i*) the effects that high altitude has on the human body and its functions; (*ii*) archaeological findings; (*iii*) flora and fauna; (*iv*) ecology; (*v*) geology and hydrology; (*vi*) Hawaiian culture, including legends and cultural practices; (*vii*) Pōhakuloa Training Area and Hakalau Forest National Wildlife Refuge; (*viii*) weather and climate changes; and (*ix*) historical accounts, recreation, and controversial issues related to Maunakea. The library also contains environmental assessments, environmental impact statements, planning documents, and legal documents related to Maunakea. In addition, the library hosts the Akiyama Archival Collection which consists of nine volumes (about 1,000 items) of correspondence, newspaper clippings, photographs, invitations, copies of programs, and other materials related to the early development of astronomy on Maunakea. The Library Catalog is available on-line via CMS's website at http://www.malamamaunakea.org/library/.

<u>CDUA/CDUP Database</u>. CMS maintains a database of Maunakea projects and their Conservation District Use Applications (CDUA), CDUP, Site Plan Approvals (SPA), Department of Land and Natural Resources (DLNR) staff reports, correspondence, maps, drawings, project descriptions, etc.

<u>Electronic Database of Media Articles</u>. UH maintains an electronic media database to document Maunakea-related news; including natural resources, astronomy news (non-research papers), management, community concerns, and events or incidents (including issues of concern for immediately adjacent area). Sources include newspapers, various newsletters, blogs, and other online websites. Over 7,000 media entries are presently included in the database that extends back to the 1800s. This tool allows managers and researchers to readily access historic and public articles about management, community concerns, events and incidents related to Maunakea. Access to the database is available to CMS-designated individuals and entities.

<u>Photo Database</u>. UH maintains a searchable, georeferenced, photo database that illustrates conditions, resources, activities, and issues or topics of concern on the UH Management Areas. Photos originate from OMKM/CMS staff, MKSS staff, observatories, independent researchers, private citizens, commercial sources, historic sources, etc. As of October 2020, the database contained approximately 6,500 photos, and is constantly growing as new staff submissions are received, reviewed, and added on a daily basis. Access to the photo database is available to CMS-designated individuals and entities.

<u>Maunakea Ranger Database</u>. The Rangers maintain a comprehensive internal computerized database containing information related to their activities. It includes daily Ranger reports that log vehicle and visitor counts, as well as public, commercial and astronomy activities on the mountain. The first Ranger report was initiated on June 10, 2001, and the format and content of the reports have evolved over time. Today the types of information gathered include: (*i*) number of permitted as well as unpermitted commercial tour operators; (*ii*) number of visitor vehicles by four-wheeldrive (4WD), two-wheel-drive (2WD) and motorcycles; (*iii*) number of hikers; (*iv*) number of visitors under the age of 16; (*v*) parking, road and weather conditions; (*vi*) special requests; (*vii*) the number of emergency and search and rescue responses made; (*viii*) astronomy project activity; (*ix*) debris removal; and (*x*)astronomy facility inspections for CDUP compliance.

<u>*Resources Database.*</u> OMKM staff created and maintained an electronic database of all resources including datasets of all monitoring efforts and provided many of these datasets to DLNR annually. CMS is continuing this practice.

<u>Other Information Sources</u>. In addition to the sources listed above, data is also available in the UH Library digital collection repository and commercial equivalents. Relations have been established with UHM and UHH for this purpose. Thesis and data are in the UH Library system repositories, as are third-party products. The OMKM library has copies of most, but not all, of this material.

3.1.3 COMMUNITY ENGAGEMENT

Community engagement has and continues to inform OMKM/CMS on good stewardship and is a major focus of UH management. Appendix F of OMKM's 2020 Annual Report to DLNR (see Appendix A) contains a detailed listing of the education, training, and outreach events that OMKM has participated in. Examples of the kinds of community activities that OMKM and CMS have engaged in since the CMP was adopted are provided below.

<u>Community Outreach and School Visits</u>. OMKM (and now CMS) has maintained relationships, shared information about the work being done on Maunakea, and addressed concerns face-to-face through community engagement with island schools, UH Hilo, civic organizations, businesses, and through its volunteer program begun in 2012. OMKM booths have typically included hands-on activities and displays (e.g., insect display box); educational and age-appropriate take-home items; and informational literature. Community engagement is also formalized through public attendance of MKMB meetings. Recent events include:

· Kealakehe Elementary School - 2015, 2016, 2017, 2018, and 2019.

- · Keaukaha Elementary School 2016, 2018, and 2019 for Science Technology Engineering Art Math (STEAM) night.
- Mountain View Elementary School 2019.
- · Volcano School of Arts and Science 2018.
- Hilo Intermediate School 2015.
- · Hawaii Academy of Arts & Sciences Public Charter School 2017.
- Nā Kilo: PUEO 2017.
- UH Hilo Earth Day 2015, 2016, 2017.
- Aunty Mimi' Astro Bash 2017.
- · Kona-Kohala CC Business Expo 2016, 2017, and 2019.
- · Waimea Community Association Presentation regarding ongoing stewardship 2018.
- Hawai'i Island Chamber of Commerce general membership meeting 2018.
- · Hawai'i Leeward Planning Conference-2018.
- · Japanese Chamber of Commerce & Industry of Hawai'i, Kona Lions Club, Kiwanis Club Kona, Rotary Club of Hilo, West Hawai'i Community Forum, Rotary Club of Hilo Bay 2018.
- · Waikoloa Lions Club, Hawaiian Affairs Caucus of the Democratic Party, Kona-Kohala Chamber of Commerce, Hawai'i Island Portuguese Chamber of Commerce, Pōhakuloa Advisory Council, Rotary Club of Kona Mauna, Rotary Club of North Hawai'i 2019.

<u>Brochures & Educational Outreach</u>. OMKM has communicated with the public in a variety of formats suited to the task. Examples of the brochures and educational outreach materials that UH has prepared and distributed to help inform visitors about Maunakea's unique and significant landscape, history and resources are shown in Table 3.1. The brochures and materials are also available from the OMKM/CMS website (http://www.malamamaunakea.org/visitor-information). With the reorganization that has recently occurred, Imiloa has assumed responsibility for much of this type of work.

Торіс	Number Produced			
What is OMKM?	5,000 prints			
Cultural Brochure	80,100 prints			
Hazards Flyer (English, Chinese & Japanese)	44,500 prints			
Visiting Safely Brochure	224,000 prints			
Heritage & Natural Resources Guide	23,600 prints			
Coloring Sheets	200 prints			
'Āhinahina Postcards	1,100 prints			
Trading Cards (5)	7,380 prints			
Resource Poster	1,000 prints			
Temporary Tattoos	4,000 prints			
Source: OMKM records. Numbers reflect those who attended and received completion certificates.				

 Table 3.1
 Examples Brochures and Educational Outreach Materials

Volunteer Events. The OMKM/CMS volunteer program provides community members an opportunity to participate in management, learn about Maunakea, provide direct feedback to

managers, and experience the resources first hand. Since the program's inception in Spring 2012, OMKM/CMS has held 58 events, filled over 2,400 bags of weeds by nearly 1,500 volunteers putting in over 10,400 hours. Volunteers have included individuals from local schools, UH Hilo student groups, Rotary Clubs, Chambers of Commerce, observatories, and the general public. Among other accomplishments, these efforts have prepared areas at Halepōhaku for outplanting with native biota, including māmane seedlings. The long-term goal is to repopulate the Halepōhaku area with native plants. OMKM/CMS is propagating native plants for future restoration efforts in the Halepōhaku area.

<u>Maunakea Speakers Series</u>. The Maunakea Speakers Series provides opportunities for UH to share with the community the results of science and scholarship involving Maunakea. The series emphasis is on place, it focuses on knowledge, and it is not about taking positions for or against astronomy. Monthly talks are free, are recorded for on-demand viewing, originate in Hilo, and are presented as a collaboration between UHH Physics & Astronomy, 'Imiloa Astronomy Center, and OMKM/CMS. They are available on YouTube. Topics to date have included tropical mountain permafrost, the history of snow & ice on Hawai'i's summits, Hawai'i's birds, rapid 'ō'hia death, Maunakea geology and groundwater, Lake Waiau, adze quarrying and the movement of Hawaiian adzes through the islands, high school student research projects, climate change on Maunakea, Lake Wai'au, lunar eclipse observing, Maunakea arthropod biodiversity, Maunakea weather forecasting services, Maunakea erosion, and sea-level rise.

<u>Student Mentorship/Career Development</u>. OMKM has worked with staff, faculty, graduate students, and undergraduate students to mentor students and prepare them for careers, and CMS is continuing these initiatives. For example, between 2012 and 2019 OMKM sponsored 17 undergraduate internships to work on resource management, research, inventory, and monitoring projects. Three of these interns continued as regular employees at OMKM for several years before returning to graduate school to work on conservation-related research projects in Hawai'i. Additional interns and students have partnered with UH faculty or OMKM on topics ranging from basic office support to collaborative research. CMS is continuing this initiative.

Graduate students or post-docs sponsored in-whole or in-part by OMKM have worked directly on CMP-identified resource management concerns such as climate-change modelling and monitoring, erosion, wēkiu bug habitat restoration, wēkiu bug food deposition, arthropod biodiversity, and DNA analysis of arthropods. Many of these same students, faculty, and staff work with local middle and high schools to serve as science fair judges, science project mentors, and career role models. Recent examples include participating in school career days, serving as science fair judges, and science fair projects on Maunakea's ants and spiders. Student mentorship directly contributes to numerous CMP action items such as resource protection; provides solid science to OMKM/CMS and other resource managers; boosts UH's educational and training mandate; and gives students knowledge, skills, and networking experience; all of which ensures efficient use of resources while maximizing positive societal benefits.

<u>Community Engagement with Management Plans, Rulemaking, and Other Relevant Plans</u>. Community Open Houses have provided an opportunity for community members to interact directly with OMKM/CMS staff while learning about management, resources, and other issues. These interactions have informed OMKM's drafting plans and policies and educated the public regarding the need for and the content of the plans and policies. Examples of the meetings are shown in Table 3.2. CMS is continuing these activities.

Subject of Engagement	Date	Location
Comprehensive Management Plan	2008 Nov. 14, 17, 18	Kona, Waimea, Hilo
Cultural Resources Management Plan & Natural	2009 Sept. 1, 2, 3	Waimea, Kona, Hilo
Resources Management Plan		
Public Access Plan & Decommissioning Plan	2009 Dec. 1, 2, 3	Hilo, Waimea, Kona
Resource open house	2015 May 28	Halepōhaku
Suggested administrative rules	2015 June 23, 24, 25	Kona, Hilo, Waimea
Land Authorization EISPN scoping mtgs	2015	Waimea, Hilo, Honolulu
Land Authorization EISPN scoping mtgs	2018 March 12, 13, 14	Waimea, Hilo, Honolulu
Proposed administrative rules	2018 Sept. 24, 25, 26, 28	Oʻahu, Hawaiʻi, and Maui
Draft administrative rules	2019 June 3, 4, 5, 7	O'ahu, Hawai'i, and Maui
Source: OMKM records.		

 Table 3.2
 Public Meetings Regarding Management Activities, Products, and Processes

<u>Awards</u>. UH has received several awards for its Maunakea planning and outreach. Examples are listed in Table 3.3.

 Table 3.3 Awards and Recognition for Maunakea Planning

Year	Award Description				
2013	Hawai'i Invasive Species Council (HISC) Community Hero Award to Mary Begier and the				
	Hawai'i Island Chamber of Commerce for helping establish a volunteer program to facilitate				
	invasive species management on Maunakea.				
2016	Kona-Kohala Chamber of Commerce, Pūalu Awards: Environmental Awareness				
2017	Kona-Kohala Chamber of Commerce, Pūalu Awards: Culture & Heritage				
2017	Historic Hawaii Foundation Preservation Honor Awards, Preservation Commendation: The Long-				
Term Historic Property Monitoring Plan for UH Managed Land on Maunakea					
Source: OME	KM records.				

3.1.4 ORIENTATION

<u>Persons Working on Maunakea</u>. Orientation of all persons working on Maunakea above Halepōhaku (i.e., astronomy personnel, mountain staff, contractors, etc.) is required under the CMP. The purpose of this requirement is to: maintain the integrity of the environment, communicate cultural significance and appropriate behavior, and ensure staff and public safety on Maunakea. Beginning in August 2013, prior to working on or in support of activities in the UH Managed Areas, OMKM required all astronomy staff, tour operators, support staff, contractors, vendors, Rangers, etc. that travel to Halepōhaku or above to attend an orientation session (or, beginning in 2017, view a training video) and receive certification that must be periodically renewed. Topics covered in the 45-minute orientation include the scope of UH/OMKM/CMS management on Maunakea, cultural resources, natural resources, and best practices and safety. The number of program participants is shown by year in Table 3.4. Responsibility for the orientation using the system it inherited from OMKM while working to improve the orientation as directed by BOR Resolution.

Year	# Sessions	No. In-Person	No. Online	
2013	18	543	N/A	
2014	21	362	N/A	
2015	28	480	N/A	
2016	28	458	N/A	
2017	15	275	263	
2018	13	258	114	
2019	12	85	630	
2020	10	93	245	
Source: OMKM records. Numbers reflect those who attended and received completion certificates.				

 Table 3.4
 Maunakea Worker Orientation Statistics

<u>General Public</u>. In collaboration with CMS, the 'Imiloa Astronomy Center has been tasked with developing a suite of educational programs regarding Maunakea. These include, but are not limited to programs dealing with Native Hawaiian culture, history, environmental, and biological considerations and are designed for tour guides and drivers, employees, contractors, recreational users, scientists, observatory workers, and visitors, as required by the CMP and Executive Policy EP10.104. The target date for completing program development is September 30, 2021, with implementation targeted to commence no later than December 31, 2021.

3.1.5 PERMITTING & COMPLIANCE

OMKM/CMS oversees activities in the UH Management Areas to ensure that appropriate permits are obtained, permit and lease conditions are complied with, and relevant reporting is completed. All permits, from project proposals to film permits, are reviewed for general appropriateness as well as fulfillment of permit-specific criteria and requirements. Visitors are informed that Maunakea is a sensitive place and visitors must conduct themselves responsibly and be respectful at all times and reminded that all Federal, State, and County laws apply. Additional information about each type of oversight is provided below.

<u>On-Site Astronomy Facility Project Monitoring</u>. Believing that regular, consistent communications and teamwork are key to successful completion of projects, Rangers and construction monitors keep watchful eyes on all phases of exterior building repairs and renovations, ground disturbance, and road work requested on UH Management Areas. Monitoring is performed by the Rangers and designated construction project monitors. The purpose for monitoring is to ensure that proper documentation, including permits and required construction best management practices, are in place and their provisions adhered to. The presence of monitors also helps construction workers keep in mind the cultural importance of the area, know how to conduct themselves in a respectful manner, refrain from littering, remain mindful of others while on the job, and encourages the orderly cleanup of all construction debris at the completion of the project. Examples of the projects that have been monitored are listed in Table 3.5.

Year	Projects Monitored						
2013:	TMT – Geo-technical surveys, core sampling, geologist surveys.						
2014:	TMT – access road and ground breaking site preparations.						
	CFHT – Nexus Steel, replacement of 2 dome vents.						
	Keck – mirror polishing repairs.						
2015	Gemini – Shutter door replacement.						

Year	Projects Monitored					
	CSO – Decommissioning planning site inspection.					
	SMA – overhead crane repair.					
2016	Gemini – Gear box replacement.					
	CFHT – Vent gear drive replacement.					
	IRTF – Chiller replacement.					
2017	CSO – Decommissioning planning.					
	IRTF – Re insulation / re-foiling (painting) of dome.					
	UH 2.2m – Modernization project. Major upgrade to telescope.					
	Hōkū Ke'a – Decommissioning planning cost estimates inspection.					
2018	IRTF – Re-foiling (painting) of dome continues.					
	Gemini – Equipment upgrade.					
2019	Keck – Photovoltaic system installation					
	MKSS – VIS Ingress/Egress improvements					
2020	UH IfA – Long-term permafrost monitoring					
Source: ON	IKM records as of December 31, 2020.					

<u>Film Permits</u>. OMKM/CMS has worked cooperatively with the State of Hawai'i Film Office on permits for filming on Maunakea. Neither has promoted Maunakea as a visitor destination and the vast majority of film permits granted (generally about 30 per year) are for films that are educational in nature. News/media are allowed for current events coverage. Projects have included documentary and educational films, music videos, travel logs, TV episodes, and TV commercials.

<u>Oversight of Commercial Tours</u>. UH accepted the responsibility for oversight of commercial tour operators in the UH Management Areas from DLNR in 2005. The eight current permittees are each limited to two, 14-passenger vans daily during the sunset and stargazing period. The number of permitted tour vehicles and passengers that have visited the summit since 2010 are shown in Table 3.6. The data show that after peaking in 2012 and 2013, the number of commercial tour vehicles and passengers over the years prior to the road blockages and the pandemic were generally between 60 and 80 percent of the daily maximum allowed by the permits.

Year	Vehicles	Passengers
2010	5,576	63,142
2011	5,880	62,532
2012	6,470	70,281
2013	6,690	70,615
2014	6,364	67,106
2015	5,753	56,380
2016	5,793	60,069
2017	6,098	64,983
2018	5,305	52,887
2019	2,936	27,833
2020	823	7,658
Source: OMKM r	ecords through Decen	nber 31, 2020.

 Table 3.6
 Number of Permitted Commercial Tour Vehicles & Passengers: 2010 to 2020

During the 2015-2019 period, Rangers reported seeing an increasing number of unpermitted tour operators (those with no UH permit) in the summit area.¹⁶ When they did, the Rangers made contact with suspected unpermitted tours and OMKM issued cease and desist notifications. Rangers worked with DOCARE to address the violations, and DLNR acted on DOCARE-issued citations on adjacent DLNR lands. In addition to collaborating with DOCARE and law enforcement, HAR § 20-26-73 allows an authorized agent, law enforcement officer, or the UH president to issue civil fines on unpermitted commercial tour operators and to exclude them from the UH Management Area.

<u>Astronomy/MKSS/Research/Management Project Proposal Permits</u>. Each year UH receives a number of requests involving "land uses" as that term is defined under HAR Chapter 13-5, which requires approval from DLNR's Office of Conservation and Coastal Lands (OCCL). Under the project review process established by OMKM based on the 2000 Master Plan, OMKM coordinated review by advisory bodies (e.g., KKM, MKMB, EC), University approvals, and community input, before an application was submitted to OCCL for consideration and issuance of Conservation District use permits and approvals by OCCL, DLNR, or BLNR. CMS has now been assigned responsibility for processing such applications.

Examples of astronomy projects are listed above in Table 3.5. MKSS Projects have included such things as continued maintenance and repairs to the summit road, installation of septic tanks at Halepōhaku, minor renovations to the Visitor Information Station, installing fiber optic cables at Halepōhaku, installation of guardrails around culverts on the Mauna Kea Access Road, installation of a remote road surface condition sensor, and installing a photovoltaic system at Halepōhaku.

Research/experiment projects that have requested and received approvals include: (*i*) spectral mineral mapping of the summit cinder cones; (*ii*) history of the ice ages as recorded on Maunakea; (*iii*) measuring of atmospheric pressure, temperature and humidity; (*iv*) acute mountain sickness surveys; (*v*) climate change; (*vi*) study of basaltic rocks under glaciers and ice sheets; (*vii*) astrogeology survey of hydrological outflow features around the base of Pu'upōliahu; (*viii*) testing of a star tracker; (*ix*) use of a portable cosmic-ray muon detector to take cosmic ray data; (*x*) study of arthropod diversity assessment and develop species descriptions on Maunakea; (*xi*) permafrost monitoring; (*xii*) baseline study on surficial geomorphology and erosion monitoring; and (*xiii*) surveys of the distribution of native Hawaiian birds and bats within sub-alpine and alpine habitats on Maunakea. The types of permits that have been issued each year from 2009 through 2020 are shown in Table 3.7.

¹⁶ These increased from 154 in 2014 to 360 in 2016 before dropping back to 244 in 2017. The COVID-19 pandemic reduced the number to near zero during 2020. Rangers estimated that unpermitted tour operators carried and average of 5 passengers on each of these trips.

Year	Astronomy	MKSS	Research/Exp.	Mgmt.	Annual Total
2009	4	-	1	1	6
2010	4	1	-	-	5
2011	5	1	2	-	8
2012	6	2	1	-	9
2013	2	2	5	-	9
2014	5	4	1	-	10
2015	7	2	-	1	10
2016	7	2	4	-	13
2017	5	1	4	2	12
2018	3	2	1	-	6
2019	5	2	3	1	11
2020	3	4	3	1	11
Totals	56	23	25	6	110
Source: OMKM	records through Decen	nber 31, 2020.			

Table 3.7Requests for Project Approvals by Type: 2009 to 2020

<u>Special Requests</u>. UH's Special Request policy was developed to address increasing visitation levels and is consistent with DLNR Special Use Permitting required for groups comprised of ten or more individuals seeking access to their lands. OMKM has reviewed special requests on a case-by-case basis and approved them only if they were for appropriate purposes and the proponents were able to meet transportation, insurance and other requirements. Most of the Special Requests approved have been for activities that are educational in nature (elementary through college), for traditional cultural practice, and/or consist of astronomy guests including scientific review boards and visiting dignitaries. Depending on the participants' ages, time of visit, and stated itinerary, the group may have been required to arrange for a Ranger escort, similar to a film permit.

Year	Approved	Not Approved	Withdrawn	Total
2014	162	13	40	215
2015	113	16	32	161
2016	106	12	25	143
2017	84	13	17	114
2018	102	11	29	142
2019	51	22	6	79
2020	4	6	3	13
Source:	OMKM records			

 Table 3.8
 Outcome of Special Requests Received by OMKM/CMS: 2014-2020

In January 2020, promulgation of the UH Maunakea Rules replaced the Special Request policy for public and commercial groups with a requirement for "Special Use Permits" (SUPs). HAR § 20-26-63 describes SUPs as required for activities otherwise prohibited under HAR Chapter 20-26 and for activities other than research, commercial tour activities, and commercial film and recordings, which have separate permitting. It calls for SUPs to be evaluated for: (*i*) compatibility with the functions and purpose of the UH Management Areas; (*ii*) consistency with existing approved management plans; (*iii*) potential effect on the surrounding resources, existing facilities, and the public's use of the UH Management Areas; (*iv*) compatibility with existing approved uses; (*v*) compatibility with scheduled or ongoing construction, repairs, or maintenance activities; and (*vi*) the applicant's prior record of compliance with conditions of previous permit (if any). It is important to note that the UH Maunakea Rules apply to <u>activities</u> not "land uses," which are still reviewed, processed, and approved by OCCL, DLNR, or BLNR.

<u>3.1.6</u> STAFF TRAINING EFFORTS

A training plan (see Section 3.10.2.2) that went into effect in 2016 addresses general staff training (all OMKM/CMS and MKSS employees & staff), volunteer training, field-personnel training, Visitor Information Staff training, Ranger training, etc. The focus of staff training is to ensure that all those who work on Maunakea have an in-depth grasp of the resources, cultural considerations, and management to enable them to better respond to public questions and be ambassadors for UH and Maunakea.¹⁷ This training is in addition to the User Resource Orientation and training sessions have covered such things as the CMP, invasive species, historic property preservation, and Hālau 'Ōhi'a - cultural principles of resource management.

3.1.7 RANGER PROGRAM / PUBLIC SAFETY

The Maunakea Ranger program was established in 2001. There are currently eight full time and three part-time Rangers. Ranger presence is 365 days a year from 7:15 am to 10:00 pm daily, with at least two Rangers on-duty at all times within those hours. Rangers also sleep at Halepōhaku to be better prepared to respond to after-hours emergencies. Their duties and responsibilities include:

- Patrolling and monitoring activities in the UH Management Areas.¹⁸
- Serving as ambassadors on the mountain by interacting with visitors and sharing information about: (*i*) visitor safety; (*ii*) the natural, historical, cultural, and scientific resources; and (*iii*) management policies on Maunakea.
- Coordinating and managing visitor movements during peak visitation periods, especially on days following heavy snowfall.¹⁹
- Providing first-responder first aid.
- Coordinating with County of Hawai'i and Pōhakuloa Training Area emergency personnel with medical emergencies and search and rescue operations.
- · Assisting visitors with vehicle break-downs or stalls.
- Inspecting the Mauna Kea Access Road for snow and ice, closing it when necessary for safety reasons.
- · Conducting biannual inspections of astronomy facilities for DLNR permit compliance.
- · Maintaining orderly traffic flow.
- Removing invasive plants in the upper elevations as time permits.

¹⁷ The monthly staff trainings have been on hold since Fall 2018. The suspension stems from changes in operations associated first with the protests and then with the COVID-19 pandemic.

¹⁸ In coordination with VIS staff, Rangers help to maintain orderly traffic and parking, cone off hazardous areas including accidents, provide updated notification to all users of road conditions, and provide emergency transport.

¹⁹ A snow event on Maunakea in 2017 coincided with Christmas and favorable weather that reopened the road to the public. Highs approaching 1,200 private vehicles were recorded on the RFID traffic monitor December 25-26, 2017, during which one Ranger estimated 300-400 vehicles on the summit at any one time (Ranger Report, 12/23/2017). Higher visitation was still observed through the first week of January 2018, with about 250-450 total vehicles per day. On normal days, visitor traffic varies between approximately 125-250 vehicles. The majority of summit traffic occurs around sunset. In contrast, between December 2017-January 2018, the maximum daily RFID total for observatory and commercial vehicles was 55 vehicles.

- · Picking-up and properly disposing of trash found in the upper elevations on a daily basis.
- · Shadowing film crews to ensure compliance with the conditions of their permits.
- · Photo-documenting their daily observations and adding these to the OMKM/CMS database.
- · Hiking to Lake Wai'au, which is not in the UH Management Areas, bimonthly to photodocument the lake level and pick up trash.
- · Hiking into the adze quarry, which is not in the UH Management Areas, to monitor activity.
- Assisting foreign visitors having conversational difficulty by communicating with rental car companies, tow services, locksmiths, police, and others.

The Rangers have played a prominent role in documenting the level of vehicular and pedestrian activity within the UH Management Areas that is referenced elsewhere in this OAR. Rangers conduct point-in-time counts of vehicles while on patrol, and a vehicle monitoring system was installed with full-year data available from 2015 onward (see Table 3.9). The data that they have collected show that: (*i*) the problems most frequently encountered by motorists include vehicle stalls/breakdowns, overheating, and flat tires and (*ii*) major and fatal vehicular accidents are often related to brake failure, poor visibility, and/or loss of vehicle control.

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Vehicle Type	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
2WD and 4WD	17,027	20,244	20,967	20,595	18,278	22,115	24,536	21,350	13,769	10,287
Permitted Tours	5,891	6,458	6,680	6,322	5,720	5,783	6,072	5,305	2,936	823
Astronomy	10,049	9,485	9,184	8,631	7,821	7,613	8,182	7,888	6,894	7,562
Source: OMKM record	Source: OMKM records.									

Table 3.9 Ranger Vehicle Counts: 2011-2020

Maunakea Ranger reports provide the best available indication of the level of use of the foot paths and trails on Maunakea. Hikers are asked to register at the VIS and to sign-out once done, and Rangers record hiker-numbers based on visual observation of persons on a specific trail/route, currently the best method to estimate hiker presence on Maunakea. Rangers also proactively check on hikers by inquiring about the hiker's wellbeing, general level of preparation including knowledge of planned route and supplies, and whether the hiker registered.

Yearly totals shown represent activity on the five major hiking routes: Humu'ula Trail, Lake Wai'au Trail, Pu'upoliahu, Pu'uwēkiu, and the Mauna Kea Access Road. Data for the years since the CMP was adopted are shown in Table 3.10.

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
7,958	9,134	13,778	10,240	7,489	4,326	6,126	6,652	8,197	5,112	3,781
Note: Roads	Note: Roadside sign asking visitors to stay off of Pu'uwēkiu was installed August 2014.									
Source: OM	Source: OMKM records.									

3.2 EDUCATION AND OUTREACH

3.2.1 EDUCATION AND OUTREACH PROVISIONS OF THE CMP

Section 7.1.3 of the CMP provides information and management recommendations intended to improve upon education and outreach efforts related to the UH Management Areas. Education

includes providing information about natural, cultural, and astronomical resources to the public, through on-site and off-site materials and programs. <u>Outreach</u> includes activities to increase public participation in the stewardship of Maunakea through community consultation, through community involvement in resource management activities, and through volunteer-based programs.

The "desired outcome" that the CMP seeks to achieve with respect to education and outreach is as follows:

Build and maintain a constituency to engage in active and meaningful stewardship of Mauna Kea, through education and involvement of the public, to support, enhance conservation, and sustain the natural, cultural, and astronomical resources of Mauna Kea.

<u>Education Needs</u>. After summarizing the various educational and outreach efforts that were ongoing at the time it was prepared, the CMP identifies a number of educational and outreach needs that its authors concluded were not then being fully met. These include the following:

- Inadequate education of persons accessing the mountain on a range of issues, such as (*i*) sensitivity to cultural resources; (*ii*) the status and condition of natural resources; (*iii*) threats to resources; (*iv*) the ban on off-road vehicle use; (*v*) the proper way to deal with the health and safety concerns that accrue to visitors to the high-altitude environment; (*vi*) the rules and regulations in effect within the UH Management Areas; and (*vii*) Rangers as a resource.
- The desirability of having visitors undergo a mandatory educational program before traveling above Halepōhaku. At a minimum, the education would consist of viewing an orientation video or program before accessing Maunakea to educate visitors about its cultural, historical and natural resources, along with critical safety information.

Noting that many people visiting and/or working on Maunakea were unaware of the current status of its natural and cultural resources and why certain management activities may be necessary, the CMP directed that the education efforts be aimed at raising awareness and appreciation of the area, for both those who visit and for those who work at Maunakea. It expressed the strong belief that most damage to historic properties and natural resources is done inadvertently or in ignorance, it postulates that public outreach and education that addresses community concerns and needs, while highlighting measures developed to protect Maunakea's resources, would increase support for management activities.

The CMP also stresses the importance of educating those visiting and/or working on Maunakea regarding personal safety and the potential hazards of visiting the mountain. It notes that in addition to protecting the well-being of visitors, education helps conserve management time and resources by reducing the number of instances requiring a response by the support staff, such as calls for search parties or medical assistance.

<u>Outreach Needs</u>. The CMP concluded that additional outreach activities that focus on involving the community in the management decision-making process were needed and recommended that this consist of two major components: (*i*) community consultation and (*ii*) community involvement. Specifically, it highlights the following needs related to each.

- Community Consultation. It recommended that UH increase its effort at community consultation to address concerns that the decision-making process is not transparent and that community members have not been adequately involved. The desired consultation was for a range of activities, including management planning, rule-making, development of cultural protocols, historic preservation, and environmental analyses for new projects. It specifically recommended that the Native Hawaiian community be involved through direct consultation, in addition to their representation in the entities that advise on management, such as Kahu Kū Mauna.
- Community Involvement. The CMP concludes that there is a need to encourage and coordinate community participation in the stewardship of Maunakea through protection and conservation of its cultural and natural resources and that doing this will require educating and informing the public about activities there, including management programs and providing ways for the community to become involved. It also recommends that IfA and the astronomy community become more involved in the greater Hawaiian community in which they operate and live and that it do this, in part, by supporting education and outreach programs focused on astronomy (such as astronomy scholarships and school field trips to 'Imiloa).

The CMP goes on to outline ideas regarding the nature of the education and outreach program. It recommends that the first step be to outline and prioritize education and outreach activities that would build awareness about Maunakea and involve the community in education, volunteer projects, and research aimed at protecting cultural and natural resources. It emphasizes that an orientation program for visitors and workers addressing cultural, environmental, and safety concerns would be a major aspect of the program.

Table 7-4 in the CMP identifies eight "management actions" to address the needs related to education and outreach that it had identified. Those actions, and the extent to which they have been completed, are listed in Table 3.11. Their status is discussed in detail in Section 3.2.2.

Measure	Description	Status	Discussion			
PROGRAM DEVELOPMENT						
EO-1	Develop and implement education and outreach program.	Ongoing	3.2.2.1			
EDUCAT	ION					
EO-2	Require orientation of users, with periodic updates and a certificate of completion, including but not limited to visitors, employees, astronomy staff, contractors, and commercial and recreational users.	Ongoing	3.2.2.2			
EO-3	Continue to develop, update, and distribute materials explaining important aspects of Maunakea.	Ongoing	3.2.2.3			
EO-4	Develop and implement a signage plan to improve signage throughout the UH Management Areas (interpretive, safety, rules and regulations).	Completed/ Ongoing	3.2.2.4			
EO-5	Develop interpretive features such as self-guided cultural walks and volunteer-maintained native plant gardens.	Ongoing	3.2.2.5			
EO-6	Engage in outreach and partnerships with schools, by collaborating with local experts, teachers, and university researchers, and by working with the 'Imiloa Astronomy Center of Hawai'i.	Ongoing	3.2.2.6			

Table 3.11 Status of Measures Related to Education and Outreach

Measure	Description	Status	Discussion
OUTREA	СН		
EO-7	Continue and increase opportunities for community members to provide input to cultural and natural resources management activities on Maunakea, to ensure systematic input regarding planning, management, and operational decisions that affect natural resources, sacred materials or places, or other ethnographic resources with which they are associated.	Ongoing	3.2.2.7
EO-8	Provide opportunities for community members to participate in stewardship activities.	Ongoing	3.2.2.8
Note: A Source: Table	status of "Completed/Ongoing" means that the needed procedures and systems have been com on an ongoing basis.	pleted and are be	ing implemented

Source: Table 7-4, CM

3.2.2 STATUS OF MEASURES RELATED TO EDUCATION AND OUTREACH

3.2.2.1 EO-1: Develop Education and Outreach Program

This element of the CMP calls on UH to develop an Education & Outreach Plan that would: (i) guide development of programs which generate visitor and user awareness about Maunakea's cultural, natural, and scientific resources; (ii) promote health and safety awareness on visiting high altitudes; and (iii) inform the public about the Office of Maunakea stewardship efforts. OMKM, in collaboration with representatives of the Maunakea Observatories, and the Visitor Information Station, completed the "Maunakea Education and Outreach Plan", which addresses the entirety of EO-1²⁰ and portions of CMP management actions EO-3, 5, 6, 7, and 8, and submitted it to MKMB late in 2019 for consideration. Following MKMB input, OMKM finalized the plan in July 2020 and began working to implement it as fully as possible given the constraints that COVID-19 placed upon its resources. The Maunakea Education and Outreach Plan is presently being further reviewed and revised in accord with Executive Policy 10.104 which delegated authority to administer HAR § 20-26-5 regarding required orientation to the executive director of the 'Imiloa Astronomy Center.

The stated purposes of the Maunakea Education and Outreach Plan are to:

- · Contribute to the protection and conservation of State of Hawai'i owned lands on Maunakea, including cultural, natural, and scientific resources.
- · Significantly increase the knowledge of University-supported interpretive opportunities onsite, within the community, and through partners - regarding the heritage, resources, and stewardship of Maunakea.
- · Increase public support and strengthen the constituency for University management of State lands on Maunakea in general, and more specifically the management of the MKSR.
- · Guide the development and implementation of education and outreach programs.

²⁰ The CMP calls for the education and outreach plan to "...outline the process and discuss a venue for mandatory visitor orientation, and community consultations." The program that was formally adopted makes the program "mandatory" only for "users," which Section 1.1.1 of the plan defines as "...individuals working under the auspices of a land-use permit on Maunakea." Examples of users include observatory employees, observatory vendors, University support staff, and other public agency employees. However, mandatory visitor orientation is addressed further in EO-2.

The *Maunakea Education and Outreach Plan* identifies the collective vision, core values, and visitor experience goals that represent an array of interpretive services, media, programs, and outreach activities to communicate UH's mission in accepting stewardship of lands on Maunakea. It also recommends specific actions that should be taken over the next decade.

3.2.2.2 EO-2: Mandatory Visitor Orientation

HAR § 20-26-5 of the UH Maunakea Rules provides that as set forth in the CMP, all persons accessing the UH Management Areas must complete an orientation regarding cultural and natural resources, safety matters, and other relevant information before entering the UH Management Areas. While UH has developed a substantial amount of material that it uses to inform visitors of the nature and sensitivity of the cultural and natural resources that are present, it has tasked 'Imiloa to develop a brief (less than 15 minute) visitor orientation for the general public. The video will be on-line and shared at the VIS as circumstances permit and once infrastructure is available.

3.2.2.3 EO-3: Develop, Update, & Distribute Materials Explaining Important Aspects of Maunakea

The CMP calls on UH to develop and distribute educational materials in a variety of formats covering important aspects of Maunakea. As described in detail in its reports, UH has prepared a variety of printed materials (brochures, maps, newsletters, etc.) covering topics such as safety, cultural resources, natural resources, and recreational activities. It distributes these free of charge from various outlets (e.g., VIS, Halepōhaku, IfA/OMKM/CMS office in Hilo, 'Imiloa, commercial tour operators, etc.). It is also developing more interactive web-based products that it believes reach a broader audience.

CMS has increasingly used its <u>website</u> to make available information on the natural and cultural resources found at Maunakea, and on visiting the mountain safely and responsibly. The website contains versions of brochures available at the VIS and user entrance requirements and rules and regulations. It is also used to distribute up-to-date information, such as documents, meeting agenda and minutes, results of scientific studies, etc.) that help keep the public informed. Many, but not all of, the potential topics mentioned in the CMP are already being addressed, and the range of topics covered is constantly being expanded. UH is working towards having all of the orientation and educational materials available in the Hawaiian language as well as English, but considerably more remains to be done in this regard.

3.2.2.4 EO-4: Develop Signage Plan

OMKM staff completed an inventory of the signs present on Maunakea in 2012. OMKM developed an internal draft signage plan for Maunakea in 2016 that was subsequently reviewed by the MKMB, and a draft of the plan was released to the public on February 6, 2017. It describes the underlying legal and policy requirements, presents a sign policy, describes the different types of signs that are allowed, provides guidance on sign design, installation, and maintenance, and presents a review and approval process for signage. The Signage Plan was formally adopted by the MKMB on February 14, 2017, and it has guided the design, installation, and maintenance of all official signage on the mountain since that time.

3.2.2.5 EO-5: Develop Interpretive Features and Activities

This element of the CMP calls for UH to develop interpretive features such as self-guided cultural walks and volunteer-maintained native plant gardens. This work is intended to make information about and interaction/experience with cultural and natural resources more available to those visiting the upper slopes of Maunakea.

UH has progressed farthest with respect to the natural resources part of this measure. It has worked with DLNR to improve the fence around the Silversword enclosure at the VIS and to establish an area of native vegetation as part of the recently completed expansion of the parking immediately below the VIS. Some of the restoration and even more of the maintenance of these re-vegetated areas has been done with the help of volunteers. Interpretive signage has been installed to call out the particular value of the restored areas. Finally, UH has committed to fencing other high-value vegetation within the UH Management Areas if resource managers determine that this is needed.

UH has also progressed on the cultural aspects of this management action and plans to implement additional measures in the near future. For example, UH has led or contributed to programs that provide guided experiences on Maunakea, such as the Kama'āina Observatory Experience, that included a cultural component. 'Imiloa has started planning new and improved displays that focus on cultural resources; some have already been installed at the VIS and others will be installed as they become available. Furthermore, this management action includes efforts to keep people away from vulnerable resources or sensitive cultural practices that are unsuitable for public visitation or can be adversely affected by the general public. CMS has coordinated with cultural practitioners to identify areas where access should be restricted and facilitate privacy for sensitive cultural practices.

Based on input from advisory groups, concerns related to health and safety, and the imperative to conserve the resources, UH has not yet implemented other possibilities for interpretive features mentioned in the CMP, e.g., (*i*) a self-guided tour (using brochures or podcasts) of geological resources at the summit; (*ii*) development of one or more small pull-out gardens along the Mauna Kea Access Road, from Halepōhaku to the Summit, planted with representative vegetation and accompanying interpretive signage, to illustrate change of vegetation communities with an increase in elevation; or (*iii*) designate historic properties suitable for public visitation.

3.2.2.6 EO-6: Engage in Outreach and Partnerships

As documented elsewhere in this OAR (e.g., Section 3.1.3) and in Appendix D of its 2020 Annual CMP status report to DLNR (see Appendix A), UH has engaged in extensive public outreach. It has also entered into partnerships with many schools by collaborating with local experts, teachers, and university researchers, and by working with the 'Imiloa Astronomy Center, which is a part of UH Hilo.

Partnership efforts have included, but are not limited to a June 2014 West Hawai'i Science Technology Engineering & Math (STEM) camp presentation on maps and drones to primary school students at summer camp done in partnership with STEM Works and Kealakehe Robotics and a June 2017 partnership with the American Association for the Advancement of Science Pacific Division in an OMKM sponsored session called "Student Science Conference" for middle and High School student science projects. In addition, while it has not formally joined as a

member, staff from OMKM has regularly participated in meetings of the Maunakea Watershed Alliance and, where possible, has supported its initiatives. CMS is committed to continuing that effort.

3.2.2.7 EO-7: Create Opportunities for Community Input on Resource Management

This element of the CMP calls on UH to continue and expand opportunities for community members to: (i) provide input to cultural and natural resources management activities on Maunakea and (ii) ensure systematic input regarding planning, management, and operational decisions that affect natural resources, sacred materials or places, or other ethnographic resources with which they are associated. It recommends that outreach efforts include such things as contacting local civic and environmental groups, local experts in natural and cultural resources, families with lineal and historic connections to Maunakea, kūpuna, cultural practitioners, the Office of Hawaiian Affairs and other Native Hawaiian groups. The CMP further notes that input should be gathered during both public meetings and more informal private consultations with community members. It advises OMKM/CMS to maintain a list of interested individuals, families, and organizations who should be notified and consulted when individual development projects requiring regulatory review (e.g., outreach and consultation required by state and federal historic preservation and environmental laws) are proposed or when other issues arise that may be of public interest. Finally, it cautions that while web sites and email list-serves can and should be used to distribute information pertinent to the community and to keep the public informed, other mechanisms (e.g., telephone, regular mail, meetings, a web-based forum, and a comment box at the VIS) may be required to reach all interested parties.

As documented in its annual reports to the BLNR and in this OAR, UH has created the opportunities for input that are called for in the CMP. Specifically, OMKM/CMS through the MKMB, Kahu Kū Mauna, and special committees such as the EC have provided an ongoing opportunity for members of the community and other organizations to contribute their ideas on how best to manage activities of the mountain. These meetings, as well as opportunities to participate in bi-monthly volunteer activities provide an opportunity for the community to participate in work that helps maintain and restore the mountain and to share their extensive knowledge about it.

A specific example involved the recent review, approval, and adoption of the UH Maunakea Rules. For that effort, UH held several rounds of public meetings at various locations seeking input on iterative drafts of the UH Maunakea Rules. The opportunities for comments that these created resulted in the receipt of hundreds of oral and written comments that were considered by UH and the BOR, and the rules that were ultimately adopted incorporate many of the items that commentors suggested. Outreach was wide-ranging and included open houses and small meetings with groups and persons representing specific interests, such as native Hawaiian cultural practitioners, relevant agencies including OHA and DLNR, observatories, and commercial tour operators.

3.2.2.8 EO-8: Provide Community Opportunities to Participate in Stewardship Activities

Measure EO-8 in the CMP calls on UH to provide opportunities for community members to participate in stewardship activities. Examples of these include public meetings, workshops,

meetings with citizen advisory and "friends" groups, volunteer opportunities and school-related programs that will help involve children. Additionally, the CMP recommends:

- The consideration of establishing a docent program to provide guided tours highlighting cultural and natural resources.
- Developing service projects that fulfill stewardship objectives while also providing education and enjoyment to volunteers.²¹

It recommends that OMKM cooperate and collaborate with other state and federal agencies that run volunteer-based projects to increase the volunteer pool and conduct larger-scale projects than would be possible with only its own dedicated resources.

As documented in its annual reports to the BLNR and in this OAR, OMKM has created many of the opportunities for participation that are called for in the CMP. These include such things as:

- Arranging bi-monthly volunteer activities that provide an opportunity for the community to participate in conservation efforts and to share their knowledge with University staff and other volunteers.
- Conducting regular meetings of the MKMB, Kahu Kū Mauna, and special committees like the EC that provide opportunities for members of the community to discuss and participate in the management of the mountain.
- Providing guided tours, such as the Kama'āina Observatory Experience, that highlight cultural and natural resources.
- Stationing a CMS natural resources representative at Halepōhaku to inform people about the out-planting efforts, species, and success.
- Supporting student projects and providing mentoring opportunities (science fair, legacy, etc.) that allow for one- on-one interaction and more in-depth efforts.

3.2.3 ADDITIONAL MEASURES RELATED TO EDUCATION AND OUTREACH

Based on the information presented above, UH anticipates that the CMP management actions related to Education and Outreach that are ongoing will continue to adapt and evolve, but it does not believe any entirely new measures are needed.

²¹ The CMP gives the following as examples of the kinds of efforts it deems appropriate for different types of projects. Projects related to natural resources: (i) basic maintenance (trash pick-up and inspection for damage to facilities or signs); (ii) care of the botanical enclosure (weeding, watering, and inspecting the enclosure); (iii) enhancing native plant communities (weeding, outplanting, and care of native species around VIS and dormitories); (iv) trail maintenance and development; and (v) restoration projects for native plant communities. For projects related to cultural resources, it mentions training of archaeology students in field methods during the monitoring of historic properties.

3.3 ASTRONOMICAL RESOURCES

3.3.1 PROVISIONS OF THE CMP REGARDING ASTRONOMICAL RESOURCES

Section 7.1.4 of the CMP provides information and management recommendations intended to preserve the conditions that make Maunakea so well-suited for astronomy research. The "desired outcome" that the CMP seeks to achieve with respect to astronomy resources is as follows:

Astronomical resources shall also be protected. The University's lease of the summit area provides that the scientific reserve shall be operated as a buffer zone to prevent the intrusion of activities incompatible with the use of the land as a scientific complex or observatory. The lease specifically recognizes light and dust interference as well as certain types of electronic interference as incompatible.

The CMP lists the two management actions shown in Table 3.12 that are needed to achieve the desired level of protection of astronomical resources. As indicated in that table and in the discussion in Section 3.3.2, UH has established and is implementing procedures that are protective of the astronomical resources.

Measure	Description	Status	Discussion
AR-1	Operate the UH Management Areas to prohibit activities resulting in	Ongoing	Sec. 3.3.2.1
	negative impacts to astronomical resources.		
AR-2	Prevent light pollution, radio frequency interference (RFI) and dust.	Ongoing	Sec. 3.3.2.2
Source: Table	e 7-5, CMP.		

 Table 3.12 Status of Measures Related to Protection of Astronomy Resources

3.3.2 STATUS OF MEASURES RELATED TO ASTRONOMY RESOURCES

3.3.2.1 AR-1: Prohibit Activities That Negatively Impact Astronomical Resources

In addition to the clauses that are in the sub-leases that UH has granted to various observatories, UH has included provisions in the UH Maunakea Rules that provide the protection called for in the CMP.²² Specifically, HAR § 20-26-23 preserves scientific and educational resources by prohibiting activities within the UH Management Areas north of Halepōhaku, as follows:

- 1. Using any radio transmitter, including but not limited to two-way radios, Wi-Fi and Bluetooth devices, and cellular telephones; provided that, cellular telephones may be used for emergency purposes or when radio transmission is suspended, for example by using airplane mode.
- 2. Directing artificial illumination, for example, lasers and flashlights, at or near observatories.
- 3. Conducting any other activity that materially interferes with the scientific and educational operations of the astronomical facilities or research equipment or with the protection of scientific resources.

²² The subleases provide that the land be used by the Lessee as a scientific complex, including without limitation thereof an observatory, and as a scientific reserve being more specifically a buffer zone to prevent the intrusion of activities inimical to said scientific complex. Activities inimical to said scientific complex shall include light and dust interference to observatory operation and certain types of electric or electronic installation on the demised lands, but shall not necessarily be limited to the foregoing.

These provisions, together with the restrictions on vehicular travel on the mountain contained in HAR § 20-26-38, will ensure that the Maunakea's astronomical resources are preserved.

3.3.2.2 AR-2: Prevent Light Pollution, Radio Frequency Interference (RFI) and Dust

UH has included provisions in its UH Maunakea Rules that specifically prohibit using radio transmitters except for emergency purposes (e.g., HAR § 20-26-23(1)). Similarly, HAR § 20-26-23(2) prohibits artificial illumination (including lasers and flashlights) at or near the observatories. Finally, HAR § 20-26-23(3) broadly prohibits <u>all activities</u> (including those that would generate dust) that might materially interfere with the educational and scientific operations of the astronomical facilities or research equipment that is situated there. Taken together, these provisions provide the degree of protection called for in AR-2.

3.3.3 ADDITIONAL MEASURES RELATED TO ASTRONOMICAL RESOURCES

No need for additional measures to protect astronomical resources has been identified.

3.4 ACTIVITIES AND USES

3.4.1 PROVISIONS OF THE CMP REGARDING ACTIVITIES AND USES

Section 7.2.1 of the CMP contains information and management recommendations related to the management of scientific research work, cultural and religious activities, and recreation activities and uses within the UH Management Areas. While recognizing that the best known and most prominent activity there is astronomical research, it also references other types of ongoing scientific research, including that related to geology, meteorology, biology, and archaeology. It also refers to the cultural and religious practices associated with the mountain, including prayer, burial, and other rituals and the construction of small shrines. Finally, it acknowledges the value of the recreational activities that occur in the UH Management Areas, including sightseeing, stargazing, skiing and snow-play, hiking, biking, hunting, and the attraction to visitors wishing to see the natural beauty and scenic vistas.

The "desired outcome" that the CMP seeks to achieve with respect to activities and uses is as follows:

To retain and enhance recreational and cultural activities, ensure regulation of commercial activities, and support scientific studies while maintaining adequate protection of resources, educating users regarding resource sensitivity, and ensuring the health and safety of those visiting or working at Maunakea.

The CMP observes that public use of Maunakea has increased immensely since the State constructed the Mauna Kea Access Road. It concludes that a managed access policy would help protect resources, enhance visitor safety, and maintain the unique qualities of the mountain. It also emphasizes that one of the best methods of minimizing damage to resources is through education such as that discussed under other headings in this OAR. The rules that are contained in HAR Chapter 20-26 provide the framework within which managed access can be fully implemented.

Table 7.6 in the CMP lists what it refers to as "Permitted General Uses," Table 7-7 in the CMP lists what it refers to as "Permitted Public Uses," and Table 7-8 in the CMP lists what it refers to

as "Permitted Commercial Uses." Many of those are the same as those that are included in HAR Chapter 20-26, which is consistent with the provisions of the CMP and has replaced it as the governing document.

Table 7-9 in the CMP identifies 12 additional "management actions" to address the needs related to activities and uses that it had identified. Those actions, and the extent to which they have been completed, are shown in Table 3.13. Their status is discussed in detail in Section 3.4.2.

Measure	Description	Status	Discussion
GENERA	L MANAGEMENT		•
ACT-1	Continue and update managed access policy of 1995 Management Plan.	Completed/ Ongoing	3.4.2.1
ACT-2	Develop parking and visitor traffic plan.	Completed/ Ongoing	3.4.2.2
ACT-3	Maintain a presence of interpretive and enforcement personnel on the mountain at all times to educate users, deter violations, and encourage adherence to restrictions.	Completed/ Ongoing	3.4.2.3
ACT-4	Develop and enforce a policy that maintains current prohibitions on off-road vehicle use in the UH Management Areas and that strengthens measures to prevent or deter vehicles from leaving established roads and designated parking areas.	Ongoing	3.4.2.4
RECREA	TIONAL		
ACT-5	Implement policies to reduce impacts of recreational hiking.	Completed/ Ongoing	3.4.2.5
ACT-6	Define and maintain areas where snow-related activities can occur and confine activities to slopes that have a protective layer of snow.	Ongoing	3.4.2.6
ACT-7	Confine University or other sponsored tours and star-gazing activities to previously disturbed ground surfaces and established parking areas.	Ongoing	3.4.2.7
ACT-8	Coordinate with DLNR in the development of a policy regarding hunting in the UH Management Areas.	Completed/ Ongoing	3.4.2.8
COMME	RCIAL		·
ACT-9	Maintain commercial tour permitting process; evaluate and issue permits annually.	Ongoing	3.4.2.9
ACT-10	Ensure OMKM input on permits for filming activities.	Completed/ Ongoing	3.4.2.10
ACT-11	Seek statutory authority for the University to regulate commercial activities in the UH Management Areas.	Completed	3.4.2.11
SCIENTI	FIC RESEARCH		
ACT-12	Ensure input by OMKM, MKMB, and Kahu Kū Mauna on all scientific research permits and establish system of reporting results of research to OMKM.	Ongoing	3.4.2.12
Note: A	status of "Completed/Ongoing" means that the needed procedures and systems have been c on an ongoing basis.	completed and are be	ing implemented
Source: Table			

 Table 3.13 Status of Management Actions Related to Activities and Uses

<u>3.4.2</u> STATUS OF MEASURES RELATED TO ACTIVITIES AND USES

3.4.2.1 ACT-1: Update and Implement Managed Access Policy

This measure calls for UH to adopt administrative rules that would allow it to better manage access and protect resources. HAR § 20-26-38 provides UH the authority and mandate to:

- · Install a gate or other control structure (with the approval of the BLNR) to manage vehicular access to the UH Management Areas.
- Close or limit access to all or portions of the UH Management Areas, when needed for protection from hazardous conditions, including but not limited to inclement weather conditions, construction or maintenance activities on or near the roadway or at astronomy sites, transportation of wide, heavy, or otherwise hazardous loads, or roadway congestion.
- · Limit access by private vehicles for public safety and welfare, for the protection of resources, and to reduce congestion. Restrictions may include, but are not limited to, setting a maximum number of private vehicles allowed within the UH Management Areas at a time, restricting the areas in which private vehicles may operate, or utilizing shuttle vehicles in lieu of private vehicles.
- · Limit public access hours for the UH Management Areas, provided that hunting be allowed pursuant to hunting rules.

The CMP notes that a key component of a managed access program will be visitor registration and orientation to ensure that all who work at or visit Maunakea are taught about its unique, sensitive landscape, potential impacts of activities, health and safety issues, and rules and regulations. Accordingly, it calls for UH to develop and implement an "entrance control protocol" to manage the Mauna Kea Access Road and the number of visitors at the summit. It envisions managing access to the summit region using a control point, with registration required for travel beyond Halepōhaku.

The CMP does not attempt to define the logistics of implementing the access control process, but it does note that it would include establishment of an entrance kiosk at Halepōhaku and states that signage stating hours of operation and access policies shall be displayed prominently, including at the entrance kiosk. It goes on to state that information and warnings regarding such things as: (*i*) personal safety, (*ii*) protection of historic properties; (*iii*) invasive species; (*iv*) off-road vehicular use; (*v*) hiking off trail; (*vi*) exposure to high winds, and leave-no-trace practices should be distributed to all those desiring to proceed above Halepōhaku and call for an orientation program that would ensure visitors are educated on safety and resources issues as well as on prohibited uses. Finally, the CMP explicitly states that entrance fees may be charged at the discretion of UH under its rule-making authority.

3.4.2.2 ACT-2: Develop Parking and Visitor Traffic Plan

As documented in its annual reports to the BLNR, UH has used capital improvement funds to implement various ingress/egress upgrades and area improvements to address concerns of traffic flow and pedestrian safety. These include such things as: (*i*) the construction of a new paved parking lot and an ingress access lane at the VIS (see CMP IM-9) and (*ii*) evaluation of Mauna Kea Access Road repair and improvements. The work in the vicinity of the VIS has improved vehicle and pedestrian flow and safety. In addition, the automated vehicle-counter that OMKM has installed on the Mauna Kea Access Road provides accurate information concerning the number of vehicles that drive above Halepōhaku. Finally, the Rangers provide important field support for the management of vehicles that aggregate at and around the VIS. That assistance helps maintain order, allows the facility to function efficiently and accommodate the greatest number of vehicles possible during peak periods, and improves the safety of visitors to the VIS.

Now that HAR Chapter 20-26 has been promulgated, UH is in a position to enforce those CMP management actions that have parallel provisions in it. If fully implemented, those measures (including the possible institution of a shuttle system) have the potential to significantly reduce visitor-related vehicular traffic on the Mauna Kea Access Road, with the greatest reduction felt on the particularly sensitive stretch above Halepōhaku.

3.4.2.3 ACT-3: Interpretive and Enforcement Personnel

This management action calls on UH to maintain a presence of interpretive and enforcement personnel on the mountain at all times to educate users, deter violations of the applicable rules, and encourage adherence to restrictions. UH's establishment of, and on-going support for, the Ranger program and its implementation of the provisions of HAR Chapter 20-26 fully implement this measure.

As described in Section 3.1.7, the Rangers are present year-round from 7:15 am to 10:00 pm daily, monitor activities, help educate people about Maunakea, pick up trash, address public safety and provide first aid, assist in the coordination with County of Hawai'i emergency responders in search and rescue efforts,²³ and perform other tasks. Twice annually the Rangers conduct inspections of the summit and Halepōhaku facilities for compliance with their Conservation District use permits.

Various provisions of the UH Maunakea Rules are particularly germane to the enforcement aspects of this CMP recommendation. For example, HAR § 20-26-73(a) provides that "[a]n authorized agent, law enforcement officer, or the president shall impose…sanctions for violations of these rules or permits issued pursuant to these rules." Likewise, HAR § 20-26-74 provides that "[a]n authorized agent or law enforcement officer has the power(s) to issue a citation for any violation of the provisions of this chapter."²⁴

3.4.2.4 ACT-4: Establish/Enforce Policy and Regulations Prohibiting Off-Road Vehicle Use

The CMP calls attention to the fact that off-road vehicle use has the potential to irreversibly damage cultural and natural resources and calls for their prohibition <u>except</u> on roads or trails and in parking areas specifically designated for their use. Recognizing that successful implementation of this prohibition will require a significant educational effort, it calls for the off-road vehicle policy for the UH Management Areas to be advertised widely and for UH to coordinate closely with DLNR to ensure that all off-road vehicle users of the adjacent land areas (Natural Area Reserve and Forest Reserve) are informed of the policy.

In full alignment with this provision of the CMP, HAR § 20-26-28 generally prohibits driving, operating, or using any motorized or non-motorized vehicles in areas not specifically designated for that purpose. This prohibition is explicitly called out on all permits and other authorizations that UH issues for travel on its managed lands above Halepōhaku. It is also displayed prominently in printed material distributed at the VIS and on the CMS website.

²³ DOCARE officers and Hawai'i County Police are called for assistance on an as-needed basis.

²⁴ The UH Maunakea Rules define "Authorized agent" as a person, persons, or entity authorized by the president, to act on the president's behalf under this chapter.

CMS' educational efforts, the presence of the Maunakea Rangers, and the authority that the adoption of HAR Chapter 20-26 gives UH to enforce the prohibition on unauthorized off-road vehicle use has greatly reduced the incidence of off-road vehicle use. Failure to comply with the UH Maunakea Rules may result in penalties, as provided for in HAR § 20-26-73 and § 20-26-74.

3.4.2.5 ACT-5: Implement Policies to Reduce Impacts of Recreational Hiking

The CMP calls on UH to keep a well-maintained trail network as a means of minimizing the development of new, unwanted trails by individuals and groups. It recommends that any proposal for the creation of a new, formalized trail or substantial alteration of an existing route be subject to review by SHPD.²⁵ The CMP also calls for UH to delineate the trail network on maps that it makes available to the public, to mark the trails with signs, and to assign members of the Rangers to patrol them. It recommends that hikers be asked to self-register at the VIS, be provided with maps, and informed that hiking off trail is prohibited and about safety concerns, including that hiking alone at high elevations is dangerous and discouraged. Finally, the CMP calls for all unwanted trails to be removed and the terrain restored insofar as is practical.

UH has taken a number of actions to fully implement this measure. HAR § 20-26-21(10) specifically prohibits hiking, conducting nature study, or conducting any activity on pu'u unless on designated trails or roads, except by written permit. HAR § 20-26-28(2) prohibits "[d]riving, operating, or using any motorized or non-motorized vehicle in areas and on roads or trails unless designated for that use." In addition, UH:

- Always consults with the SHPD when considering the possible creation of a new, formalized trail or substantial alteration of an existing route.
- Has prepared a map delineating trails within the UH Management Areas and makes it available at no charge to the public both at the VIS and on-line.
- Has marked trailheads with informational and warning signs.
- · Assigns Rangers to patrol trails on an as-needed basis.
- Encourages hikers to self-register at the VIS, provides them with maps, and distributes materials informing hikers that hiking off trail is prohibited and about safety concerns, including that hiking alone at high elevations is dangerous and discouraged. Table 3.10 summarizes the number of hikers observed by the Rangers.

While UH has posted signs discouraging use of some existing trails (e.g., trails to the summit of Poli'ahu and to Kūkahau'ula the highest point on Maunakea), it has not removed those trails and they continue to be used.

3.4.2.6 ACT-6: Regulate Snow Play

The CMP recognizes the public's desire for limited public access to the summit for "snow play" (which it defines as skiing, sledding, snowboarding or other recreational activities involving snow). The CMP recommends that areas suitable for snow-play be designated on maps, using temporary signs, or through directions given by Rangers. It further calls for the monitoring of

²⁵Actions of this sort are also subject to Chapter 343, HRS and the implementing environmental regulations (HAR 11-200).

areas that are used for snow play for adverse effects once the snow is gone. Finally, the CMP calls for snow-play activities to be confined to areas with a layer of snow deep enough to provide protection to resources.

The Rangers maintain a constant presence on the summit region during periods when snow may attract the public and the Mauna Kea Access Road is open. They generally perform several functions to improve safety, including:

- Warning persons who appear likely to engage in activities that will be dangerous to themselves, others, or to the mountain's cultural or natural resources when they believe such a warning is appropriate.
- · Directing people to areas where snow is deepest.
- Establishing one-way traffic flow on the summit loop road so that vehicles are able to move safely when the designated parking areas are full and many cars are parked along the sides of the roadway.
- · Cleaning up the trash and garbage that is invariably left behind.

CMS is working on additional measures to address this management action, including temporary signage.

With the adoption of the UH Maunakea Rules, UH is in a position to better manage this activity. Specifically, HAR § 20-26-39 provides UH authority to restrict and/or prohibit skiing, snowboarding, sledding and other similar winter or snow sports to maintain public safety and welfare, to prevent damage to resources, and to minimize conflicts among visitors. It also prohibits formally or informally organized contests, meets, or competitions, snow play tours, or other similar events for skiing, snowboarding, sledding or other forms of snow recreation or snow activities and the operation of snowmobiles, all-terrain vehicles, or other motorized vehicle used for snow recreation. Citations may also be issued for vehicles not parked in designated areas under HAR § 20-26-28(4).

3.4.2.7 ACT-7: Confine Commercial Activities to Limited Areas

The CMP calls on UH to confine tours and stargazing activities to previously disturbed ground surfaces and established parking areas. As discussed below, UH has complied and continues to comply fully with this management action.

HAR Chapter 20-26 contains regulations governing all aspects of commercial tour activities on UH Management Areas.²⁶ HAR § 20-26-61(3) authorizes the issuance of permits for commercial tour activity. HAR § 20-26-64 authorizes UH to issue permits allowing entities to conduct commercial tours or transport passengers for hire within the UH Management Areas. HAR § 20-26-64(c) requires that each commercial tour permit application be evaluated for its: (*i*) compatibility with the functions and purpose of UH Management Areas; (*ii*) consistency with existing approved management plans; (*iii*) potential effect on the surrounding resources, the

²⁶ The regulations state: "Commercial tours" means the transport of people for compensation for the purpose of engaging in public activities within the UH Management Areas, including but not limited to transport by cars, sport utility vehicles, trucks, taxis, vans or buses.

existing facilities and infrastructure, and the public's use of the UH Management Areas; (*iv*) compatibility with existing approved uses; (*v*) compatibility with scheduled or ongoing construction, repairs, or maintenance activities; (*vi*) the applicant's prior record of non-compliance with permit conditions, or of violations; and (*vii*) the quality of the educational aspects of the activity, the comprehensiveness of planned staff training, the inclusion of safety protocols, and the extent to which additional practices are incorporated to ensure customer and public safety and welfare and to protect the resources of the UH Management Areas.

HAR § 20-26-64 gives UH considerable flexibility in the way that it manages commercial tour activities. Specifically, it provides that this may be done through issuance of one or more concession agreements in lieu of, or in addition to, commercial tour activity permits. It also allows for UH to enter into an agreement with another public agency to manage commercial tour activities and transportation of passengers for hire within the UH Management Areas. Such agreements may be in lieu of, or in addition to, written permits or concession agreements for such purposes. Finally, it allows fees to be charged and for the imposition of whatever terms and conditions are necessary or appropriate to reduce congestion, protect the resources of the UH Management Areas, and protect safety and welfare.

UH limits commercial star gazing activities to: (*i*) designated parking areas along the Mauna Kea Access Road above Halepōhaku and (*ii*) previously disturbed areas within Halepōhaku that are suitable to star-gazing.

3.4.2.8 ACT-8: Coordinate with DLNR Regarding Hunting Policy

This measure in the CMP requires UH to work with DLNR to establish a clear policy regarding recreational hunting within the UH Management Areas. As outlined below, UH has, through its UH Maunakea Rules, codified the hunting policy on the UH Management Areas and ensured that hunting rights are preserved there.

HAR § 20-26-3, which addresses the general applicability of UH's rules, states (in subsection (c)):

"Where overlapping jurisdictions within UH management areas are present, including but not limited to department of land and natural resources administrative rules pertaining to conservation districts, forest reserves, historic preservation, <u>hunting</u> [emphasis added], and natural area reserves, those rules shall govern."

Subsection (d) further states that the rules will be implemented in such a way as to allow hunting in accordance with DLNR's hunting rules. Complementary assurances regarding hunting are provided elsewhere in the regulations [see, for example, HAR § 20-26-4; HAR § 20-26-21(8); HAR § 20-26-27; HAR § 20-26-32; and HAR § 20-26-38(c)].

3.4.2.9 ACT-9: Oversee Commercial Tour Permitting Process

The CMP calls on UH to review the commercial tour permitting process at regular intervals to determine any changes that should be made in view of relevant information relating to permit violations or impacts to cultural and natural resources. It also recommends that commercial tour permits include a requirement for an orientation and for University review and approval of brochures and/or maps distributed by commercial operators. Finally, it recommends that

commercial permit funds collected continue to be deposited into a revolving fund²⁷ used to support management of the mountain.

As discussed elsewhere in this OAR (e.g., Section 3.4.2.7), UH maintains close oversight and control of the commercial tour permitting process. Specific requirements are spelled out in HAR § 20-26-64, entitled "Commercial tour activity permits." Accordingly, UH is continuing to comply fully with this measure.

In collaboration with UH Mānoa's School of Travel Industry Management, in 2019 UH initiated a study intended to assess the capacity for commercial tour operations and public visitation on the UH Management Areas and assess reasonable fees. Unfortunately, data collection efforts have been hampered by road blockades associated with demonstrations against the TMT project and imposed travel limitations in response to the COVID-19 pandemic. Because of this, no results or information are yet available. However, UH expects data on future conditions will provide valuable insights to guide changes, if any, to the commercial tour permitting process to address impacts.

3.4.2.10 ACT-10: Advise Regarding Film Permits

The CMP stipulates that UH be provided an opportunity to review all applications for film permits on Maunakea that are initiated through the State of Hawai'i Film Office. As discussed below, UH has established and is continuing to implement procedures that are consistent with this mandate.

As provided for in HAR § 20-26-65, commercial video, digital, film, still photography, or any other visual and audio recordings may not be taken within the UH Management Areas without a written permit issued by the State Department of Business, Economic Development and Tourism Hawai'i Film Office. All film permits must be reviewed by UH before they are issued, and UH is authorized to recommend approval or denial of each permit application,²⁸ may require specific conditions, and may request fees, insurance, performance bonds, or deposits to cover administrative and personnel expenses or potential damages to resources associated with the proposed activity. However, ultimate authority remains at DBEDT's Hawai'i Film Office.

3.4.2.11 ACT-11: Seek Statutory Authority to Regulate Commercial Activities

At the time the CMP was adopted, UH had no express statutory or regulatory authority to issue permits for commercial activities, and the CMP's authors observed that statutory amendments allowing UH to control these activities in a manner consistent with this CMP would be beneficial. The CMP notes that a wide variety of commercial activities had been proposed over the years, including concessions, resource extraction, and special events. It recommended that special one-time or yearly events (e.g., conferences, cultural festivals or other permitted organized gatherings) be required to obtain a permit limiting the number of participants, fees, and other conditions imposed on daily commercial operators such as insurance requirements. It also concluded that fees generated from commercial projects, such as one-time events, be deposited into the fund used

²⁷ The CMP uses the term "revolving fund." The funds are deposited into the Mauna Kea lands management special fund established in HRS § 304A-2170.

²⁸ Film permit applications are submitted to the State of Hawai'i Film Office. That office informs the University of all requests to film within the UH Management Areas. The University makes its recommendations to the Film Office, and then that office makes its determination.

to support management of the mountain and recommended that requests for commercial activities permits be subject to review and approval by UH and DLNR. Other CMP recommendations were that: (*i*) commercial events expected to draw a large number of visitors or that would be ongoing be subject to community input; (*ii*) cultural- and eco-tours be subject to the same conditions as required for commercial tours; and (*iii*) cultural tour operators be required to consult with Kahu Kū Mauna and SHPD to determine which sites are appropriate for visitation. Finally, the CMP recommends that Commercial permits <u>not</u> be granted for snow-play tours, ski meets, or any snowplay events.

Some of these recommendations may be allowed under HAR § 20-26-63, entitled "Special use permits." SUPs may be issued to allow activities otherwise prohibited by the UH Maunakea Rules. Such activities may be allowed if they are compatible with the functions and purpose of the UH Management Areas and consistent with approved management plans. UH is required to evaluate each special use permit application for such things as: (*i*) compatibility with the functions and purpose of the UH Management Areas; (*ii*) consistency with existing approved management plans; (*iii*) potential effect on the surrounding resources, the existing facilities, and the public's use of the UH Management Areas; (*iv*) compatibility with existing approved uses; (*v*) for compatibility with scheduled or ongoing construction, repairs, or maintenance activities; and (*vi*) the applicant's prior record of non-compliance with permit conditions, or of violations. Issuance of a permit requires the payment of fees that are set in accordance with HAR § 20-26-6 and compliance with additional terms and conditions UH deems necessary to protect the resources of the UH Management Areas and to protect safety and welfare.

3.4.2.12 ACT-12: Oversee Research Permits

Section 7.2.1 of the CMP states the following regarding research permits and proposals.

Currently, research activities in the Conservation District are regulated by the DLNR and/or BLNR pursuant to the Conservation District rules. DLNR and BLNR shall consult OMKM, MKMB and/or Kahu Kū Mauna, as appropriate, regarding permit applications for research in the UH Management Areas. If research is proposed near known historical or cultural sites, SHPD and Kahu Kū Mauna shall be consulted, as appropriate. Research activities must be consistent with the CMP and the Conservation District rules. Appropriate and enforceable conditions may be placed on permits to help regulate and monitor any type of disturbance and incidental take or damage. All permits relating to the study of cultural, archaeological or natural resources shall contain a condition requiring that the results be reported to OMKM for inclusion in OMKM's database or to establish baseline information. Research projects that contribute to improved management decisions, address existing data gaps, and further the objective of protecting natural and cultural resources should be approved if in compliance with this CMP and the Conservation District rules.

Research shall be conducted as to have minimal impact on cultural and natural resources. Potential effects include inadvertent alteration of shrines, other archaeological sites, or burial sites by researchers; alteration of the landscape by installing permanent equipment or instruments; visual intrusion by installed equipment or instruments in the historic district; habitat disturbance through access and sampling, and the potential for introduction or spread of invasive species. Research must use best practices to minimize negative effects on cultural, archaeological and natural resources. In order to minimize effects on astronomical research, projects must control dust and light conditions near the summit. The use of equipment or instruments that emit radio or sound waves shall be prohibited, unless special permission is granted after consultation with IfA and OMKM. In evaluating requests for incidental take related to research projects the reviewer shall consider whether the resources to be collected can be obtained elsewhere and whether collection will severely deplete or damage the integrity of the resource.

In accordance with this guidance, OMKM has sought and CMS is continuing to seek input from all relevant parties on all requests for scientific research permits within the UH Management Areas. They have also worked to ensure that: SHPD and Kahu Kū Mauna are consulted, as appropriate, whenever research is proposed near known historical or cultural sites. OMKM has typically recommended project-specific conditions it believes should be included in those research project permits that are issued, and CMS presently anticipates continuing that practice.

In general, research permit conditions are intended to help ensure that activities are properly regulated and monitored for any type of disturbance and incidental take or damage. They also provide a means of ensuring that all permits relating to the study of cultural, archaeological or natural resources contain a condition requiring that the results be reported to UH for inclusion in its database and/or to establish/update existing condition/baseline information. In deciding whether to approve research requests, UH considers the extent to which the results will contribute to improved management decisions, address existing data gaps, and further the objective of protecting natural and cultural resources. It also considers the extent to which the proposed activity is in accord with the CMP and the Conservation District rules.

In its decision-making regarding requests for research permits, UH attempts to ensure that the research is conducted in such a way as to have minimal impact on cultural and natural resources, avoiding insofar as practical: (*i*) inadvertent alteration of shrines, other archaeological sites, or burial sites; (*ii*) alteration of the landscape by installing permanent equipment or instruments; (*iii*) visual intrusion by installed equipment or instruments in the historic district; (*iv*) habitat disturbance through access and sampling; and (*v*) the potential for introduction or spread of invasive species. It insists that researchers use best practices to minimize negative effects on cultural, archaeological and natural resources, and it seeks to protect astronomical research by requiring those who are granted permits to control dust and light emissions near the summit. Finally, UH does not allow the use of equipment or instruments that emit radio or sound waves unless special permission is granted after consultation with IfA and the observatories.

The UH Maunakea Rules fully implements the kinds of oversight over research that the CMP calls for. Specifically, HAR § 20-26-62, entitled "Research permits," allows UH to issue research permits to parties wishing to engage in scientific, educational, or management purposes. It requires that applications for research permits adequately describe the planned research activity (including but not limited to the scope, duration, and location of the research) and be submitted at least 120 calendar days in advance of the date the permit is to be in effect. Applications for research permits are evaluated to confirm that: (i) they do not duplicate existing or previously approved research; (ii) they are compatible with the functions and purpose of the UH Management Areas and consistent with existing approved management plans; (iii) do not have undue adverse effect on the surrounding resources, existing facilities, and/or the public's use of the UH Management Areas; and (iv) are compatible with existing approved uses.

Where appropriate, researchers are required to seek the advice of the MKMB and the Kahu Ku Mauna. As required for any activity conducted under the UH Maunakea Rules, research permittees are prohibited from abridging Native Hawaiian traditional and customary rights as recognized and protected under article XII, section 7, of the Hawai'i State Constitution.

3.4.3 ADDITIONAL MEASURES RELATED TO ACTIVITIES AND USES

No need for additional measures related to activities and uses has been identified.

3.5 PERMITTING AND ENFORCEMENT

3.5.1 PROVISIONS OF THE CMP REGARDING PERMITTING AND ENFORCEMENT

Section 7.2.2 of the CMP addresses the permitting and enforcement that is needed to be proper stewards of Maunakea. Noting that successful stewardship will come, in part, from balancing development and public access with the enforcement of rules, it highlights the importance of UH establishing rule-making authority. The UH Maunakea Rules were adopted by the BOR on November 6, 2019, and approved by the governor on January 13, 2020.

The "desired outcome" that the CMP seeks to achieve with respect to permitting and enforcement is as follows:

Achieve compliance with existing and any new policies and regulations designed to manage and minimize human impacts, to preserve and protect Mauna Kea's resources.

The CMP observes that the UH Management Areas are designated part of the Resource Subzone of the State Conservation District. As such, "land use" as that term is defined under HAR Chapter 13-5 is regulated DLNR. Consequently, any land uses in the Conservation District requires a permit or approval from OCCL, DLNR, or BLNR. In certain cases, a management plan is required as well as part of the permit approval process.

UH is responsible for monitoring activities and uses within the UH Management Areas under terms of its Master Lease, conditions imposed by several CDUPs issued to UH as applicant for land uses in the area, and the implementation mechanisms of the UH Maunakea Rules. The astronomy facility operators are responsible to UH for compliance with their respective sublease agreements and operating agreements, compliance with the terms of applicable CDUPs, and compliance with UH Maunakea Rules when engaged in public or commercial activities outside of its subleased area. UH monitors the activities of its sublessees for compliance.²⁹ DLNR has ultimate authority over the Conservation District and is responsible for <u>enforcing</u> Conservation District Use regulations and CDUP terms on Maunakea. Monitoring of historic sites during construction or maintenance may be required as determined by DLNR.

²⁹ On behalf of the University, OMKM, now CMS, has been designated the entity responsible for monitoring holders of CDUPs, and twice a year, Rangers inspect each observatory for compliance with its CDUP.

State and County personnel are alerted to potential violations by on-mountain personnel, principally the Rangers. As discussed elsewhere in this OAR, the Rangers monitor activity in the summit region, inform visitors of rules and appropriate behavior, and assist with visitor safety. Although the Rangers do not have law enforcement authority, they do have authority to issue citations and impose other non-criminal civil remedies under the UH Maunakea Rules. Their presence and their firm but positive behavior deters vandalism and promotes adherence to rules.

BLNR, DLNR's Natural Area Reserve System (DOFAW-NARS), and UH have entered into a cooperative agreement for the Rangers to provide certain assistance with respect to the Maunakea Ice Age Natural Area Reserve which is located outside UH Management Areas and is not subject to the UH Maunakea Rules and the CMP. Under the agreement, DOFAW-NARS is primarily responsible for land management within the NAR and the Rangers provide an on-site presence at the summit, disseminate information about the NAR to visitors, and report illegal activities. The agreement also addresses cooperative research and management of natural and cultural resources.

UH issues permits for a variety of activities as provided for in HAR Chapter 20-26. These include research activities, special uses, commercial tour activity, and commercial film and recordings. The details of this are discussed elsewhere in this OAR. As provided in § 20-26-74, Rangers have the power to issue citations for violations under the UH Maunakea Rules. The UH Maunakea Rules provide for civil penalties and other sanctions and an appeal process.

In discussing the need for additional measures related to Permitting and Enforcement, the CMP stressed the need for UH to adopt its own rules and regulations. As noted above, the formal BOR adoption and governor's approval of HAR Chapter 20-26 fully implements that recommendation.

Table 7-10 in the CMP identifies eight "management actions" to address the needs related to permitting and enforcement. Those actions, and the extent to which they have been completed, are listed in Table 3.14. Their status is described in detail in Section 3.5.2.

Measure	LAWS AND REGULATIONS	Status	Discussion
P-1	Comply with all applicable federal, state, and local laws, regulations, and	Ongoing	3.5.2.1
	permit conditions related to activities in the UH Management Areas.		
P-2	Strengthen CMP implementation by recommending to the BLNR that the	Ongoing	3.5.2.2
	CMP conditions be included in any Conservation District Use Permit or other permit.		
P-3	Obtain statutory rule-making authority from the legislature, authorizing	Complete	3.5.2.3
	the University of Hawai'i to adopt administrative rules pursuant to		
	Chapter 91 to implement and enforce the management actions.		
P-4	Educate management staff and users of the mountain about all applicable	Ongoing	3.5.2.4
	rules and permit requirements.		
ENFORC	EMENT		
P-5	Continue coordinating with other agencies on enforcement needs.	Ongoing	3.5.2.5
P-6	Obtain legal authority for establishing, and then establish, a law	Complete	3.5.2.6
	enforcement presence on the mountain that can enforce rules for the UH	-	
	Management Areas.		
P-7	Develop and implement protocol for oversight and compliance with	Ongoing	3.5.2.7
	Conservation District Use Permits.		
P-8	Enforce conditions contained in commercial and Special Use permits.	Ongoing	3.5.2.8
Source: Table	27-10, CMP.		

 Table 3.14 Status of Management Actions Related to Permitting and Enforcement

3.5.2 STATUS OF MEASURES RELATED TO PERMITTING AND ENFORCEMENT

3.5.2.1 P-1: Comply with Applicable Laws, Regulations, and Permit Conditions

Compliance with applicable statutes and regulations is the responsibility of everyone who comes to Maunakea. Like anywhere in the state, various statutes and regulations may apply to a person or entity depending on the acts conducted by that person or entity. Examples include the following (primary enforcement entities indicated in parentheses):

- HAR Chapter 20-26, "Public and Commercial Activities on Mauna Kea Lands" (University of Hawai'i).
- HAR Chapter 13-5, "Conservation District Rules" (DOCARE).
- · HRS § 701-100, et seq., "Hawai'i Penal Code" (law enforcement officers).
- HRS Chapter 6E, "Historic Preservation" (DOCARE).

When an agency issues permits under its administrative rules, those permits often include conditions of approval. Failure to comply with those conditions can result in penalties and/or permit revocation.

BLNR or DLNR has issued numerous Conservation District Use Permits or approvals for specific land uses on Maunakea. To ensure compliance with the conditions of these permits, OMKM has historically conducted biannual inspections of all facilities within the UH Management Areas, and CMS has now assumed responsibility for that task. CMS maintains files of facility inspection reports and respective follow-up letters. OMKM was (and now CMS is) in regular contact with DLNR regarding compliance matters. CMS consults with DLNR regarding land uses that may require permits or other approvals since all the UH Management Areas are within the Conservation District.

Coordination also occurs with local law enforcement officers such as the Hawai'i County Police Department, DOCARE, and the State Sheriff's Office when assistance is required for matters that appear to fall within their respective jurisdictions. For example, OMKM works with DOCARE when unpermitted commercial activities are observed on adjacent lands under the jurisdiction of DLNR. Also, Rangers coordinate with the Hawai'i County Police Department when criminal activities such as theft are observed or suspected.

3.5.2.2 P-2: Encourage DLNR to Require Compliance with CMP be a CDUP Condition

UH has, and is continuing, to implement this provision of the CMP. Specifically:

- CMS requires project proposals to include a summary and/or plan of how the proposer would comply with CMP action items relevant to the proposal.
- Since the CMP was adopted, several CDUPs have been issued to UH for projects proposed by UH and by other entities. In all cases OMKM advocated that compliance with the CMP be made a condition of approval.

3.5.2.3 P-3: Obtain Rule-Making Authority

The 2009 State Legislature granted UH authority to promulgate administrative rules governing the Maunakea Management Areas when it adopted Act 132. UH exercised this authority when it formally adopted HAR Chapter 20-26, which was approved by the Governor on January 13, 2020, and became effective on January 23, 2020.

3.5.2.4 P-4: Promote User-Awareness Regarding Applicable Rules & Permit Requirements

All University personnel with the authority to make significant decisions concerning activities on Maunakea are informed of the rules and permit requirements applicable to their areas of responsibility. Similarly, UH provides an overview and detailed information regarding Maunakea-specific rules, including HAR Chapter 20-26, to sub-lessees and other personnel at every new-project start-up meetings.

3.5.2.5 P-5: Coordinate Enforcement Efforts with Other Agencies

As specified in this measure, UH actively coordinates with other agencies regarding enforcement of the rules and regulations that are applicable within the UH Management Areas and on immediately adjacent lands. It is continuing to work with them to achieve coordinated and consistent policies for access and use. Importantly, this coordination includes entering into a cooperative agreement with DOFAW relating to the Mauna Kea Ice Age NAR.

UH coordinates its enforcement activities and shares Ranger reports with other entities (e.g., NAR, DOFAW, DOCARE, U.S. Army Installation Management Command/Pōhakuloa Training Area, and the U.S. Fish & Wildlife Service) as it deems appropriate.

3.5.2.6 *P-6: Establish Law Enforcement Presence*

Noting that effective enforcement is an essential component in obtaining compliance and compliance is needed to protect resources and manage public activity and safety, this measure calls upon UH to obtain legislative authority for establishing administrative rules and then establishing a law enforcement presence on the mountain that can enforce the rules that are adopted.³⁰ The adoption of Act 132 in 2009 provided the prerequisite legal authority for UH to adopt and enforce administrative rules within the UH Management Areas. UH subsequently adopted HAR Chapter 20-26, entitled "Public and Commercial Activities on Mauna Kea Lands," on November 6, 2019, which the governor approved on January 13, 2020. UH enforces these rules through its president and her/his designees within the UH system. The president may also seek the assistance of authorized agents or law enforcement officers for enforcing the rules.

Act 132 required the rules to establish violations, penalties, costs, administrative fines, and sanctions, which are enumerated under HAR § 20-26-73 and Exhibit A attached to the rules. Here is a brief summary of those provisions:

³⁰ Under the Hawaii Penal Code, "law enforcement officer" is defined as "any public servant, whether employed by the State or county or by the United States, vested by law with a duty to maintain public order or, to make arrests for offenses or to enforce the criminal laws, whether that duty extends to all offenses or is limited to a specific class of offenses." *See* HRS § 701-118. Rangers do not have "law enforcement" authority; however, they do have authority to enforce the UH Maunakea Rules through citations that impose civil violations, penalties, costs, administrative fines, and sanctions.

- HAR § 20-26-71 governs UH's practices and procedures relating to civil violations of the rules and the assessment of administrative sanctions for such violations.
- HAR § 20-26-72 provides that civil penalties imposed under the UH Administrative Rules are separate from civil or criminal penalties imposed under other laws by other agencies or governmental entities.
- HAR §20-26-73 lists penalties, costs, administrative fines, and sanctions that may be imposed under the rules. These include: (*i*) immediate expulsion from the UH Management Areas; (*ii*) exclusion from the UH Management Areas until the violation has been corrected; (*iii*) an administrative fine; (*iv*) a monetary assessment to recover costs of mitigation or restoration required as a result of the violation and to recover the costs of enforcement proceedings; (*v*) revocation or suspension of a permit; and (*vi*) imposition of additional permit conditions.
- HAR § 20-26-74 describes the nature of the citations that may be issued for violation of the rules.

The rules also provide for an appeals process under HAR § 20-26-75.

3.5.2.7 P-7: Oversee Compliance with Conservation District Use Permit Conditions

This measure recommends that UH establish and enforce a permit and sublease monitoring system to promote responsible stewardship, prevent damage to Maunakea, and report infractions to DLNR. In accordance with this provision of the CMP, UH has developed a protocol for the Rangers to conduct biennial inspections of all of the facilities within the UH Management Areas for which CDUPs have been issued. The purpose of the inspections is to confirm that all permit conditions are being met. It has, and will continue, to submit the results of these inspections to the DLNR as part of its annual reporting. Hence, it is fully implementing this measure.

3.5.2.8 P-8: Enforce Commercial and Special Permit Conditions

The Rangers monitor activities on the UH Management Areas on a daily basis. They record pertinent data regarding the number and behavior of commercial tour operators and their clients and provide real-time feedback to operators when they observe activity that appears to be inappropriate. In addition, as discussed in the preceding section of this OAR, twice annually the Rangers inspect facilities at the summit and Halepōhaku that have a Conservation District Use Permit and prepare reports regarding their findings regarding the status of compliance with the permit conditions.

3.5.3 ADDITIONAL MEASURES RELATED TO PERMITTING AND ENFORCEMENT

No need for additional measures related to permitting and enforcement have been identified.

3.6 INFRASTRUCTURE AND MAINTENANCE

3.6.1 PROVISIONS OF THE CMP REGARDING INFRASTRUCTURE AND MAINTENANCE

Section 7.3.1 of the CMP provides management recommendations concerning the maintenance needs of the existing infrastructure and other components of the built environment.³¹ Activities to maintain infrastructure are on-going, so minimizing the impact to resources from maintenance activities is essential.

The "desired outcome" that the CMP seeks to achieve with respect to managing the built environment is as follows:

Manage the built environment by implementing an Operations, Monitoring and Maintenance Plan (OMMP) containing specific maintenance strategies and protocols that will result in minimal disruptions to activities and uses, minimize impacts to the resources, and ensure that permittees remain compliant with their CDUP requirements.32

The maintenance actions that were the focus of the CMP recommendations range from basic tasks (e.g., painting buildings) to more complex and involved tasks (e.g., installing, operating, and maintaining septic tanks and keeping the roadways in serviceable condition).

In discussing the need to minimize the impacts of maintenance actions required to keep facilities operating and in compliance with their permits, the CMP noted the importance of UH working closely with the observatories to identify strategies and protocols that reduce impacts to resources associated with infrastructure and maintenance practices. It emphasized that educational efforts targeted at maintenance staff and astronomy personnel are necessary to provide an understanding of the resources and applicable regulations, potential harmful effects of routine maintenance activities, and ways to minimize impacts. Finally, the CMP made it clear that while the observatories themselves are legally required to comply with terms of their permits, OMKM/CMS has a shared responsibility for helping ensure that: (*i*) CDUP conditions are met (see Section 7.2.2); (*ii*) operational and maintenance activities are compliant with applicable historic preservation review requirements set forth by SHPD; and (*iii*) facilities comply with all applicable regulations pertaining to wastewater disposal and management of hazardous materials.

Table 7-11 in the CMP identifies 14 "management actions" to address the infrastructure and maintenance needs that it had identified. Those actions, and the extent to which they have been completed, are listed in Table 3.15. Their status is described in detail in Section 3.6.2.

Measure	Description	Status	Discussion
ROUTINE MAINTENANCE			
IM-1	Develop and implement an OMMP.	Complete/ Ongoing	3.6.2.1

 Table 3.15 Status of Management Actions Related to Infrastructure and Maintenance

³¹ The infrastructure of the UH Management Areas includes observatories, support facilities, and associated support elements (e.g., roadways, electric power supply, communications network).

³² An OMMP is a concise planning document that contains all management strategies, protocols, schedules, necessary to conduct maintenance and the locations of facilities and infrastructure.

Measure	Description	Status	Discussion
IM-2	Reduce impacts from operations and maintenance activities by	Ongoing	3.6.2.2
	educating personnel about Maunakea's unique resources.		
IM-3	Conduct historic preservation review for maintenance activities	Ongoing	3.6.2.3
	that will have an adverse effect on historic properties.		
IM-4	Evaluate need for and feasibility of a vehicle wash station near	Complete/	3.6.2.4
	Halepōhaku, and requiring that vehicles be cleaned.	Ongoing	
IM-5	Develop and implement a Debris Removal, Monitoring and	Ongoing	3.6.2.5
	Prevention Plan.		
IM-6	Develop and implement an erosion inventory and assessment plan.	Ongoing	3.6.2.6
IM-7	Prepare a plan, in collaboration with the Department of Defense, to	Ongoing	3.6.2.7
	remove military wreckage from an area of the UH Management	0 0	
	Areas, while ensuring protection of natural and cultural resources.		
INFRAST	TRUCTURE		
IM-8	Assess feasibility of paving the Mauna Kea Access Road.	Complete/	3.6.2.8
•		Ongoing	
IM-9	Evaluate need for additional parking lots and vehicle pullouts and	Ongoing	3.6.2.9
	install if necessary.	0 0	
IM-10	Evaluate need for additional public restroom facilities in the	Ongoing	3.6.2.10
	summit region and at Halepohaku, and install close-contained zero		
	waste systems if necessary.		
SUSTAIN	ABLE TECHNOLOGIES		
IM-11	Encourage existing facilities and new development to corporate	Ongoing	3.6.2.11
	sustainable technologies, energy-efficient technologies, and LEED		
	standards, whenever possible, into facility design and operations.		
IM-12	Conduct energy audits to identify energy use and system	Ongoing	3.6.2.12
	inefficiencies, and develop solutions to reduce energy usage.		
IM-13	Conduct feasibility assessment, in consultation with Hawaii	Ongoing	3.6.2.13
	Electric Light Company, on developing locally-based alternative		
	energy sources.		
IM-14	Encourage observatories to investigate options to reduce the use of	Ongoing	3.6.2.14
	hazardous materials in astronomy operations.		
Note: A	status of "Completed/Ongoing" means that the needed procedures and systems have bee	n completed and are	being implemente
С Т. 1.1	on an ongoing basis.		
source: Table	e 7-11, CMP.		

3.6.2 STATUS OF MEASURES RELATED TO INFRASTRUCTURE AND MAINTENANCE

3.6.2.1 IM-1: Develop and Implement an OMMP

As envisioned in the CMP, the purpose of an "Operations Monitoring and Maintenance Plan" (OMMP) is to identify maintenance needs, strategies, and protocols that minimize impacts to the resources, and ensure that permittees comply with the provisions of their CDUP, subleases, and other State of Hawai'i and Federal regulations including Conservation District Rules. The OMMP also serves as a reporting mechanism documenting implementation of CMP management actions.

UH completed its OMMP for Maunakea in 2017 and has implemented it since that time. Consistent with the adopted OMMP and in accordance with its provisions, each astronomy facility and MKSS annually submit descriptions of projects and activities they anticipate undertaking over the coming five years. These "5-year outlook" submittals describe all activities that involve: (*i*) the alteration or modification of the exterior of a facility; (*ii*) interior projects with exterior impacts;

(*iii*) the outdoor storage of materials for more than 30 days; or (*iv*) the use of heavy equipment.³³ The level of review that operations and maintenance projects receive depends upon how they are classified (i.e., as either "Minimal Impact or Routine Activities" or "In-Depth Consultation").

Monitoring is accomplished through CMS's project approval and tracking, daily Ranger Activity Reporting, State permitting, and comparison of detailed project proposals with existing 5-year outlooks. Examples of the kinds of review and mitigation considerations that are being applied to proposals are presented in Table 3.16.

	Minimal Impact/Routine Activities				
Environmental Mitigation Considerations					
Security Cameras	OMKM and the astronomy facility shall work with the MKSS Oversight				
•	Committee to ensure installed cameras are necessary, eliminate potential				
	redundancy, comply w/policy, prior to submitting to MKMB.				
Cloud/Sky Cameras	Same as security cameras				
Weather masts, sensors & other	Typically, sensors are only useful for astronomy observations and				
environmental monitoring	weather forecasting (but not suited for long-term climate monitoring).				
C C	OMKM will work with observatories to maximize utility to the potential				
	user community.				
Facility Maintenance & Safety	Mitigation Considerations				
Safety	Generally inconspicuous hardware or signs outside of buildings for fall				
-	protection, de-icing, alarms, etc.				
Painting	Repainting with same color. Color change could entail in-depth				
-	consultation.				
Dome Hardware	Repair or replace with like-to-like materials.				
Renovations & Infrastructure	Mitigation Considerations				
Resurface Concrete pads	Minimize color change to the extent possible.				
Equipment movement & Mirror	No permanent land use.				
maintenance					
Photovoltaic Systems	Reduce energy use.				
Dome Vents	No substantive change in visible profile.				
HVAC repair and renovations	No change in facility footprint.				
Fiber Optic Conduit	No change in facility footprint.				
Pro	jects Requiring "In-Depth" Consultation				
Includes all "Upgrades"	Mitigation Considerations				
CFHT renovation, including	Major scientific upgrades and potential for visibility impacts, along with				
soils testing and UST removal	ground disturbance.				
UH 2.2m renovation	Major maintenance and interior upgrades. Include laser astronomy and				
	environmental instruments in consultation.				
VIS & HP renovations	Improve public facilities, more clearly define limits for Astronomy				
	Support and road maintenance purposes. Ground disturbance.				
Consolidate storage at HP	Includes (potential for) ground disturbance.				
VIS ingress/egress	Public access.				
Slope Stabilization of Mauna	Ground disturbance on pu'u near the summit.				
Kea Access Road					
New or replaced pavement	Includes (potential for) ground disturbance.				
Moving or Backfilling cinder	Incudes ground disturbance.				

 Table 3.16 Review and Mitigation Considerations

³³ These plans do not cover work that is limited to the existing interior of a facility, or routine maintenance and replacement inkind of outdoor items that otherwise would not require OMKM, State, or MKMB approval.

Projects Requiring "In-Depth" Consultation (cont'd)			
Septic or other Underground Includes ground disturbance. Evaluate closed-system for liquid waste			
Tanks	updating septic system.		
Electrical transformer relocation Includes (potential for) ground disturbance.			
Trail or parking delineation	Includes (potential for) ground disturbance.		
New sign posts, gates, etc.	Includes (potential for) ground disturbance.		
Decommissioning Includes (potential for) ground disturbance.			
Source: 2017 Operations, Monitoring, and Maintenance Plan			

3.6.2.2 IM-2: Reduce O&M Impacts by Educating Personnel about Unique Resources

As discussed in Section 3.2.2.1 and elsewhere in this OAR, UH has developed and requires all persons who are going to work in the UH Management Areas to complete an educational orientation. The program informs them of the unique nature of the resources and the kinds of behavior that they need to engage in to protect them. As a result of these efforts, operation and maintenance activities have not caused any known adverse effects on unique resources.

3.6.2.3 IM-3: Conduct Historic Preservation Review for O&M Activities

The CMP, which was approved by the State Historic Preservation Officer, notes that most daily activities and routine maintenance operations that take place within the UH Management Areas will not affect historic properties and need not be subject to historic preservation review. At the same time, it concludes that certain maintenance activities may require additional historic preservation review. Accordingly, it calls upon UH to develop, in consultation with DLNR, a list that distinguishes between maintenance actions that require no further historic review and those that do require historic review.

In fulfillment of this, UH and DLNR reached agreement on such a list, and UH has followed the appropriate review and consultation procedures for all of its O&M activities. CMS is using this list as guidance when it reviews activities by its sublessees and other entities that conduct operations within the UH Management Area. However, because sublessees generally conduct work only within areas that have already been disturbed, most such activities do not entail detailed review or consideration. This is discussed further in Section 3.6.2.1.

3.6.2.4 IM-4: Provide for Cleaning of Vehicles Proceeding above Halepōhaku

This measure calls for UH to evaluate the need for/feasibility of establishing a vehicle wash-station near Halepōhaku to prevent the transport of invasive plants and animals to higher elevations on the mountain where they do not presently exist. Such a wash station would allow UH to reduce the potential for inadvertent introductions as a result of activities within the UH Management Areas.

In accordance with this measure, in 2015 UH initiated a study to evaluate measures to prevent the introduction of invasive species, in particular the inspections of vehicles and equipment. This included an analysis of the feasibility of a vehicle washing facility as a means of helping to prevent the introduction of invasive species. This study concluded in early 2018 and provides management-specific recommendations as part of a MS thesis (Zarders, 2018).

As part of its Invasive Species control efforts, UH developed a set of standard operating procedures (SOPs) regarding the cleaning of vehicles and personal belongings (Version 1.3, 2/4/2016, Jessica

Fritz Kirkpatrick, Klasner. & Darcy Yogi) [http://www.malamamaunakea.org/uploads/environment/MKISMP/SOP01_CleaningofVehiclesPerso nalBelongings.pdf] that apply to the passengers, vehicle operators, immediate personal possessions, and any vehicle operating under a permit within the UH Management Areas. The SOP requires that all vehicles entering the UH Management Areas must be cleaned and inspected by the operator, prior to arrival at the Saddle Road/Mauna Kea Access Road junction to ensure they are free of plant, animal, and earthen materials. It further requires that vehicles with three or more axles, vehicles kept in lots with irregular grounds-keeping, and equipment (i.e., motor vehicles without a highway license plate) be inspected by a DLNR-approved biologist. The objective of the cleaning/inspection is to remove any plant, animal, or earthen material (i.e., ants, soil, mud and food scraps), that might harbor invasive animals or plant seeds. If invasive species are found, the operator is required to stop, confine the invasive species, and immediately leave the UH Management Areas.

3.6.2.5 IM-5: Develop & Implement Debris Removal, Monitoring, and Prevention Plan

This measure recommends preparation of a *Debris Removal, Monitoring and Prevention Plan* to address fugitive trash, which could impact cultural resources directly, through impact, and indirectly, through clean-up activities. It calls for the plan to assign responsibilities for: regular trash maintenance (e.g., observatories: dumpsters, MKSS: trash receptacles, Rangers: fugitive trash); provide for the installation and operation of adequate, secured receptacles, including temporary receptacles during high-use periods; conduct of a post-snow-season inspection and clean-up at high use areas; discussion of potential impacts to cultural and natural resources; provision of a map of sensitive areas, to limit impacts to cultural and natural resources; and an educational component, to address potential threats of trash, methods to prevent escape, and a "pack it in, pack it out" strategy (see Section 7.1.3).

In accordance with this recommendation, OMKM/CMS has developed a draft *Debris Removal*, *Monitoring and Prevention Plan* that contains numerous procedures aimed at maintaining the UH Management Areas in a clean and orderly condition for resource protection. The expressed goals of the plan include: (*i*) identifying actions which would prevent the introduction of litter and debris; (*ii*) establishing standards for documenting and reporting efforts to monitor presence of litter and debris; (*iii*) articulating plans for removing debris when appropriate; (*iv*) educating staff and visitors about ways to prevent the introduction of litter and debris; and (*v*) minimizing impacts to historic properties, cultural sites, and native biota.

Some of the relevant Best Management Practices (BMP) measures in that plan that are designed to prevent litter and debris include: the use of secured receptacles; regular pickup of trash from dumpsters and trash receptacles: placement of extra receptacles during high-use periods; and post-snow inspection and pickup of trash and debris left behind after snow-melt. Consistent with the provisions of that plan, MKSS and/or contractors remove waste from the HP facilities and VIS on a daily basis. Each astronomy facility operator collects and stores solid waste generated by its activities and stores it on-site in containers that are protected from the elements. The stored material is collected as needed, generally every few days, and transported off-site to an approved disposal facility.

Rangers routinely look for and pick up the small amounts of trash and debris found along the roadside and in frequently used parking areas while on their daily patrols. Rangers also pick up

and map the location of trash found at the parking lot near the Lake Waiau trail head. They report that the amount of human waste and soiled paper they find decreased following the installation of a portable toilet.

3.6.2.6 IM-6: Develop and Implement Erosion Control Plan

OMKM partnered with the UH Hilo Geography Department to study surficial geology and cinder cone erosion issues. As indicated in its 2020 Annual Report to the BLNR, the targeted completion date for the study is 2021. Implementation of the erosion control will depend upon the findings outlined in the report and UH's ability to obtain funds needed to take recommended actions.

3.6.2.7 IM-7: Prepare Plan to Remove Military Wreckage

This component of the CMP calls for UH to prepare a plan, in collaboration with the U.S. Department of Defense (DoD), to remove military wreckage from the UH Management Areas, while ensuring protection of natural and cultural resources. As indicated in UH's 2020 status report to the BLNR, UH completed an inventory of all known military aircraft wreckage within the UH Management Areas and submitted it to the DoD. In collaboration with DoD, OMKM/CMS has prepared a Draft *Military Wreckage Removal Plan*. In addition to providing a detailed description of the wreckage that has been found, the plan identifies potential impacts to resources if wreckage is removed or remains. CMS anticipates finalizing the plan in consultation with DoD over the next year, subject to DoD priorities and resources. Once finalized, the plan will be submitted to the SHPD for review and approval before any action is taken.³⁴

3.6.2.8 IM-8: Paving Mauna Kea Access Road

The CMP notes the drawbacks that are associated with the fact that portions of the Mauna Kea Access Road remain unpaved. Accordingly, it recommends that the feasibility of paving it be evaluated based on known considerations related to: (*i*) safety; (*ii*) road maintenance costs (including direct costs, as well as indirect costs such as wear and tear on State vehicles); (*iii*) potential adverse environmental impacts from dust, cinder movement, and erosion; and (*iv*) the potential impacts from paving on natural and cultural resources.

The road paving issues discussed in the CMP are largely facility issues that are being considered in UH's new Maunakea Master Plan. UH has consulted with engineers, archaeologists, and other professionals and determined that it will not pursue paving the entire unpaved portion of the Mauna Kea Access Road at this time. Nevertheless, after carefully considering safety and road maintenance issues, UH continues to consider paving certain portion (e.g., the last/upper half mile) of the unpaved access road.

3.6.2.9 IM-9: Parking and Pullouts

Management measure IM-9 calls for an evaluation of the need for additional parking areas and pullouts and for the construction of such facilities that are found to be needed both at Halepōhaku and in the summit region. This recommendation resulted in a study of the need for additional

³⁴ Based on the information in the draft *Military Wreckage Removal Plan*, it is possible that SHPD may decide that some or all of the wreckage should remain in place.

visitor and employee parking at the VIS and the 2018-2019 construction of roadway and parking improvements in that area that have improved both the safety and maintainability of these facilities. No further study of the need for additional road pullouts has yet been conducted.

While recognizing that parking does become challenging in the summit region on high-use snow days, the authors of the CMP did not recommend the addition of formal visitor parking lots there. Instead, they suggested <u>continuing</u> the practice of establishing a one-way loop system to keep cars flowing during periods of high traffic, including high-use snow days. Finally, the CMP recommended that parking areas be designated by unobtrusive signs, temporary signs when needed, and on maps distributed to public users. Furthermore, identifying designated parking areas, roads, and trails for motorized or non-motorized vehicles is required to enforce HAR § 20-26-28.

The parking and pullout issues discussed in the CMP are largely facility issues that are being considered in UH's new Maunakea Master Plan. Relevant considerations covered in the CMP are being addressed as part of that planning process and subsequent project-specific planning.

3.6.2.10 IM-10: Evaluate Need for Restroom Facilities/Install as Needed

Recognizing the potential for pollution if substantial numbers of people congregate in areas with inadequate restroom facilities, management action IM-10 calls on UH to evaluate the need for additional public restroom facilities in the summit region and at Halepōhaku and to install close-contained zero waste systems in those locations if necessary. Because this is primarily a facility issue, it is being considered in the Master Plan and will be informed by access management facilities and procedures implemented, if any.

3.6.2.11 IM-11: Encourage Sustainable Technologies and Adherence to LEED Standards

This measure calls on UH to do its best to encourage existing and new facilities within the UH Management Areas to maximize their use of sustainable technologies, energy-efficient technologies, and LEED standards.

Few projects have been proposed within the UH Management Areas since the CMP was approved that involve the development of new land uses that could achieve a LEED certification. Nevertheless, through the design review process, OMKM encouraged existing and new facilities to maximize sustainability and energy efficiency. For example, the TMT project incorporated energy audits, waste minimization, zero-waste discharge, and other sustainable elements into its design and operation plan; Keck Observatory and Gemini Observatory installed photo-voltaic panels on the roofs of their support buildings; and UH installed photo-voltaic panels and water-saving fixtures at Halepõhaku.

In addition, since the adoption of the CMP, the UH System has adopted several policies that reinforce its commitment to sustainability in all its functions. These include BOR Policy RP 4.208 entitled "Sustainability Policy," effective as of May 21, 2015, and Executive Policy EP 4.202 entitled "System Sustainability."

3.6.2.12 IM-12: Conduct Energy Audits/Implement Changes to Reduce Energy Use

UH has conducted energy audits of all the facilities that it operates on Maunakea. As documented in the Office of the State Auditor July 2017 report entitled "*Follow-Up on Recommendations from Report No. 14-07, Follow-Up Audit of the Management of Mauna Kea and the Mauna Kea Science Reserve* (Report No. 17-06), UH has completed energy audits to identify energy use and system inefficiencies. It has used the information obtained through the audits to develop measures that reduce energy usage at its facilities on Maunakea. A prime example of this is the way that energy audits have been used as part of the photovoltaic system design process at Halepōhaku.

Many of the entities whose facilities are situated on astronomy sites (e.g., Gemini, Keck, and others) have also completed energy audits and have installed, or are in the process of installing, photovoltaic systems that provide self-generated electricity and modernizing equipment to reduce the amount of electrical energy needed to operate the facilities. In addition, the move by many to largely off-site control of operations means that far less energy is consumed transporting workers to and from their job sites.

3.6.2.13 IM-13: Assess Feasibility of Developing Alternative Energy Sources

After investigating the opportunities for developing alternate energy sources on Maunakea, MKSS installed a photovoltaic system at Halepōhaku. Additional energy conservation and sustainable generation possibilities are discussed by UHH, MKSS, and Observatories as opportunities arise. Astronomy facilities continue to add renewable energy sources (e.g., PV panels, solar hot water systems, etc.) as the opportunities arise.

3.6.2.14 IM-14: Encourage Observatories to Reduce Use of Hazardous Materials

The University encourage the managers of all astronomy facilities to minimize the use and presence of hazardous materials. For new facilities this begins with the concept of removing from the UH Management Areas all material (hazardous and otherwise) that they bring onto the mountain and disposing of it in a proper manner. As evidenced by the spill prevention and response plans that all of the facilities have prepared and are implementing, multiple safety measures and protocols are in place that: (*i*) reduce the potential for accidental spills of hazardous materials; (*ii*) maximize the speed with which leaks or spills that do occur can be detected (e.g., built-in leak detection systems, mandated daily inspections of equipment that handles hazardous materials), and (*iii*) require rigorous training of all personnel responsible for implementing each facility's detailed Spill Prevention and Response Plan.

3.6.3 ADDITIONAL MEASURES RELATED TO INFRASTRUCTURE AND MAINTENANCE

No need for additional measures related to infrastructure and maintenance have been identified.

3.7 CONSTRUCTION GUIDELINES

3.7.1 PROVISIONS OF THE CMP REGARDING CONSTRUCTION GUIDELINES

Section 7.3.2 of the CMP provides information and management recommendations focused on minimizing the direct and indirect impacts that construction activities can have on resources. It

notes that such planning guidance and protocols are especially important since construction workers are often temporary, may be unfamiliar with the high-altitude alpine habitat that is present, are likely to be unfamiliar with the site, and have to conduct their activities over short durations, often under difficult conditions.

The "desired outcome" that the CMP seeks to achieve with respect to construction is as follows:

Minimize adverse impacts to resources during all phases of construction through use of innovative best management practices.

Whereas minor routine construction activities are addressed under the discussion of infrastructure and maintenance, this section focuses on construction activities associated with large projects, including new buildings, site recycling, demolition, and site restoration. The guidelines contained in this section of the CMP are intended to supplement and complement, not replace, guidelines and mandates in other governing approvals and requirements so that these issues are considered early in the planning and development process.³⁵

The CMP concluded that there was a need to implement a series of precautions and procedures to minimize adverse effects and prevent or reduce adverse impacts to resources during construction projects. It emphasized the importance of carefully observing the effects of activities undertaken during the construction phase of projects so that managers could gather information that would allow them to differentiate between processes and procedures that are working and those that are not.³⁶ It also called for this sort of information to be passed on to UH for inclusion in an ever-growing database on: (*i*) the status and condition of resources; (*ii*) the type and level of construction activities; and (*iii*) potential effects of these activities on cultural and natural resources. Finally, the CMP called for an <u>independent</u> monitor to report to UH on major construction projects to allow UH to be assured that construction activities are in full compliance with all of the conditions that have been imposed during the various approval processes.

Table 7-12 in the CMP identifies nine "management actions" related to construction guidelines. Those actions, and the extent to which they have been completed, are listed below in Table 3.17. The nature of the work that has been done for these measures is discussed below in Section 3.7.2.

Measure	Description	Status	Discussion		
GENERA	GENERAL REQUIREMENTS				
C-1	Require an independent construction monitor who has oversight and authority to insure that all aspects of ground based work comply with protocols and permit requirements.	Ongoing	3.7.2.1		
BEST MA	BEST MANAGEMENT PRACTICES				
C-2	Require use of Best Management Practices Plan for Construction Practices.	Ongoing	3.7.2.2		

 Table 3.17 Status of Management Actions Related to Construction Guidelines

³⁵ For example, construction guidelines for activities permitted under a CDUP are promulgated by DLNR and may require an approved BMP plan or identify safeguards to protect resources prior to authorizing construction activities. Similarly, SHPD may require protection of cultural resources through a site-specific archaeological monitoring plan as required by SHPD. Similar guidelines and procedures may arise out of the University's design review process.

³⁶ As an example, the CMP noted that ensuring that construction contractors transmit relevant information such as recorded data and field notes arising from their activities (e.g., soil boring log sheets with data on subsurface composition), is a low-cost method for data acquisition.

Measure	Description	Status	Discussion
C-3	Develop, prior to construction, a rock movement plan.	Ongoing	3.7.2.3
C-4	Require contractors to provide information from construction activities to OMKM for input into OMKM information databases.	Ongoing	3.7.2.4
C-5	Require on-site monitors (e.g., archaeologist, cultural resources specialist, entomologist) during construction, as determined by the appropriate agency.	Ongoing	3.7.2.5
C-6	Conduct required archaeological monitoring during construction projects per SHPD approved plan.	Ongoing	3.7.2.6
C-7	Education regarding historical and cultural significance.	Ongoing	3.7.2.7
C-8	Education regarding environment, ecology and natural resources.	Ongoing	3.7.2.8
C-9	Inspection of construction materials.	Ongoing	3.7.2.9
Source: Table 7-12, CMP.			

3.7.2 STATUS OF MEASURES RELATED TO CONSTRUCTION GUIDELINES

3.7.2.1 C-1: Require Independent Construction Monitor

This measure requires that there be an independent on-site construction monitor (funded by the project) during all periods of construction (including, but not limited to, the delivery of construction materials to the site or to staging areas) whose duty is to oversee compliance with the terms and conditions of any CDUP as related to construction activities, as well as any terms and conditions agreed to between the constructing entity and UH.

Several CDUPs have been issued since the CMP was adopted, most for relatively small projects. However, two involved larger undertakings. One was for the improvements made to the VIS and other facilities at Halepõhaku; the other was for the TMT project. The Management Plans on which both those approvals, and others that involved ground disturbance, were predicated provide for an on-site construction monitor (selected by UH with the concurrence of DLNR) who has the authority to order that any or all construction activity cease if/when she/he believes that: (i) there has been a violation of the terms or conditions of the CDUP that warrants cessation of construction activities or (*ii*) continued construction activity will unduly harm natural or cultural resources.³⁷

3.7.2.2 C-2: Best Management Practices Plan for Construction Practices

This measure requires that each project have a "Best Management Practices Plan for Construction Practices" that covers a range of topics and incorporates sustainable practices. It also requires that the project proponent bear all costs of implementing the BMPs.³⁸

UH has required a Best Management Practices Plan for all construction projects that have been granted a CDUP since the CMP was adopted. It has also prepared a template for the required plan that can be used for future projects, whether initiated by UH or by others. The template incorporates all the protocols and other items referenced in the CMP.

³⁷ Persons designated as construction monitors must have experience and be knowledgeable in construction management and have completed the educational and training programs as provided in C-7 and C-8.

³⁸ The CMP calls on the BMPs to target such things as minimizing: (i) construction time; (ii) water use; (iii) traffic; (iv) use and transport of toxic materials; (v) disturbance to ground surface and dust generation; (vi) noise; and (vii) transport of invasive species. It recommends that as part of an adaptive management approach, the University should study past projects to learn which BMPs were most successful and to recommend that those measures and/or ones shown to have equal or greater effectiveness, to be used for future projects.

3.7.2.3 C-3: Rock Management Plan

Management action C-3 requires all new construction in the summit region, including new development or site demolition and restoration, that requires a CDUP and involves the movement of rock material to prepare a "rock management plan." It further requires that excess excavated cinder be placed within the UH Management Areas after consultation with the SHPD and with the prior approval of the OMKM and the DLNR. Management action C-3 also stipulates that:

- Construction staging or storage areas within the UH Management Areas be confined to areas that have already developed, improved, or previously disturbed and that such use be coordinated with and be approved by UH and DLNR.
- The rock management plan: (*i*) identify the location and type of the source material; (*ii*) provide estimates of the volume of material to be moved; (*iii*) present a detailed description of the extraction and movement process (employing appropriate construction BMPs); and (*iv*) identify storage or disposal locations.
- Rock management plans for the summit area are to be based, in part, on a consideration of the following factors: (*i*) the source of material used for site restoration or, for potential new construction; (*ii*) the logistics of storing extracted material for future use; (*iii*) the cultural sensitivity of the rock material (e.g., use of non-summit material on the summit); (*iv*) the visual impacts of the extraction site, the stored material, and any restored site using rock material; (*v*) preventing the side-casting of cinder and other materials into wēkiu bug habitat; and (*vi*) the potential for transport of invasive species if rock material is moved to the summit from lower elevations.

UH is fully implementing this measure as it develops its own plans and reviews proposals from sublessees that involve the movement of rock material. It has ensured that DLNR is consulted to determine whether trained biologists and/or archaeologists need to be on site to monitor any impacts, real or potential, of construction activity on the wēkiu bug habitat or on archaeological or historical resources. All monitoring has been paid for by the individual project proponents.

3.7.2.4 C-4: Information/Documentation

This component of the CMP requires contractors to provide information from construction activities to UH for input into the informational database that UH maintains for its UH Management Areas. Required submittals include field logs, laboratory analyses, and other construction documents that contain information on the biotic and abiotic environmental variables encountered.

UH has been requiring contractors who perform work within the UH Management Areas to submit the required information, and it has maintained hard copy and/or electronic versions of that information in its files. UH has already digitized some of the hard copy information and is in the process of scanning additional documents. These will be made available via the CMS Library.

3.7.2.5 C-5: On-Site Monitoring During Construction

Measure C-5 of the CMP calls for the need for on-site construction monitors to be determined by the appropriate agency (e.g., SHPD, DLNR, etc.). As discussed elsewhere in this chapter, this monitoring is focused primarily on those activities involving earth movement or disturbance.

Experts (e.g., archaeologist, cultural resource specialist, entomologists, etc.) approved by the appropriate agency have been on-site to monitor construction impacts on resources in accordance with the applicable permit conditions of their approval.

3.7.2.6 C-6: Archaeological Monitoring Plan

This management action calls for project proponents, in consultation with UH, to consult with SHPD about whether archaeological monitoring is required during a construction project. In all cases where SHPD determines that archaeological monitoring is needed, an acceptable archaeological monitoring plan must be approved by SHPD prior to the start of any ground-disturbing work, and monitoring must be conducted according to the approved plan. SHPD has jurisdiction over inadvertently discovered human remains, and in the event of an inadvertent discovery of any human burial during construction, work in the immediate area of the burial must be halted and may not be resumed until it is authorized by SHPD and UH.

Archaeological monitoring has been conducted in accordance with this provision for all projects that have been initiated since the CMP was adopted.

3.7.2.7 C-7: Education Regarding Historical and Cultural Significance

This measure calls for all persons involved with the construction and installation of any future facilities and all persons involved in the operation and maintenance of astronomy facilities (including scientists and support staff) to be educated about the historical and cultural significance of the Maunakea summit area, and to be made aware of what constitutes respectful and sensitive behavior while there. As discussed in Section 3.2.2.1, OMKM has completed a detailed plan for complying with this condition (including the content of training, the procedures for implementation, and the means for certifying completion) and CMS is now implementing it. It is now implementing this plan.³⁹

The OMKM launched the Maunakea Orientation program in 2012. The program covers many topics and includes an extensive module relating to the historical and cultural significance of the mountain. All astronomy facility staff (both office and on-mountain), vendors, construction workers, Halepōhaku support and VIS staff, UH employees, and commercial tour drivers must complete the orientation program. As documented in Table 3.4, more than 3,800 individuals had successfully completed the training since 2013. As of February 1, 2021, approximately 1,500 individuals held a current orientation certificate. While the program was originally available only "in-person," UH subsequently developed an online version with an assessment quiz as a more efficient means of delivery and an alternative to in-person sessions. With this capability, regular workers needing to maintain their certification have been able to do so conveniently despite COVID-19 restrictions on business and interpersonal contact. The Orientation is also available free to interested persons in the general public.

³⁹ As called for in the CMP, the compliance plan was developed by following consultation with Kahu Kū Mauna, families with lineal and historic connections to Mauna Kea, kūpuna, cultural practitioners, the Office of Hawaiian Affairs, and other Native Hawaiian groups, and reviewed and approved by the DLNR.

3.7.2.8 C-8: Education Regarding Environment, Ecology, and Natural Resources

This measure, which parallels that regarding historical and cultural significance discussed in the preceding section of this OAR, calls for all persons involved with the construction and installation of any future facilities and all persons involved in the operation and maintenance of astronomy facilities (including scientists and support staff) to be educated about the environment, ecology and natural resources of the summit area, and to be given training as to what constitutes appropriate behavior while there for the protection of the natural resources. The work that UH has done to comply with this condition parallels and is comparable to that related to historic and cultural resources as discussed in Section 3.7.2.7.

3.7.2.9 C-9: Inspection of Construction Materials

This part of the CMP requires that all construction materials, equipment, crates, and containers carrying materials and equipment be inspected by a trained biologist approved by the DLNR before it is allowed to enter the summit area. Before being allowed to proceed higher, the biologist must certify that they are free of any flora and fauna that may potentially have an impact on the Maunakea summit ecosystem. As discussed in Section 3.6.2.4, UH is fully implementing inspections and controls called for in this measure.

3.7.3 ADDITIONAL MEASURES RELATED TO CONSTRUCTION GUIDELINES

No need for additional measures related to construction guidelines have been identified.

3.8 SITE RECYCLING, DECOMMISSIONING, DEMOLITION, & RESTORATION

3.8.1 CMP PROVISIONS RELATED TO SITE RECYCLING, DEMOLITION, & RESTORATION

Section 7.3.3 of the CMP provides general guidance on site recycling, decommissioning, demolition and restoration for facilities in the UH Management Areas. It notes that while these apply primarily to astronomy facilities, they are also relevant to the Mauna Kea Access Road as well as the support facilities at Halepōhaku as infrastructure needs in that area change.

The "desired outcome" that the CMP seeks to achieve with respect to site recycling, decommissioning, demolition and restoration is as follows:

To the extent possible, reduce the area disturbed by physical structures within the UH Management Areas by upgrading and reusing buildings and equipment at existing locations, removing obsolete facilities, and restoring impacted sites to predisturbed condition.

In discussing the then-current status regarding these topics, the CMP notes that although the observatories are aware that they will need to comply with the decommissioning, demolition, and restoration terms specified in their agreements with UH, there were then no specific plans for restoration in terms of what might physically happen at any particular site. It then goes on to note that each astronomy facility will need to identify what course of action it will pursue when it is taken out of service and that the decision-making regarding that needs to be a collaborative effort between OMKM, DLNR, UH, and the observatories.

Table 7-13 in the CMP identifies three "management actions" related to site recycling, decommissioning, demolition and restoration. Those actions, and the extent to which they have been completed, are listed in Table 3.18. The nature of the work that has been done for these measures, all of which are ongoing, is discussed below in Section 3.8.2.

 Table 3.18 Status of Management Actions Related to Site Recycling, Decommissioning, Demolition and Restoration

Measure	Description	Status	Discussion	
SR-1	Require observatories to develop plans to recycle or demolish facilities	Ongoing	3.8.2.1	
	once their useful as ended, in accordance with their sublease requirements,			
	identifying all proposed actions.			
SR-2	Require observatories to develop a restoration plan in association with	Ongoing	3.8.2.1	
	decommissioning, to include an environmental cost-benefit analysis and a			
	cultural assessment.			
SR-3	Require any future observatories to consider site restoration during project	Ongoing	3.8.2.2	
	planning and include provisions in subleases for funding of full			
	restoration.			
Source: Table	Source: Table 7-13, CMP.			

<u>3.8.2</u> <u>Status CMP Provisions Related to Site Recycling, Demolition, &</u> <u>Restoration</u>

3.8.2.1 SR-1 and SR-2: Required Site Recycling, Decommissioning, Demolition, & Restoration

UH has established a robust site recycling, decommissioning, and restoration process as called for in the CMP. In accordance with that process, the operators of two of the observatories decided to decommission their facilities and have submitted official notices announcing their intent.

- On September 16, 2015, UH Hilo, on behalf of its Department of Physics and Astronomy, submitted to OMKM its Notice of Intent (NOI) to decommission its Hōkū Kea telescope and observatory structure.
- On November 18, 2015, the California Institute of Technology (Caltech) submitted its NOI to Decommission its Caltech Submillimeter Observatory (CSO).

Caltech subsequently completed a Phase I Environmental Site Assessment and is moving ahead with subsequent steps in the decommissioning process, such as preparing its Site Decommissioning Plan, CDUA, and Environmental Assessment (EA). The announced goal is to begin removal before the end of 2023.

The Hōkū Kea decommissioning process is less advanced than that for CSO, but is following the same general path. UH believes it is likely that it will lag only slightly behind that of CSO.

Because UH administration has also confirmed that there will be no more than nine operational astronomical facilities in the MKSR by the end of 2033 even if UH is able to obtain a new lease, at least three additional observatories must be decommissioned by that time. Given the complexity and duration of the decommissioning process and the fact that a good part of the timing depends upon choices that are presently up to the discretion of the sublessees, it expects that it may not be in a position to report a decision as to which additional facilities will be decommissioned before the end of 2025.

3.8.2.2 SR-3: Potential Future Observatories, Restoration

This element of the CMP calls on UH to require observatories being established, reconstructed, or replaced (i.e., subject to site recycling) following adoption of the CMP to consider site restoration during project planning and for UH to include provisions for funding of site restoration in all new subleases. Depending upon the exact circumstances on each site, as indicated in the Decommissioning Plan, the following levels of restoration are to be considered.

- *Minimal restoration* is the removal of all man-made materials and grading of the site, leaving the area in safe condition.
- *Moderate restoration* goes beyond minimal to include enhancing the physical habitat structure to benefit the native arthropod community.
- *Full restoration* would return the site to its original pre-construction topography, as well as restoring arthropod habitat.

The only new sublease that UH has issued since the CMP was adopted was for the TMT project. Item 10 in the "Sublease and Non-Exclusive Easement Agreement" between TMT International Observatory LLC and UH deals specifically with what must be done as part of the decommissioning of that facility in accordance with the provisions of an approved Decommissioning Plan. It specifies that upon termination the sublessee must (at UH's sole option and at sublessee's sole cost and expense) either: (*i*) surrender the subleased area with all improvements existing or constructed thereon or (*ii*) decommissioning Plan. The aforementioned sublease provision is fully consistent with this component of the CMP.

3.8.3 <u>Additional Measures Related to Site Recycling</u>, <u>Decommissioning</u>, <u>Demolition and Restoration</u>

No need for additional measures related to site recycling, decommissioning, demolition and restoration has yet been identified.

3.9 CONSIDERING FUTURE LAND USE

3.9.1 PROVISIONS OF THE CMP CONCERNING FUTURE LAND USE

Section 7.3.4 of the CMP addresses issues related to new land uses or activities and their potential impacts on the resources. It notes that "future land use" is not confined to astronomy development but could include roadway upgrades, improvements to Halepōhaku, or a cultural facility such as a *hale* for Hawaiian navigation or astronomy. The discussion makes it clear that the CMP does not address development plan issues related to future observatories, including whether new observatories should be located on Maunakea to support the astronomy program or if observatories should have their leases extended or be decommissioned. Instead, it defers to UH's Maunakea Master Plan on that subject.

The most relevant CMP passage specifically states:

"The role of the CMP in considering future land use is to guide the evaluation of proposed projects from the standpoint of potential impacts to cultural and natural

resources, and to provide management actions that can be adopted by BLNR as special conditions in any CDUPs that it may issue."

The "desired outcome" that the CMP seeks to achieve with respect to future land use is as follows:

To protect cultural and natural resources in the assessment of future projects.

The CMP contains a lengthy discussion of design and siting issues that existed at the time the CMP was prepared in view of the provisions of the 2000 Master Plan. The design and siting issues are being addressed through the ongoing process to prepare a new Master Plan.

Table 7-14 in the CMP identifies seven "management actions" (all of which are characterized as "Facility Planning Guidelines") related to future land use. Those actions, all of which are ongoing, are listed in Table 3.17. The nature of the work that has been done for these measures is discussed below in Section 3.9.2.

 Table 3.19 Status of Management Actions Related to Future Land Use

Measure	Description	Status	Discussion
FLU-1	Follow design guidelines presented in the 2000 Master Plan.	Ongoing	3.9.2.1
FLU-2	Develop a map with land-use zones in the Astronomy Precinct based on	Complete	3.9.2.2
	updated inventories of cultural and natural resources, to delineate areas	d	
	where future land use will not be allowed and areas where future land		
	use will be allowed but will require compliance with prerequisite studies		
	or analysis prior to approval of Conservation District Use Permit.		
FLU-3	Require cataloguing of initial site conditions for use when conducting	Ongoing	3.9.2.3
	site restoration.		
FLU-4	Require project-specific visual rendering of both pre- and post-project	Ongoing	3.9.2.4
	settings to facilitate analysis of potential impacts to view planes.		
FLU-5	Require an airflow analysis on the design of proposed structures to assess	Ongoing	3.9.2.5
	potential impacts to aeolian ecosystems.		
FLU-6	Incorporate habitat mitigation plans into project planning process.	Ongoing	3.9.2.6
FLU-7	Require use of close-contained zero-discharge waste systems for any	Ongoing	3.9.2.7
	future development in the summit region, from portable toilets to		
	astronomy facility restrooms, if feasible.		
Source: Table	e 7-14, CMP.		

3.9.2 CMP PROVISIONS RELATED TO FUTURE LAND USE

3.9.2.1 FLU-1: Master Plan Design Guidelines

UH has followed the Design Review Process it established in accordance with the recommendations of the 2000 Master Plan in reviewing project proposals that it has received. This includes the very detailed review that was given to the TMT project. It anticipates that the process will evolve, as will the CMP, through iterative planning and review as required under MEU-3.

3.9.2.2 FLU-2: Map Land Use Zones

This management action called for UH to more precisely delineate areas where future observatories could be sited, essentially refining the areas indicated in the 2000 Master Plan based on updated cultural and natural resource information. Since the time the CMP was approved, the situation has changed, and UH is no longer considering siting additional observatories in areas within the MKSR where they do not presently exist. Instead, UH has committed to reducing the number of operational astronomy facilities within it to nine and it has stipulated that all of these will be on astronomy sites that BLNR has already approved for that use, i.e., there will be no new observatories established on sites where they do not presently exist. In view of these decisions, there is no need for a map that delineates where future observatories could be sited. Hence, further action related to this measure is unnecessary and it is therefore considered "completed".

3.9.2.3 FLU-3: Cataloging Initial Site Conditions

This management action calls on UH to catalog and retain baseline information so that it can be used to inform the future restoration of each site. Such information includes topography, substrate composition, and presence/absence and density of species. Accordingly, UH maintains copies of reports, permit applications, permit approvals, construction plans, and other documents related to the facilities that have been constructed within the UH Management Areas. Those constitute the best information available for use in establishing the original site conditions and providing a baseline for use during site restoration as called for in the site decommissioning process. As scientific and data recording techniques and methodologies have improved over the decades since the first astronomical facilities were constructed on Maunakea, pre-development site conditions are better known for the most recently developed sites than for the ones that were developed long ago. In the case of the TMT project, which is the only astronomy facility permitted after the CMP was approved, its owner conducted high-resolution surface and aerial photography to document conditions prior to development.

3.9.2.4 FLU-4: Require Visual Rendering

Through its project review and approval process, UH requires visual renderings to be prepared for all major new development projects that have the potential to substantially affect view planes or other aesthetics. It uses this information in consulting with stakeholders and in making project-related decisions.

3.9.2.5 FLU-5: Require Airflow Analysis

Recognizing that wind direction and speed across the summit area play a large role in the aeolian environment on Maunakea, bringing small debris (including food such as insects and other small arthropods) from lower elevations up to the summit area, this provision of the CMP calls on UH to require an airflow analysis on the design of proposed structures to assess impacts to aeolian ecosystems. UH has required such an analysis for all major projects that have been proposed since the CMP was adopted and will continue to require similar studies for any new major projects that may be proposed in the future.

3.9.2.6 FLU-6: Incorporate Habitat Mitigation Plans into Project Planning Process

UH has incorporated a requirement for habitat conservation into its project planning process. That, together with the decision to limit future astronomical land uses in the MKSR to a subset of already approved sites means that this measure is being fully implemented.

3.9.2.7 FLU-7: Expand Use of Zero-Discharge Waste Treatment Systems

UH is requiring the use of zero-discharge treatment systems for all new and replacement facilities within the summit area and is encouraging operators of facilities that do not already have such systems to incorporate them at the earliest possible date.

3.9.3 ADDITIONAL MEASURES RELATED TO FUTURE LAND USE

No need for additional measures related to siting future land uses have been identified.

3.10 OPERATIONS AND IMPLEMENTATION

3.10.1 CMP PROVISIONS RELATED TO OPERATIONS AND IMPLEMENTATION

Section 7.4.1 of the CMP provides recommendations relating to operations and implementation of the CMP and to emergency procedures. While it recognizes that the CMP does not apply to other state lands on Maunakea, it notes that coordination with other entities will be required to implement the full range of management actions that it calls for.

The "desired outcome" that the CMP seeks to achieve with respect to operations and implementation is as follows:

Conduct effective operations to support management that is focused on resource protection, education, and public safety.

The CMP identifies numerous operations-related items that it concludes deserve attention, including a stronger foundation (e.g., sufficient funding, staffing, and facilities) to support the achievement of management goals. In particular, the CMP calls attention to the importance of having a greater staff presence in the summit region to work as enforcers and resource managers. Hand-in-hand with that was a call for improved staff training in safety, emergency response, visitor orientation, and cultural and natural resource protection.

Accordingly, the CMP calls for UH to work with various stakeholders, including IfA, MKSS, and with federal and state agencies and local landowners in the region, to define policies and procedures relating to the CMP and to coordinate management planning and implementation measures. It makes specific reference to the importance of gathering input from the community, federal and state agencies, and other stakeholders on an ongoing basis. It specifically references doing this via such things as: (*i*) the periodic CMP review process of which this OAR is a part (especially the stakeholder comments on the OAR); (*ii*) through interagency meetings conducted annually; and (*iii*) through a grievance procedure to address problems and issues as they arise, so that community concerns can be addressed in the periods between CMP updates. Finally, the CMP identifies a need to update emergency response procedures so that UH can work with neighboring landowners and other agencies to plan for coordinated response to range of emergency situations.

Table 7-15 in the CMP identifies five "management actions" related to operations and implementation. Those actions, and the extent to which they have been completed, are listed in Table 3.20 and discussed in Section 3.10.2.

Measure	Description	Status	Discussion	
OI-1	Maintain OMKM, MKMB, and Kahu Kū Mauna in current roles,	Completed	3.10.2.1	
	with OMKM providing local management of the UH Management			
	Areas, and MKSS providing operational and maintenance services.			
OI-2	Develop training plan for staff and volunteers.	Completed	3.10.2.2	
OI-3	Maintain and expand regular interaction and dialogue with	Ongoing	3.10.2.3	
	stakeholders, community members, surrounding landowners, and			
	overseeing agencies to provide a coordinated approach to resource			
	management.			
OI-4	Establish grievance procedures for OMKM, to address issues as	Completed/	3.10.2.4	
	they arise.	Ongoing		
OI-5	Update and implement emergency response plan.	Ongoing	3.10.2.5	
Note: A				
on an ongoing basis.				
Source: Table	Source: Table 7-14, CMP.			

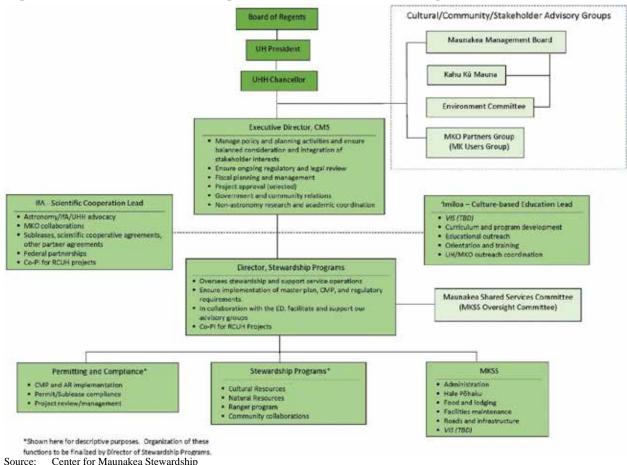
Table 3.20 Status of Management Actions Related to Operations and Implementation

3.10.2 STATUS OF MEASURES RELATED TO OPERATIONS AND IMPLEMENTATION

3.10.2.1 OI-1: Local Management of the UH Management Areas

Per this management action, for many years OMKM, MKMB, Kahu Kū Mauna, and MKSS provided local management, advice, expertise, and guidance as they were in existence when the CMP was approved. In August 2020, the structure of the local management was modified in a manner that brought the MKSS function and personnel and the OMKM function and personnel together under a centralized operations and management entity, named CMS. As illustrated in the CMS organization chart (Figure 3-1), MKMB, Kahu Kū Mauna Council, and the EC continue to advise CMS. Those advisory groups continue to provide local advice and input to the management entity.

The management restructuring has the following six primary objectives: (*i*) improve lines of management accountability and financial transparency; (*ii*) organize UH functions around mission-critical activities.; (*iii*) clarify UH's regulatory, stewardship, and advocacy roles by separating those functions in its organization; (*iv*) leverage and optimize existing networks and partnerships; (*v*) broaden, diversify, and elevate stakeholder input into decision-making; and (*vi*) maintain governance continuity and minimize disruption as much as possible. The updated organization, which was approved by the BOR in August 2020, provides greater local control and opportunity for community input into decision-making related to Maunakea.





3.10.2.2 OI-2: Develop Training Plan for Staff and Volunteers

<u>General</u>. UH prepared a formal training plan, MKMB provided input, and OMKM has been implementing it since 2016. The approved plan conforms with all the requirements stated in the CMP.⁴⁰ As discussed in Section 3.2.2, CMS requires all staff and volunteers to attend a Maunakea orientation program that conforms with the provisions of its official training plan and pass a certification test.

<u>Volunteers</u>. Volunteers are primarily involved in weed-pulls or native plantings. Volunteers are provided preliminary information prior to the day's work; once on-site, in-person training is provided to ensure safe and respectful conduct by all participants. Similar to staff trainings, the volunteer training covers the same major themes of natural and cultural resources awareness,

⁴⁰ This means, for example, that it addresses such things as: (*i*) specialized Ranger training, field-personnel training, volunteer training and general staff training; (*ii*) applicable laws and regulations; (*iii*) basic cultural and natural resources orientation, and standard procedures for documenting potential violations (for non-enforcement personnel); (*iv*) general safety training, 4-wheel drive vehicle operation, orientation to working at high elevations, emergency response, CPR/first aid, Global Positioning System (GPS) operation, and recognition of culturally significant areas and items and protected flora and fauna for all personnel involved in field-based management activities; (*v*) safety orientation and basic cultural and natural resources training for all staff who access the mountain should receive. Rangers should receive high-level training in emergency response, including CPR and first aid as well as in-depth cultural and natural resources training, to enable them to better understand and protect the resources.

current management activities, and mountain safety. The volunteer program has been on hold since 2019 due to access issues and the ongoing COVID-19 pandemic.

Maunakea Rangers. UH has established particularly stringent qualification requirements for persons being considered for being hired as Rangers.⁴¹ The primary qualifications include a Bachelor's Degree from an accredited four (4) year college or university or a combination of college course work, formal training, and experience that are equivalent to a Bachelor's Degree in a related field. To be considered for a Ranger position, applicants must have at least two years' experience in a general public health and safety capacity related to some/all of job duties including rule enforcement experience. They must also demonstrate that they have: (i) knowledge of practices and techniques in public health and safety; (ii) knowledge of the cultural, environmental, geological and scientific importance of Maunakea; (iii) a Certification in First Aid/CPR (or be able to obtain certification within 12 months of hire); (iv) experience in enforcing rules of conduct; (v) experience using good teamwork skills; (vi) excellent writing and verbal communication skills; (vii) the ability to establish and implement crowd control and traffic management procedures; (viii) a valid driver's license, clean driver's abstract, and ability to drive a 4-wheel drive vehicle on ice or snow covered unpaved or paved roads; (ix) passed instructional courses in First Responder/First Aid certification training and other safety related disciplines; (x) passed a post-offer criminal background check including a substance abuse test; (xi) the ability to work and hike long distances over rugged terrain at 14,000 feet elevation under inclement weather conditions to assist injured victims.

3.10.2.3 OI-3: Coordinated Management

Noting that effective ecosystem management requires that UH work closely with neighboring landowners, the CMP commits UH to coordinate its actions within the UH Management Areas with adjacent property owners and users. Accordingly, it has worked diligently with the managers of the Mauna Kea Ice Age NAR, the State Division of Forestry and Wildlife, and other agencies responsible for the management of resources that also depend upon continuing use of the UH Management Areas. It has formalized an agreement with DOFAW-NARS, coordinated closely with the Department of Hawaiian Home Lands, attempted to make its trail management efforts supportive of the Na Ala Hele Trail system's goals and objectives, and coordinated with the Mauna Kea Watershed Alliance, whose members include the major adjacent landowners. Rangers report unusual or suspicious behavior observed on DLNR lands to DLNR including DOCARE so that those agencies can take appropriate follow-up action.

⁴¹The formal Ranger job description lists the following duties: (*i*) directly monitoring all activities including rules/laws compliance within the UH Maunakea Rules; (*ii*) supporting public, observatory and commercial activities; (*iii*) liaison and coordinate with other safety and law enforcement agencies; (*iv*) coordinating with the various departments at Halepōhaku; (*v*) providing crowd control and vehicle management including parking and traffic; (*vi*) conducting external inspections of observatory sites within the Science Reserve; (*vii*) providing interpretive services for visitors and other users on Mauna Kea; (*viii*) explaining environmental, archeological, geological, cultural and scientific features of Mauna Kea to workers and visitors; (*ix*) informing visitors of the hazards encountered on Mauna Kea and explaining how to safely deal with them; (*x*) interacting with and educating visitors to the Mauna Kea summit region, including cultural practitioners, film crews, observatories' staff; natural and cultural resource managers and research staff, recreational visitors such as hunters and skiers, commercial tour operators including guides and customers; (*xi*) acting as First Responder and following established safety procedures in emergency situations; and (*xii*) inspecting road conditions during inclement weather and performing crowd management duties during road closures.

3.10.2.4 OI-4: Grievance Procedures

The public has the opportunity to inform UH of grievances at the MKMB publicly held meetings. The Director of CMS is present at all such meetings and the grievance procedure consists of the following:

- If the grievance concerns management issues or items within CMS' jurisdiction, the Director researches the issue, consults with staff and advisory groups, and coordinates with the individual or group to bring the grievance to a resolution. If the grievance cannot be resolved within a month, updates are provided at subsequent MKMB meetings and input from MKMB sought until it is resolved.
- If the issues represent broad planning or policy questions beyond the management authority of CMS, the Director refers the questions or questioner to specific contacts at the appropriate agencies, usually DLNR, the UH Hilo Chancellor, the President, or the BOR as appropriate. The Director follows the progress of the grievance and assist in its resolution where able.

CMS' goal is to handle all grievances in a sensitive and timely manner.

3.10.2.5 OI-5: Emergency Response Plan

This CMP management action was to generate and implement an Emergency Response Plan. In cooperation with the various organizations that have facilities within the UH Management Areas, the Institute for Astronomy, and County, State, and Federal agencies, UH has established a comprehensive set of emergency response procedures for Maunakea, which are outlined in the Maunakea Emergency Procedures (July 2019) document. Noting that Maunakea is an isolated work location situated many miles from the nearest professional Emergency Medical Service (EMS), the procedures outline how to access the various services available, describes the limitations of these services on Maunakea, and emphasizes that the most critical thing is to do all that can be done to minimize the incidence of accidents in the first place. It stresses that the primary source of first aid assistance must be the work location itself and calls for each facility to have staff trained in first aid and CPR and to maintain a stock of emergency first aid supplies and equipment. It also recommends that each facility establish a regular schedule for first aid drills, testing of emergency and safety equipment, including the EEV (Emergency Evacuation Vehicle) and the equipment it contains. The document explains the role of the Rangers, who have emergency medical responder training and carry oxygen, backboards, AED, splints, and assorted first aid supplies in their vehicles. At the same time, it makes it clear that while the Rangers are available for assistance in an emergency, 911 should still be called immediately and before contacting Rangers for any serious emergency.

The emergency procedures document outlines the many logistical considerations in responding to emergencies on the mountain. These include appropriate communications links, the EMS (ambulance) response that is available from the Hawai'i County Fire Department and Pōhakuloa Training Area (PTA), helicopters (civilian, and Army National Guard). It also provides specific advice and guidance for dealing with a variety of emergency situations, including: (*i*) altitude sickness; (*ii*) deficient oxygen; (*iii*) fire; (*iv*) weather hazards; (*v*) earthquakes; (*vi*) hazardous material spills; (*vii*) missing-person/lost hiker; and (*ix*) other human and/or cultural issues. In addition to maps showing the locations of facilities and places where help may be available, it also contains a comprehensive list of telephone numbers.

3.10.3 ADDITIONAL MEASURES RELATED TO OPERATIONS AND IMPLEMENTATION

No need for additional measures related to operations and implementation have been identified.

3.11MONITORING, EVALUATION, AND UPDATES

3.11.1 CMP PROVISIONS RELATED TO MONITORING, EVALUATION, AND UPDATES

Section 7.4.2 of the CMP outlines the process for monitoring, evaluating, and updating the CMP. The "desired outcome" that the CMP seeks to achieve with respect to monitoring, evaluation, and updates is as follows:

Determine whether management actions are achieving the goals of the CMP and provide a process for improving and updating management strategies through evaluation and revisions of the CMP.

The CMP notes that it was based on the state of knowledge as of December 2008 regarding the status of the resources, activity levels, and most appropriate management actions. Recognizing that new information would become available and that environmental conditions would likely evolve over time, it calls for the application of adaptive management principles that would allow resource managers to improve strategies and plans as new information becomes available. It also requires that management plans undergo regular review, to reduce uncertainty, incorporate lessons learned, and take advantage of new data and information from monitoring, ecosystem science, surveys, and traditional knowledge.

The CMP concludes that comprehensive evaluation to develop or refine management actions requires collection of specific data, performance evaluation measures to be identified, and data collected that can be used to assess the effectiveness of these performance measures. It concluded that the CMP needs to be reviewed and revised as new, pertinent information becomes available about the resources being managed and the extent to which the management actions being implemented are achieving the management objectives.

Finally, the CMP calls for monitoring and evaluation of its effectiveness to be conducted annually and for the results to be summarized in an annual progress report. It also recommends that a major review and revision of the CMP be undertaken every five years, using information contained in the annual reports, and that this evaluation and revision include consultation with federal and state agencies and the local community, to inform stakeholders on program progress, and to gather input on changes or additions to management activities. The report also calls for the CMP to be updated as needed to comply with any requirements or conditions imposed by the BLNR on the CMP upon acceptance of the plan. Taken as a whole, the CMP provisions relating to updates, which focus on adaptive management, indicate that the authors of the plan believed that most plan revisions could be made without going through the very lengthy process that had been used to develop the original (2009) plan.

Table 7-16 in the CMP identifies three "management actions" related to monitoring, evaluation, and updates. Those actions, and the extent to which they have been completed, are listed in Table 3.21. All the work that has been completed for these measures is discussed below in Section 3.10.2.

Measure	Description	Status	Discussion
MEU-1	Establish a reporting system to ensure that the MKMB, DLNR, and the	Ongoing	3.11.2.1
	public are informed of results of management activities in a timely		
	manner.		
MEU -2	Conduct regular updates of the CMP that reflect outcomes of the	Ongoing	3.11.2.1
	evaluation process, and that incorporate new information about		
	resources.		
MEU -3	Revise and update planning documents, including the Master Plan,	Ongoing	3.11.2.2
	leases, and subleases, so that they will clearly assign roles and		
	responsibilities for managing Maunakea and reflect stewardship matters		
	resolved with DLNR.		
Source: Table	27-16 CMP		

Table 3.21 Status of Management Actions Related to Monitoring, Evaluation, & Updates

Source: Table 7-16, CMP

3.11.2 STATUS OF PROVISIONS RELATED TO MONITORING, EVALUATION, AND UPDATES

3.11.2.1 MEU-1 and MEU-2: CMP Reporting and Update/Revision Process

UH has established and is implementing a comprehensive reporting system that provides the information needed to internally track and report to others the status of its efforts to fully implement the measures called for in the CMP. Specifically, it has operationalized the reporting system called for in the CMP and, in accordance with the approved system, it has:

- Prepared and submitted annual status reports to the BLNR every year since 2012. Additionally, UH submits reports to other agencies in compliance with the requirements of the various permits that are held in its name and provides copies of the reports to interested parties at public meetings that it participates in, including presentations to the MKMB.
- Prepared this OAR using information contained in the annual progress reports and multiple other sources which: (*i*) discusses the state of the cultural and natural resources; (*ii*) summarizes new information; (*iii*) analyzes trends and impacts; (*iv*) lists future management actions; and (*v*) summarizes the progress made towards meeting CMP goals and objectives.

UH will submit this OAR to stakeholders and agencies participating in the review process for their review and comment. UH will carefully consider all the comments it receives in finalizing its CMP progress report. Then, it will use the information contained in the CMP progress report as the basis for determining when management actions have been completed and for adapting or adding CMP management actions.

3.11.2.2 MEU-3: Revising and Updating Planning Documents

This measure calls for UH to endeavor to keep the planning documents that govern land use within the UH Management Areas consistent with the goals and objectives of the CMP, thereby promoting the responsible stewardship and use of the UH Management Areas on Maunakea. As evidenced by the following examples, UH has implemented this measure:

 Provisions of the CMP are a key element in formulating a new Maunakea Master Plan and in negotiating terms of all subleases. UH expects to release the public review draft of the Master Plan later this year (2021). Once finalized and adopted, the updated Master Plan will guide the use of those lands through 2040.

- The information that is in this OAR and the feedback on it that is received from reviewers will inform adaptation and refinement of ongoing CMP management actions and possibly the formulation of additional measures.
- Because UH and its partner observatories wish to continue astronomical activities on Maunakea beyond the end date of its current master lease, on August 22, 2013, the BOR informed the BLNR that it intended to seek a new land authorization.
- In February 2018, UH issued an Environmental Impact Statement Preparation Notice (EISPN) for a new land authorization. Preparation of the EIS will include additional information received after 2018, including the UH Maunakea Rules, the new Maunakea Master Plan, and the updated CMP.

3.11.3 ADDITIONAL MEASURES RELATED TO OPERATIONS AND IMPLEMENTATION

No need for additional measures related to operations and implementation have been identified.

4 MANAGEMENT PROGRAMS STATUS

4.1 PROGRESS TOWARD GOALS AND OBJECTIVES

Chapter 7 of the CMP contains an explicit discussion of the plan's goals and objectives, which are referred to as "desired outcomes." Those desired outcomes are as follows:

- Increase understanding and appreciation of Native Hawaiian history and cultural practices related to Maunakea to ensure that these practices are protected and respected. Identify, document the condition of, and protect cultural resources and historic properties in the UH Management Areas. [CMP Section 7.1.1, Native Hawaiian Cultural Resources]
- Increase understanding of the status of natural resources (biotic and abiotic), and identify threats to these resources in order to better protect and preserve unique geological features, ecosystem functions, subalpine and alpine habitats, and biological communities through adaptive management of stressors and threats. [CMP Section 7.1.2, Natural Resources]
- Build and maintain a constituency to engage in active and meaningful stewardship of Maunakea, through education and involvement of the public, to support, enhance conservation, and sustain the natural, cultural, and astronomical resources of Maunakea. [CMP Section 7.1.3, Education and Outreach]
- Protect astronomical resources. UH's lease of the summit area provides that the MKSR shall be operated as a buffer zone to prevent the intrusion of activities incompatible with the use of the land as a scientific complex for astronomy. The lease specifically recognizes light and dust interference as well as certain types of electronic interference as incompatible with such protection. [CMP Section 7.1.4, Astronomy Resources]
- To retain and enhance recreational and cultural activities, ensure regulation of commercial activities, and support scientific studies while maintaining adequate protection of resources, educating users regarding resource sensitivity, and ensuring the health and safety of those visiting or working at Maunakea. [CMP Section 7.2.1, Activities and Uses]
- Achieve compliance with existing and any new policies and regulations designed to manage and minimize human impacts, to preserve and protect Maunakea's resources. [CMP Section 7.2.2, Permitting and Enforcement]
- Manage the built environment by implementing an OMMP containing specific maintenance strategies and protocols that will result in minimal disruptions to activities and uses, minimize impacts to the resources, and ensure that permittees remain compliant with their CDUP requirements. [CMP Section 7.3.1, Infrastructure and Maintenance]
- Minimize adverse impacts to resources during all phases of construction through use of innovative best management practices. [CMP Section 7.3.2, Construction Guidelines]
- To the extent possible, reduce the area disturbed by physical structures within the UH Management Areas by upgrading and reusing buildings and equipment at existing locations, removing obsolete facilities, and restoring impacted sites to pre-disturbed condition. [CMP Section 7.3.3, Site Recycling, Decommissioning, Demolition, and Restoration]

- Protect cultural and natural resources in the assessment and consideration of future projects. [Section 7.3.4, Considering Future Land Uses]
- Conduct effective operations to support management that is focused on resource protection, education, and public safety. [CMP Section 7.4.1, Operations and Implementation]
- Determine whether management actions are achieving the goals of the CMP and provide a process for improving and updating management strategies through evaluation and revisions of the CMP. [CMP Section 7.4.2, Monitoring, Evaluation, and Updates]

The extent to which these goals and objectives (desired outcomes) have been achieved is discussed below.

4.1.1 <u>ACHIEVEMENT OF GOALS AND OBJECTIVES RELATED TO NATIVE HAWAIIAN CULTURAL</u> <u>RESOURCES</u>

UH has taken numerous steps to achieve the objective of increasing understanding and appreciation of Native Hawaiian history and cultural practices that occur on and are related to Maunakea. It has identified and protected cultural resources and historic properties in the UH Management Areas. It has also worked diligently and successfully to ensure that cultural practices are able to continue and are respected.

OMKM together with Kahu Kū Mauna developed, and MKMB considered, policies for the construction of new cultural features, including the stacking of rocks, the scattering of human remains, placement of offerings, buffers around historic properties, and visitation and use of ancient shrines. Extensive community consultation was held over a period of several years before policies regarding this were adopted and subsequently implemented in 2018.

Over the course of several years OMKM established formal education and training programs designed to educate and train management staff, stakeholders, and the general public about many aspects of Maunakea, including its cultural significance to native Hawaiians. Information concerning cultural resources is also provided to all astronomy facility staff (both office and on-mountain), vendors, construction workers, Halepōhaku support and VIS staff, UH employees, and commercial tour drivers. Over 400 people attended the orientation in 2018 and since the orientations began in 2013, over 2,500 people have attended. An online version with an assessment quiz is available as a more efficient means of delivery and an alternative to in-person sessions. Since 2020, HAR § 20-26-5 has reinforced this by stipulating that all persons accessing the UH Management Areas must complete an orientation regarding cultural and natural resources, safety matters, and other relevant information prior to entering the UH Management Areas. CMS is working diligently to ensure that the orientation procedures are fully operationalized.

The Rangers monitor activities on the UH Management Areas and through their individual interactions with those present help to educate people about all aspects of Maunakea, including its cultural significance. The UH Maunakea Rules provides the Rangers with tools to manage activities that impact cultural resources by those who visit UH Management Areas. After significant consultation and outreach on the development of the rules, as discussed in this OAR, the drafters of the rules and the BOR removed provisions that might indirectly impact cultural practitioners, such as requiring group permits. In addition, based on community input and consistent with similar administrative rules governing DLNR lands, UH added the following

statement to HAR §20-26-3(f), "Native Hawaiian traditional and customary rights as recognized and protected under article XII, section 7, of the Hawai'i State Constitution shall not be abridged."

Ku'iwalu's independent CMP evaluation report to DLNR (Ku'iwalu, December 2020) states (in Table 1) that OMKM reported nine of the 14 measures in this category as completed and five as "ongoing." Ku'iwalu's judgment, as reported in that table, was that "some progress" had been made in achieving the desired outcomes. Ku'iwalu gave OMKM this middle grade because not all of the work was timely, and it was unclear to some consulted persons whether the materials and training programs that OMKM had put in place are sufficient to increase understanding of Native Hawaiian history and practices related to Maunakea. Accordingly, its report recommends that: (*i*) Native Hawaiian Organizations (NHOs) be more directly involved in developing and reviewing the materials and providing suggestions, and (*ii*) there be greater clarity of the role that Kahu Kū Mauna plays in engaging and coordinating with NHOs on cultural issues and protocols.

In summary, as discussed in Section 2.1 and presented in tabular form in Section 4.2 (Table 4.1, Table 4.2, and Table 4.3) of this OAR, this objective is largely being met; however, refinement of the CMP and how it is implemented based on community input is an overarching and crucial objective of the CMP framework. UH will continue to reach out to and invite input from cultural practitioners on the best way to achieve the goals and objectives related to native Hawaiian cultural resources under the CMP.

4.1.2 ACHIEVEMENT OF GOALS AND OBJECTIVES RELATED TO NATURAL RESOURCES

The work that UH has conducted and/or sponsored since the CMP was adopted has further enhanced scientists' understanding of the status of Maunakea's biological and physical resources. The studies and research that have been completed have clearly identified the major threats to those resources and recommended management actions that should be undertaken to protect against those where feasible. As discussed in Section 2.2 of this OAR, the contents of OMKM's annual reports show that while the implementation status of the majority of the CMP's 18 natural resource management actions are necessarily "ongoing" because they have open-ended implementation phases, UH has been generally successful in implementing measures that will better protect and preserve unique geological features, ecosystem functions, subalpine and alpine habitats, and biological communities through adaptive management of stressors and threats. With the formal promulgation of HAR Chapter 20-26 in 2020, UH has an even stronger set of tools to use to protect the mountain's natural resources, and it is seeking funding to carry out those management duties through legislative appropriations and other channels.

Ku'iwalu's independent CMP evaluation report to DLNR supports OMKM/CMS's reporting and assessment of UH's performance on natural resource measures. It states that both the public comments it received and its evaluation indicated that OMKM had done a good job of managing natural resources by, for example, identifying threats, managing invasive species, protecting wekiu bug habitat, and conducting biological studies. It also concluded that OMKM can improve upon its outcomes reporting to the public. Accordingly, Ku'iwalu recommended that the many studies be made more readily available to the public by ensuring that all are available for download from the Internet. It also suggested that communications of the status of natural resources might be enhanced if the CMS developed a "Natural Resources Dashboard" that tracked the status of certain aspects of the natural environment (e.g., the number of invasive species identified and removed).

In summary, for reasons discussed in Section 2.2 and presented in tabular form in Section 4.2 (Table 4.4, Table 4.5, Table 4.6, and Table 4.7) of this OAR, the natural resource goals and objectives are largely being met, but there is room for improvement in the way the information is made available to the public.

4.1.3 ACHIEVEMENT OF GOALS AND OBJECTIVES RELATED TO EDUCATION & OUTREACH

As discussed in detail in various parts of Chapter 3 of this OAR and presented in tabular form in Section 4.2 (Table 4.8, Table 4.9, and Table 4.10), UH has worked to expand its contribution to the meaningful stewardship of Maunakea. Its outreach programs and public involvement and education programs have fostered much greater public awareness and conservation of the natural, cultural, and astronomical resources of the mountain. Its Ranger program provides individualized contact with visitors to the mountain that has been largely successful in promoting behavior that is respectful of Maunakea's natural and cultural value. Hence, OMKM's July 2020 CMP status report to the BLNR concluded that it was on track with respect to the Education and Outreach component of the CMP. As evidenced by information in the following paragraph, not all Maunakea's stakeholders shared OMKM's views. Despite its efforts, some members of the Hawai'i Island community have continued to feel as though they lack an effective voice in decision-making regarding activities within the UH Management Areas.

Ku'iwalu's independent CMP evaluation states that a substantial portion of the general public believes that OMKM has engaged in too little community engagement and outreach and that it needs to do more to develop strong positive relationships with the broader community (i.e., not just its supporters). However, it is important to note that Ku'iwalu's evaluation did not include a scientific poll and its list of consulted parties was not a sample of the "general public." Still, the comments are useful and UH is taking those comments seriously. UH also agrees that seeking diverse opinions about implementing the CMP, not only supporters, is critical.

Public comments summarized in the Ku'iwalu report suggest various education and outreach deficiencies, including: (*i*) the orientation video's lack of a Native Hawaiian cultural perspective and cultural sensitivity; (*ii*) an imbalance between protecting cultural resources and pursuing astronomy development; (*iii*) insufficient consultation with NHOs in decision-making for management of Maunakea; and (*iv*) a need for more thorough orientation of visitors before they are allowed to travel to the summit. Ku'iwalu's assessment was that OMKM had not clearly demonstrated that its actions had achieved the desired outcome of building a larger and/or stronger constituency to steward Maunakea. Accordingly, Ku'iwalu recommended that OMKM develop improved reporting metrics regarding the effectiveness of its measures, that it utilize the 'Imiloa Astronomy Center to develop culturally based materials to educate and raise awareness of cultural resources on Maunakea, and that it increase its efforts in presenting that information to the broader community.

As discussed in Section 3.10.2.1 of this OAR, UH has, with the establishment of the CMS, made administrative changes that will lead to enhanced community input from a more diverse set of parties, thereby improving management decision-making. The new management structure is helping UH administer the UH Management Areas in a way that is better-aligned with the desires of direct stakeholders and the broader community. Similarly, the formal promulgation of HAR Chapter 20-26 in 2020, has given UH the ability to make the successful completion of a cultural education program a prerequisite for visiting the summit area. Assuming CMS obtains the required

funding, it is committed to the public education and outreach program improvements that have been identified. Also, as noted previously, Executive Policy EP 10.104, specifically delegates authority to administer HAR § 20-26-5 regarding required orientation to the Executive Director of the 'Imiloa Astronomy Center.

4.1.4 ACHIEVEMENT OF GOALS AND OBJECTIVES RELATED TO ASTRONOMY RESOURCES

As discussed in Section 3.3.2 and summarized in tabular form in Section 4.2 (Table 4.11), CMS believes that UH's management of Maunakea has protected the summit's value as a place for world-class astronomical research. Its control of activities within the summit area, together with the underlying Conservation District regulations, have prevented the intrusion of activities incompatible with the use of the land as a scientific complex for astronomy. Activities that emit light or cause the avoidable release of dust into the atmosphere are prohibited as are activities that could produce electronic emissions that are incompatible with astronomical research. UH's commitment that no additional sites will be used for astronomy facilities and that the number of operating astronomy facilities will be reduced to no more than nine by the end of 2033 will not keep Maunakea from continuing to be supremely attractive to the world's astronomical community and is consistent with achievement of UH's and the Maunakea Observatories' (MKO) astronomy goals.

Ku'iwalu's report to DLNR supports OMKM's assessment. It states that astronomy stakeholders believe that OMKM had done a good job of protecting the quality of the summit area for astronomical purposes, though some operators felt that the situation would be even better if OMKM had initiated more regular, ongoing communications with them rather than waiting until big issues arose.

4.1.5 ACHIEVEMENT OF GOALS AND OBJECTIVES RELATED TO ACTIVITIES AND USES

The actions that UH has taken since the CMP was adopted have allowed important recreational and cultural activities on Maunakea to continue alongside the numerous astronomical uses that have been approved. The recent adoption of the UH Maunakea Rules enhances UH's ability to regulate public and commercial activities, while continuing to support scientific studies, maintain adequate protection of resources, educate users regarding resource sensitivity, and ensure the health and safety of those visiting or working at Maunakea.⁴²

The roadway and parking improvements that UH made in the vicinity of the VIS during 2019 significantly improved circulation and safety in that location. OMKM installed and CMS is continuing to operate an automated counter that records the number of vehicles proceeding above Halepōhaku, differentiating between astronomy vehicles, commercial tour vehicles, service vehicles, and others. The authority that was granted to UH when HAR Chapter 20-26 was adopted in January 2020 provides enforcement measures that support access management already called for in the CMP. These enforcement measures further support access management measures being considered as part of the ongoing new Master Plan process.

⁴² None of the restrictions limit hunting activities. As provided for in HAR § 20-26-3(c), where overlapping jurisdictions are present, DLNR's administrative rules continue to govern.

The Rangers, who are present from 7:15 am to 10:00 pm daily, maintain a presence of interpretive and enforcement personnel on the mountain at all times to educate, encourage people to conform to the rules, and generally promote positive behavior. While they have some enforcement authority, the Rangers' most effective tool is the way in which they model and teach appropriate behavior and help keep visitors safe while they are on the mountain. DOCARE officers and Hawai'i County Police are called for assistance only on an as-needed basis.

UH has taken several steps designed to minimize the adverse effects that recreational activities have on natural and cultural resources. These include encouraging hikers to use established trails and snow play enthusiasts to remain in areas that have a sufficient depth of snow-covering to prevent damage to underlying biological, physical, and cultural resources. Several provisions of the recently adopted UH Maunakea Rules provide UH with additional authority to implement the CMP management actions related to activities so that it can better steward the UH Management Areas.

Ku'iwalu's report to DLNR found that the public's perception of the effectiveness of UH's management of activities and uses is generally positive. It notes that the Rangers receive many compliments on their knowledge of the mountain's various resources and on the guidance that they provide to visitors. There was also public praise for the cultural orientation that some of the commercial tour operators provide and general support for reducing the number of vehicles accessing the summit, possibly through implementation of a shuttle service. Ku'iwalu's conclusion was that UH had made good progress towards achieving the activities and uses outcomes that the CMP "activities and uses" management actions targeted. Moving forward, the report suggested that this element might benefit from periodic surveys designed to measure the extent to which visitors, tour operators, and others felt OMKM's management was effective in preserving the environment and providing a good experience.

4.1.6 <u>Achievement of Goals and Objectives Related to Permitting &</u> <u>Enforcement</u>

UH believes it is achieving all its objectives related to permitting and enforcement. Specifically, it has complied with the terms and conditions of all the permits for Maunakea that are held in its name and has made sure that sublessees report regularly on their compliance with the terms and conditions of approvals that have been granted. In the few instances where violations have been reported, UH has used its best efforts to ensure that immediate steps are taken to resolve the problems.

While it does not have authority to direct sublessees' activities, UH is the permit-holder for all CDUPs on Maunakea and is, therefore, ultimately responsible for sublessees' compliance with the terms of the CDUPs. Accordingly, UH has used its best efforts to ensure that all the activities that it and others undertake on its property are in compliance with applicable regulations.

As a result of the efforts that UH and its sublessees have made, CMS believes that the policies and regulations that are now in place are adequate to minimize human impacts that might otherwise harm Maunakea's resources. As discussed in Section 3.5.2 and presented in tabular form in Section 4.2 (Table 4.16 and Table 4.17), the information presented in its July 2020 annual CMP status report to the BLNR indicates that UH is achieving its goals and objectives related to permitting and enforcement.

Ku'iwalu's report to DLNR found that the public's perception of the effectiveness of UH's implementation of the CMP's permitting and enforcement measures is generally positive, with the bulk of the credit being given to the performance of the Rangers. Some members of the public were of the opinion that there is room for improvement in the management of the commercial tour operators and a need to use higher fees from them to better manage resources. Complaints that visitors were allowed unlimited access while cultural practitioners were restricted were also noted. UH is not aware of instances where cultural practitioners and others were treated differently and such an event would be counter to the CMP management actions and employee training. Others had a feeling that there was inadequate coordination and clarity between County enforcement personnel and DOCARE staff with respect to jurisdiction on the Mauna Kea Access Road. In its report, Ku'iwalu's overall assessment was that UH was making good progress towards the permitting and enforcement objectives.

4.1.7 <u>Achievement of Goals and Objectives Related to Infrastructure &</u> <u>Maintenance</u>

OMKM developed and began implementing an OMMP that prescribes specific maintenance strategies and protocols designed to ensure that its operations cause minimal disruptions to other activities and uses, minimize impacts to natural and cultural resources, and ensure that permittees remain compliant with their CDUP requirements. The OMMP is formulated in a way that minimizes impacts from operations and maintenance activities by using the best available procedures and equipment and by educating all personnel working on Maunakea about its unique resources, and CMS is continuing to implement it.

Maintenance efforts that have the potential to affect historic and cultural resources are not undertaken without first having undergone thorough historic preservation review. OMKM funded a study to evaluate the efficacy measures to prevent the introduction of invasive species, including vehicle and equipment wash practices, and has implemented appropriate inspection measures. Trash from the HP facilities and VIS are removed daily, and each astronomy facility removes trash from its facilities on a regular basis. Rangers routinely check for and pick up trash and debris from public areas while on their daily patrols.

As discussed in Section 3.6.2 and summarized in Section 4.2 (Table 4.18, Table 4.19, and Table 4.20), OMKM's July 2020 Annual Report concludes that it has made very good progress with respect to implementation of infrastructure and maintenance measures and concludes that it is, therefore, achieving its goals and objectives related to infrastructure and maintenance.

Ku'iwalu's report to DLNR found that the public's perception of the effectiveness of UH's implementation of the CMP's infrastructure and maintenance measures was good, and this matched its own assessment of UH's accomplishments regarding these elements of the CMP. Ku'iwalu expressed the belief that it would be even better if future reporting included more details, copies of the reports that had been prepared, and an explanation of the ways in which the information they contained would be used to guide UH's ongoing infrastructure and maintenance efforts.

4.1.8 ACHIEVEMENT OF GOALS AND OBJECTIVES RELATED TO CONSTRUCTION GUIDELINES

Following adoption of the CMP, UH established stricter controls over <u>and</u> construction BMPs for construction within its managed areas. It believes the measures that it has put in place are allowing it to achieve the goal of avoiding or minimizing adverse construction impacts. For example, all contractors are required to adopt BMPs and to have an independent construction monitor who has oversight and authority to ensure that all aspects of ground-based work comply with agreed-upon protocols and permit requirements. The guidance that OMKM has adopted requires that the BMPs: (*i*) be developed prior to work beginning; (*ii*) include a rock movement plan, if appropriate; (*iii*) provide for on-site monitors (e.g., archaeologist, cultural resources specialist, entomologist) during construction, as determined to be warranted by the appropriate agency; (*iv*) require that archaeological monitoring be conducted during construction per an SHPD approved plan; (*v*) mandate thorough inspection of all materials brought onto the mountain to minimize the potential introduction of invasive species; and (*vi*) require contractors to educate their employees and subcontractors regarding historical and cultural significance and about particularly sensitive aspects of the ecology and natural resources.

In summary, as discussed in Section 3.7.2 and presented in tabular form in Section 4.2 (Table 4.21 and Table 4.22), UH believes it is achieving its goals and objectives related to construction guidelines.

Ku'iwalu's CMP evaluation report to DLNR indicates that the public had not yet formed an opinion as to how successful the construction guidelines are at protecting Maunakea's resources. Its own judgment was that good progress had been made with respect to achieving the outcome that these measures were intended to produce.

4.1.9 <u>ACHIEVEMENT OF GOALS AND OBJECTIVES RELATED TO SITE RECYCLING,</u> DECOMMISSIONING, DEMOLITION, AND RESTORATION

By adhering strictly to its construction guidelines and by limiting development to only those areas specifically called out in the 2000 Master Plan and approved through the Conservation District Use process as discussed in Section 3.8.2 and presented in tabular form in Section 4.2 (Table 4.23), UH believes it is making reasonable progress towards achieving its goals and objectives related to this topic, though the processes are proceeding slightly slower than it had hoped.

As demonstrated by the decommissioning efforts that two existing astronomy facility have initiated, the responsible parties are working to restore sites as deemed appropriate through the established processes. It is conceivable that as additional decommissioning proposals are received, they may include (at UH's request) provisions for the continuation or establishment of minor non-astronomy uses (e.g., restrooms, parking, space for cultural practitioners, etc.). UH may consider accommodating this through the adoption of internal guidelines or adaptations of the management actions.

Ku'iwalu's report to DLNR included a summary of comments that it had received from the public regarding progress on these CMP measures. In general, those comments indicated a strong desire for more timely decommissioning in accordance with statements by the Governor and UH representatives and for site restoration in accordance with the provisions of the Decommissioning Plan. Ku'iwalu's assessment noted that clear decommissioning requirements had been included

in the *TMT Management Plan*, the first agreement concluded following adoption of the CMP, but it noted that substantial decommissioning efforts had not been initiated until 2019. As a result, it concluded that only "some progress" had been made towards achieving the desired outcome of these management actions.

4.1.10 ACHIEVEMENT OF GOALS AND OBJECTIVES RELATED TO FUTURE LAND USES

There have been several minor new land uses and only a few major new land uses proposed and/or approved since the CMP was approved in 2009. The minor land uses include data collection efforts (including several of the research efforts discussed in Chapter 2 of this OAR). The major uses are the TMT project and the parking lot and related roadway improvements at Halepōhaku. All projects followed the appropriate CMP-required review process (different processes for minor and major projects). The projects considered their potential impacts to cultural and natural resources and incorporated avoidance, minimization, and mitigation into their designs as deemed appropriate to protect resources. Based on these outcomes, and as discussed in Section 3.9.2 and presented in tabular form in Section 4.2 (Table 4.24), the objectives related to future land uses have been met.

Ku'iwalu's report to DLNR included a summary of comments that it had received from the public regarding progress on these CMP measures. In general, those comments focused on the TMT project, with people being both for and against its construction. It was stated that TMT was proposed for a location that the 2000 Master Plan had indicated would not be developed. However, the site where the TMT project is permitted was identified as "Area E" in the 2000 Master Plan and specifically identified as an appropriate area for a "Next Generation Large Telescope," such as the TMT project. Ku'iwalu's assessment reach a similar conclusion as UH's and indicated "good progress" had been made towards achieving the desired outcome of these management actions.

4.1.11 <u>Achievement of Goals and Objectives Related to Operations &</u> <u>Implementation</u>

UH has made strides in implementing the CMP measures related to operations and implementation. As discussed in Section 3.10.2 and presented in tabular form in Section 4.2 (Table 4.25), it is on track with respect to implementing the operations and implementation measures in the CMP.

Perhaps the most important change that has occurred is the reconfiguration of the management entity from OMKM to CMS. That restructuring, which was approved by the BOR in August 2020, enhances local control, clarifies lines of responsibility, and makes the decision-making more open and responsive to community input. However, prior to and in addition to the restructuring, UH has also developed and is implementing stringent training programs for staff and volunteers, coordinating its management activities with the owners of adjacent lands, and implementing the emergency response plan procedures called for in the CMP.

Ku'iwalu's report to DLNR indicates that the public had mixed opinions as to how successful UH has been regarding the management of operations and implementation. Many felt UH was doing a "really good job," but members of the Native Hawaiian community felt that despite Kahu Kū Mauna and MKMB there had been no community involvement on resource management.

Ku'iwalu's own judgment was that good progress had been made with respect to achieving the desired outcome.

4.1.12 ACHIEVEMENT OF GOALS AND OBJECTIVES RELATED TO MONITORING, EVALUATION, AND UPDATES

Although UH has been preparing annual reports and adapting its management since the CMP was adopted, this OAR is the first effort by UH to document its evaluation of its progress and systematically and comprehensively update the management strategies in writing as called for in the CMP. As discussed in Sections 1.1.2 and 3.11.2, has consistently prepared annual report and submitted them to DLNR; those reports are cumulative and provided opportunities for the CMP-approving agency, DLNR, to provide input on UH's implementation of the plan. UH believes that because of those efforts it is now making reasonable progress towards achieving its goals and objectives related to this topic, though the CMP update process is proceeding slower than it had hoped. However, only after CMS has received feedback on this OAR and determined what adjustments it will make to its management actions will the update process as envisioned in the CMP be complete.

Ku'iwalu's report to DLNR indicated that the public felt that little progress on this goal had been made because they had not been involved in the annual reporting and OMKM had not completed a CMP update as the CMP calls for. Ku'iwalu's assessment was that minimal progress had been made toward this goal because the CMP had not been reviewed and updated in a timely manner.

4.2 IMPLEMENTATION STATUS OF MAUNAKEA CMP MANAGEMENT ACTIONS

The following tables summarize the implementation status of each of the management actions identified in the CMP. They are drawn from OMKM's 2020 Annual Report to the DLNR, which covers actions through the end of 2019.

Ineal and historical connections to Maunakea, cultural practitioners, and other Native Hawaiian groups, including the MKMB's Hawaiian Culture Committee, toward the development of appropriate procedures and protocols regarding cultural issues.Historic Preservation division approval (2014) of the Burial Solicitations were made through announcements in the daily newsletter. There were no responses to the solicitations but OMKM cor as part of its interaction and relationship building with the cc Fall 2013 the Hawaii Island Burial Council officially recogr cultural descendants of Ka'ohe Ahupua'a. OMKM placed ads over a period of several months in Hawa Hawaii Today, Honolulu Star Advertiser and OHA's Ka Wa participate in talk story sessions. Kahu Kū Mauna. May 21, 2016, Kahu Kū Mauna hosts a tal related to CMP management actions, representatives from D members of the Native Hawaiian community attended.CR-2Support application for designation of the summit region of Maunakea as a Traditional Cultural Property, per the National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470 et seq. in consultation with the larger community.Ongoing	Description Status Comments/Discussion	
region of Maunakea as a Traditional Cultural Property, per the National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470 et seq. in consultation with the larger community.	 al and historical connections to Maunakea, tural practitioners, and other Native Hawaiian ups, including the MKMB's Hawaiian Culture nmittee, toward the development of ropriate procedures and protocols regarding tural issues. Historic Preservation division approval (2014) of the Burial Treat Solicitations were made through announcements in the daily new newsletter. There were no responses to the solicitations but OMKM continue as part of its interaction and relationship building with the comm Fall 2013 the Hawaii Island Burial Council officially recognized cultural descendants of Ka'ohe Ahupua'a. OMKM placed ads over a period of several months in <i>Hawaii Tr Hawaii Today</i>, <i>Honolulu Star Advertiser</i> and OHA's <i>Ka Wai Old</i> participate in talk story sessions. Kahu Kū Mauna. May 21, 2016, Kahu Kū Mauna hosts a talk stor related to CMP management actions, representatives from DLNF 	Attment Plan (see CR-13). Aspapers and the OHA es to seek out individuals munity. several individuals as <i>ribune Herald, West</i> <i>a</i> inviting community to pry session on matters
	ion of Maunakea as a Traditional Cultural perty, per the National Historic Preservation of 1966, as amended, 16 U.S.C. 470 et seq. in	nal Register of Historic
awareness about the importance of preserving the cultural landscape. An informational brochure on cultural and natural resources revised in 2016, with periodic updates since then. OMKM sends out eNewsletters informing the public about of Resource orientation of those who work on the mountain into VIS and MKSS staff, rangers, commercial tour operators an workers commenced in 2013. An online orientation is also a	nduct educational efforts to generate public areness about the importance of preserving the tural landscape. Ongoing An informational brochure on cultural and natural resources was revised in 2016, with periodic updates since then. OMKM sends out eNewsletters informing the public about OMK Resource orientation of those who work on the mountain includin VIS and MKSS staff, rangers, commercial tour operators and star workers commenced in 2013. An online orientation is also availa visitor orientation is complete and provided for scheduled group	developed in 2014, KM and its activities. ng observatory personnel, ff, and construction able. A brief public /

Table 4.1 Implementation Status of Items Related to Native Hawaiian Cultural Resources: Management

ID No.	Description	Status	Comments/Discussion
CR-4	Establish a process for ongoing collection of information on traditional, contemporary, and customary cultural practices.	Ongoing	Archival and oral history (Mauna Kea-Ka Piko Kaulana o Ka 'Āina); Cultural Resources Management Plan; various cultural analyses completed as part of Chapter 343 mandates; Maunakea topics included by related agencies such as USGS subject matter reviews; and other studies.
CR-5	Develop and adopt guidelines for the culturally appropriate placement and removal of offerings.	Completed	In 2016, Kahu Kū Mauna reviewed and approved the wording of draft policy guidelines. Approval by MKMB occurred in early 2018 after additional consultation by Kahu Kū Mauna. Administrative rules for the UH Management Areas, effective beginning January 2020, incorporate policies approved by the University President while ensuring protections afforded to Native Hawaiian traditional and customary practices. Note: CR-5 overlaps with CR-7 (constructing new Hawaiian cultural features) being that offerings are usually associated with the construction of new features.
CR-6	Develop and adopt guidelines for the visitation and use of ancient shrines.	Completed	In 2016 Kahu Kū Mauna drafted and the MKMB approved the policy. Administrative rules for the UH Management Areas, effective beginning January 2020, incorporate policies approved by the University President while ensuring protections afforded to Native Hawaiian traditional and customary practices.
CR-7	Kahu Kū Mauna shall take the lead in determining the appropriateness of constructing new Hawaiian cultural features.	Completed	In 2012, Kahu Kū Mauna reviewed a draft of a process. In 2016 Kahu Kū Mauna re-evaluated the policy and held a consultation session that included OHA. Approval by MKMB occurred in early 2018 after additional consultation by Kahu Kū Mauna. It is noted that the proposed policy acknowledges there are existing statutes and other agency rules governing this type of activity.
CR-8	Develop and adopt a management policy for the UH Mgt. Areas on the scattering of cremated human remains.	Completed	In 2012 Kahu Kū Mauna developed and approved a draft policy. In 2016 Kahu Kū Mauna re-evaluated the policy and held a consultation session that included OHA. Approval by MKMB occurred in early 2018 after additional consultation by Kahu Kū Mauna. Administrative rules for the UH Management Areas, effective beginning January 2020, incorporate policies approved by the University President while ensuring protections afforded to Native Hawaiian traditional and customary practices.
CR-9 Source:	A management policy for the cultural appropriateness of building ahu or "stacking of rocks" will need to be developed by Kahu Kū Mauna who may consider similar policies adopted by Hawai'i Volcanoes National Park. 2020 Annual Report to BLNR: Appendix F	Completed	In 2012 Kahu Kū Mauna approved a draft policy. In 2016 Kahu Kū Mauna re-evaluated the policy and held a consultation session that included OHA. Approval by MKMB occurred in early 2018 after additional consultation by Kahu Kū Mauna. CR-7 was combined with CR-9 under the guidance of Kahu Kū Mauna who pointed out that the "stacking of rocks" may be a cultural feature.

ID No.	Description	Status	Comments/Discussion
CR-10	Develop and implement a historic property	Completed/	SHPD approved OMKM's long term historic properties monitoring plan; monitoring
	monitoring program to systematically monitor the condition of the historic district and all historic	Ongoing	is ongoing according to the plan's schedule.
	properties, including cultural sites and burials.		
CR-11	Complete an archaeological survey of the portions	Completed	An archaeological survey of the MKSR and Mauna Kea Access Road was completed
	of the Mauna Kea Access Road corridor that are under UH management.		in 2009.
CR-12	Consult with Kahu Kū Mauna about establishing	Completed	In 2012 Kahu Kū Mauna determined that this should be reviewed on a case-by-case
	buffers (preservation zones) around known		basis. They identified criteria for when to consult for routine (minimal impact) project
	historic sites in the Astronomy Precinct, to protect		proposals, as well as with future development.
	them from potential future development.		In 2016, Kahu Kū Mauna revised their policy. MKMB approved their policy.
CR-13	Develop and implement a burial treatment plan for	Completed	SHPD reviewed and approved the Burial Treatment Plan for Mauna Kea in 2014.
	the UH Management Areas in consultation with		
	Kahu Kū Mauna Council, MKMB's Hawaiian		
	Culture Committee, the Hawai'i Island Burial		
	Council, recognized lineal or cultural descendants,		
	and SHPD.		
CR-14	Immediately report any disturbance of a shrine or	Ongoing	Rangers report disturbance to OMKM and OMKM in turn notifies other parties.
	burial site to the Rangers, DOCARE, Kahu Kū		
	Mauna Council, and SHPD.		
Source: 2	2020 Annual Report to BLNR: Appendix F		

Table 4.3 Implementation Status of Items Related to Cultural Resources: Historic Properties

ID No.	Description	Status	Comments/Discussion
NR-1	Limit threats to natural resources through management of permitted activities and uses.	Completed/ Ongoing	OMKM consulted with agencies on a draft of administrative rules governing public and commercial activities. Public hearings seeking public comments on a proposed draft were held in 2018. Administrative rules, effective beginning January 2020, for the UH Management Areas incorporate policies approved by the University President while ensuring protections afforded to Native Hawaiian traditional and customary practices. An Operations, Monitoring and Maintenance Plan (OMMP) relating to the coordination of maintenance plans, activities and schedules was developed and approved by the MKMB, and is being implemented.
NR-2	Limit damage caused by invasive species through creation of an invasive species prevention and control program.	Completed/ Ongoing	The Maunakea Invasive Species Management Plan is approved and is being implemented. Additional topics are addressed as situations arise, and procedures are developed based on scientific, management board, and community feedback. A volunteer program was established to pull invasive weeds on the UH Management Areas with emphasis in the Halepōhaku area. Beginning in 2007 OMKM conducted annual surveys of invasive arthropod species on the UH Management Areas. This program was expanded to include monthly monitoring of the 9.200 ft mid-level facilities and quarterly monitoring of the summit facilities. Rapid response strategies were drafted as part of the Invasive Species Management Plan. Inspections of heavy equipment, construction material, and other items too large to be carried by an individual occur prior to coming on to the UH Management Areas. Specific requirements are part of the Invasive Species Management Plan. A MS Student evaluated program efficacy as part of his 2018 thesis, with management recommendations incorporated into OMKM policies and procedures. Beginning in 2013 to July 2020, a total 808 large vehicles and loads were inspected. 782 passed initial inspection or following quick remediation and were approved; 17 were rejected and required re-inspection; and 9 were non-compliant, that is, no requests for inspections were made prior to proceeding to the mountain.
NR-3	Maintain native plant and animal populations and biological diversity.	Ongoing	Non-native plants and arthropods are monitored. The Division of Forestry and Wildlife is completing a circum-Maunakea fence and ungulate removal from Palila critical habitat. OMKM staff investigated māmane leaf curl frequency at Halepōhaku (plant disease response) in coordination with UHH scientists. Arthropod food webs and parasites are being investigated.
NR-4	Minimize barriers to species migration to help maintain populations and protect ecosystem processes and development.	Ongoing	OMKM coordinates with Forest Reserve, Natural Area Reserve, and Department of Land and Natural Resources technical staff to identify issues, craft appropriate responses, and investigate concerns regarding ecosystems and flora and fauna populations.
NR-5	Manage ecosystems to allow for response to climate change.	Ongoing	OMKM coordinates with Forest Reserve and Natural Area Reserve staff to ensure management activities do not inadvertently impede natural ecosystem response. Research into climate change forecast downscaling and climate monitoring helps inform potential future management action. OMKM participated in Pacific Islands Climate Change Cooperative workshops on climate change to help identify mitigation and adaptation strategies. A climate monitoring sea level to summit network plan is in preparation.

Table 4.4 Implementation Status of Items Related to Natural Resource: Threat Protection and Control

ID No.	Description	Status	Comments/Discussion
NR-6	Reduce threats to natural	Ongoing	Rangers help to educate visitors about Maunakea as part of their daily activities.
	resources by educating		Resource orientation of those who work on the mountain including astronomy personnel, VIS and MKSS staff,
	stakeholders and the public		Rangers, commercial tour operators and staff, and construction workers commenced in 2013. An online
	about Maunakea's unique		orientation is also available. A brief public / visitor orientation is complete and provided for scheduled group
	natural resources.		visits.
			See also CR-3 and EO-2.
Source:	2020 Annual Report to BLNR: Append	dix F	

Table 4.5 Implementation Status of Items Related to Natural Resource: Ecosystem Protection, Enhancement & Restoration

ID No.	Description	Status	Comments/Discussion
NR-7	Delineate areas of high native diversity, unique communities, or unique geological features within the Astronomy Precinct and at Halepōhaku and consider protection from development.	Ongoing	Botanical survey of the UH Management Areas is completed. Biodiversity, wēkiu bug, and erosion and surficial geology surveys are ongoing. A study and mapping of wēkiu bug habitat is completed. Surveys for birds and bats are ongoing.
NR-8	Consider fencing areas of high native biodiversity or populations of endangered species to keep out feral ungulates (applies to areas below 12,800 ft elevation).	Ongoing	Assisted DLNR with fencing natural population of Silverswords. Other areas will be fenced when areas are identified and needed.
NR-9	Increase native plant density and diversity through an outplanting program.	Ongoing	Māmane seedlings germinated from seeds found in the Halepōhaku area were planted near the VIS. Worked with DLNR and planted 200 Silversword seedlings in the Halepōhaku area. Collaborated with Kamehameha Schools to build plant propagation benches and start seedlings for eventual habitat restoration and enhancement at Halepōhaku. Germination of māmane seedlings continues. The construction of a small greenhouse at Halepōhaku for growing native plants was approved by BLNR as part of a project to improve the ingress/egress and parking at the VIS. Over 100 native plants were planted under the ingress/egress improvements permit.
NR-10	Incorporate mitigation plans into project planning and conduct mitigation following new development.	Ongoing	Mitigation and best management practices plans are required for projects as appropriate.
NR-11	Conduct habitat rehabilitation projects following unplanned disturbances.	Ongoing	Damage assessments and rehabilitation following unplanned disturbances are conducted on a case-by-case basis as needed. Generally, unplanned disturbances, such as vehicle oil leaks, occur on previously disturbed areas such as roadways, where humans frequent.
NR-12	Create restoration plans and conduct habitat restoration activities, as needed.	Ongoing	A study of wēkiu bug habitat restoration was initiated in 2015. A study and mapping of wēkiu bug habitat has been completed. Restoration plans and greenhouse for long-term program use are part of the project to improve the ingress/egress and parking at the VIS.
Source:	2020 Annual Report to BLNR: Appendix F		

ID No.	Description	Status	Comments/Discussion		
NR-13	Increase communication, networking, and collaborative opportunities to support management and protection of natural resources.	Ongoing	OMKM has established and continues to establish working relationships with the community and DLNR through working groups such as the Maunakea Environment Committee and Big Island Invasive Species Committee, Maunakea Watershed Alliance,		
			Hawaii Ant Lab, and OHA.		
NR-14	Use the principles of adaptive management when developing programs and methodologies. Review programs annually and revise any component plan every five years, based on the results of the program review.	Ongoing	Potential CMP revisions are identified in annual program documentation. Program plans, such as the Maunakea Invasive Species Management Plan, are updated and communicated at MKMB meetings as issues are identified. Completion of Envision Maunakea project.		
Source: 2					

Table 4.6 Implementation Status of Items Related to Natural Resource: Program Management

Table 4.7 Implementation Status of Items Related to Natural Resource: Inventory, Monitoring, and Research

ID No.	Description	Status	Comments/Discussion
NR-15	Conduct baseline inventories of high-priority resources, as outlined in an inventory, monitoring, and research plan.	Completed	Baseline surveys of wēkiu bugs, other arthropods, including invasive species have been completed. A botanical survey was completed in the Summer of 2011 and published in 2013. Studies related to permafrost, climate, and erosion are also complete. Baselines for high-priority resources in the UH Management Areas have been completed. Continued monitoring and research of those resources and other resources will be conducted under NR-16 and NR-17.
NR-16	Conduct regular long-term monitoring, as outlined in an inventory, monitoring, and research plan.	Ongoing	OMKM conducts annual wēkiu bug, alien and invasive species surveys. Botanical and arthropod surveys are conducted as part of the annual archaeological monitoring.
NR-17	Conduct research to fill knowledge gaps that cannot be addressed through inventory and monitoring.	Ongoing	OMKM funded a study to develop a long term model relating to climate change and potential impact to the summit ecosystem; a study of native arthropod habitats and vegetation association, arthropod food webs; analysis of historical weather climate conditions on the summit and meteorological and geological influences on insect and snowfall drops on the summit terrain to help inform wēkiu bug research; study to assess the presence and persistence of permafrost; surficial geology and erosion; and several studies related to the wēkiu bug including life history, genetics, habitat restoration, and habitat mapping. OMKM funded an international symposium on Tropical Alpine Ecosystems. Invited speakers were experts in research and management of alpine ecosystems. OMKM hopes to develop a network with other researchers and managers to gain knowledge to better manage Maunakea.

ID No.	Description	Status	Comments/Discussion
NR-18	Develop geo-spatial database of all known natural resources and their locations in the UH Management Areas that can serve as baseline documentation against change and provide information essential for decision-making.	Ongoing	Wēkiu bug and botanical data, infrastructure and signs have been mapped. A GIS database of resources surveyed utilizing ArcGIS and distributed as GoogleEarth layers has been developed; new data as available is added to this database.
Source:	2020 Annual Report to BLNR: Appendix F		

Table 4.8 Implementation Status of Items Related to Education and Outreach: Program Development

ID No.	Description	Status	Comments/Discussion
EO-1	Develop and implement education and outreach program	Ongoing	Volunteer, Orientation, Brochures (Safety, Culture, Resources, What is OMKM) are available. In-school visits (Hilo Intermediate, Hawai'i Academy of Arts and Sciences Public Charter School, Ke Ana La'ahana, Waiakea High, Kealakehe Elementary) occur regularly. Community organizations and members help support OMKM's volunteer program. Work with Kealakehe Elementary School to support their annual Science Showcase at the school. Outreach activities by researchers are conducted at various schools. OMKM research affiliate also helps advise young scientists with their science fair projects. Updates on OMKM activities are given to various community organizations. OMKM also participates in community events. The MKMB approved an Education and Outreach plan in July 2020. That plan addresses EO-1, 3, 5, 6, 7, and 8.
Source: 2	2020 Annual Report to BLNR: A	ppendix F	

Table 4.9 Implementation Status of Items Related to Education and Outreach: Education

ID No.	Description	Status	Comments/Discussion
EO-2	Require orientation of users, with periodic	Ongoing	Resource orientation of those who work on the mountain including astronomy personnel, VIS
	updates and a certificate of completion,		and MKSS staff, Rangers, commercial tour operators and staff, and construction workers
	including but not limited to visitors,		commenced in 2013. Orientation is available to all interested parties in-person or online.
	employees, astronomy staff, contractors, and		The University's Administrative Rules for Maunakea include provisions for orientation of all
	commercial and recreational users.		users.
EO-3	Continue to develop, update, and distribute	Ongoing	Materials on the cultural and natural resources, visiting safely and responsibly and Maunakea
	materials explaining important aspects of		hazards are distributed at the VIS.
	Maunakea.		
EO-4	Develop and implement a signage plan to Complete		A sign plan was approved by the MKMB in 2016 and implemented in 2017.
	improve signage throughout the UH	Ongoing	An inventory of sign locations on the UH Management Areas has been completed.
	Management Areas (interpretive, safety,		Cultural and safety related signs have been installed.
	rules and regulations).		
EO-5	Develop interpretive features such as self-	Completed/	Included as part of ongoing CIP funded project. The MKMB approved an Education and
	guided cultural walks and volunteer-	Ongoing	Outreach plan in July 2020. That plan addresses EO-1, 3, 5, 6, 7, and 8.
	maintained native plant gardens.		

ID No.	Description	Status	Comments/Discussion		
EO-6	Engage in outreach and partnerships with	Ongoing	See EO-1.		
	schools, by collaborating with local experts,				
	teachers, and university researchers, and by				
	working with the 'Imiloa Astronomy Center				
	of Hawaiʻi.				
Source: 2	Source: 2020 Annual Report to BLNR: Appendix F				

Table 4.10 Implementation Status of Items Related to Education and Outreach: Outreach

ID No.	Description	Status	Comments/Discussion
EO-7	Continue and increase opportunities for	Ongoing	OMKM through the MKMB, Kahu Kū Mauna, and Environment Committee provide
	community members to provide input to		opportunity for members of the community and other organizations to participate in the
	cultural and natural resources management		management activities of the mountain.
	activities on Maunakea, to ensure		Bi-monthly volunteer activities provide an opportunity for the community to participate and
	systematic input regarding planning,		share knowledge.
	management, and operational decisions that		Meetings with community groups and open houses were conducted to give the public an
	affect natural resources, sacred materials or		opportunity to provide input and feedback on administrative rules being developed by OMKM.
	places, or other ethnographic resources with		Public hearings seeking public comments on a proposed draft were held in 2018.
	which they are associated.		
EO-8	Provide opportunities for community	Ongoing	OMKM through the MKMB, Kahu Kū Mauna, and Environment provide opportunities for
	members to participate in stewardship		members of the community to participate in the management activities of the mountain.
	activities.		Bi-monthly volunteer activities provide an opportunity for the community to participate and
			share knowledge.
			Student projects and mentoring provides opportunities (science fair, legacy, etc.) for one-on-
			one interaction and more in-depth efforts.
Source: 2	2020 Annual Report to BLNR: Appendix F		

Table 4.11 Implementation Status of Items Related to Astronomical Resources

ID No.	Description	Status	Comments/Discussion
AR-1	Operate the UH	Ongoing	Administrative rules, effective beginning January 2020, for the UH Management Areas incorporate policies
	Management Areas to prohibit activities resulting in negative impacts to astronomical resources.		approved by the University President while ensuring protections afforded to Native Hawaiian traditional and customary practices.

ID No.	Description	Status	Comments/Discussion
AR-2	Prevent light pollution, radio frequency interference (RFI) and dust.	Ongoing	 Project proposals requesting the use of radio signals are reviewed by the Institute for Astronomy for potential interference with astronomical research activities. At the State level, the Starlight Reserve Advisory Committee was active from 2010 to 2015. Efforts made by UH and DBEDT during subsequent Legislative sessions to make the committee permanent have been unsuccessful. UH has been working closely with Hawai'i County officials on outdoor lighting issues. This has resulted in the adoption of public-health, wildlife, and astronomy-friendly LED lights to replace the previous low-pressure sodium lights. UH and the County are now requesting the State to use similar lights at Hawai'i Island airports and harbors. UH continues to provide advice on amendments to the Hawai'i County lighting ordinance.
Source: 2	2020 Annual Report to BLNR: Appendi	x F	

Table 4.12 Implementation Status of Items Related to Activities and Uses: General Management

ID No.	Description	Status	Comments/Discussion
ACT-1	Continue and update managed access policy of 1995 Management Plan.	Completed/ Ongoing	The BLNR approved the Public Access Plan for UH Management Areas in 2011. That plan contains principles and policies regarding public access. Section § 20-26-38 of the recently adopted Administrative Rules specifically addresses limits on access within the UH Management Area. It authorizes the University to close or limit vehicular access when needed for protection from hazardous conditions, to allow construction or maintenance activities, or to allow transportation of wide, heavy, or otherwise hazardous loads. It also allows the University to restrict access by private vehicles for public safety and welfare, for the protection of resources, and to reduce congestion. UH is in the process of updating the Master Plan in accordance with those rules.
ACT-2	Develop parking and visitor traffic plan.	Completed/ Ongoing	A CDUP was issued to implement the ingress/egress project at Halepōhaku, and the improvements were completed in 2019. OMKM Rangers assist staff at the VIS with the implementation of their interim parking plan to maintain order, accommodate as many vehicles as possible and to ensure the safety of visitors to the VIS. An automated vehicle counter counts the number of vehicles (differentiating public, commercial, tour, astronomy, etc.) that drive above Halepōhaku.
ACT-3	Maintain a presence of interpretive and enforcement personnel on the mountain at all times to educate users, deter violations, and encourage adherence to restrictions.	Completed/ Ongoing	Rangers are present year-round from 7:15 am to 10:00 pm daily; DOCARE officers and Hawai'i County Police are called for assistance on an as needed basis.

ID No.	Description	Status	Comments/Discussion
ACT-4	Develop and enforce a policy that maintains current prohibitions on off-road vehicle use in the UH Management Areas and that	Ongoing	HAR § 20-26-28 limits the use of motorized vehicles to roads and trails designated for that purpose. Vehicle access to the top of Pu'upoli'ahu has been blocked since 2001 at the request of Kahu Kū Mauna. Commercial operators and film crews are required to stay on the road or within the footprint of existing facilities, unless granted permission by OMKM.
	strengthens measures to prevent or deter vehicles from leaving established roads and designated parking areas.		
Source: 2	2020 Annual Report to BLNR: App	pendix F	

Table 4.13 Implementation Status of Items Related to Activities and Uses: Recreational

ID No.	Description	Status	Comments/Discussion
ACT-5	Implement policies to reduce impacts of recreational hiking	Completed/ Ongoing	HAR § 20-26-21 limits hiking to designated trails and roads, except by written permit. The University has not yet developed a map depicting all of the trails that may be used.
ACT-6	Define and maintain areas where snow-related activities can occur and confine activities to slopes that have a protective layer of snow.	Ongoing	Generally, this is a self-regulated activity. People usually do not venture to areas where there is no snow. A map of areas where snow play generally occurs has been developed for internal use, but areas change depending on the weather and snow deposition. HAR § 20-26-39 specifically addresses snow play, restricting skiing, snowboarding, sledding, and other similar winter or snow sports as needed to: (<i>i</i>) maintain public safety and welfare; (<i>ii</i>) prevent damage to resources; and (<i>iii</i>) minimize conflicts among visitors. It specifically prohibits organized contests, meets, or competitions, snow play tours or other similar events for skiing, snowboarding, sledding or other forms of snow recreation or snow activities. It also prohibits operating a snowmobile, an all-terrain vehicle, or other motorized vehicle used for snow recreation anywhere in the UH Management Areas.
ACT-7	Confine University or other sponsored tours and stargazing activities to previously disturbed ground surfaces and established parking areas.	Ongoing	Star gazing activities on the UH Management Areas are limited to parking lots, or in areas in close proximity to the VIS. HAR § 20-26-28 requires any motorized or non-motorized vehicle or trailer to park in designated areas and use designated roads or trails.
ACT-8	Coordinate with DLNR in the development of a policy regarding hunting in the UH Management Areas.	Completed/ Ongoing	As made clear in HAR § 20-26-3(c), where overlapping jurisdictions pertaining to hunting are present (including administrative rules), DLNR's hunting rules govern.
Source: 2	2020 Annual Report to BLNR: Appendi	xF	

ID No.	Description	Status	Comments/Discussion
ACT-9	Maintain commercial tour permitting process; evaluate and issue permits annually.	Ongoing	UH oversees commercial tour permits, a responsibility transferred to UH from BLNR. As prescribed in HAR § 20-26-61-64, the University may issue permits for conducting commercial tours or transporting passengers for hire within the UH management areas. Each permit application is evaluated on its own merits for compatibility with such things as the functions and purpose of UH management areas, consistency with existing approved management plans, potential effect on the surrounding resources, existing facilities and infrastructure, and the public's use of the area. In addition, each permit application is also evaluated for the quality of its educational aspects, the comprehensiveness of planned staff training, and its safety protocols.
ACT-10	Ensure OMKM input on permits for filming activities	Completed/ Ongoing	HAR § 20-26-65 stipulates that commercial video, digital, film, still photography, or any other visual and audio recordings taken within the UH management areas are prohibited without a written permit issued by the Hawai'i Film Office of the State of Hawai'i Department of Business Economic Development, and Tourism. It requires that the University review all permit applications involving the UH management areas and recommend approval or denial of each permit application, request that any film permit that is issued include specific conditions, and may request fees, insurance, performance bonds, or deposits to cover administrative and personnel expenses or potential damages to resources associated with the proposed activity.
ACT-11	Seek statutory authority for the University to regulate commercial activities in the UH Management Areas.	Completed	The promulgation of HAR Chapter 20-26 provides statutory authority for the University to regulate commercial activities in the UH Management Areas.
Source: 20	20 Annual Report to BLNR:	Appendix F	

Table 4.14 Implementation Status of Items Related to Activities and Uses: Commercial

Table 4.15 Implementation Status of Items Related to Activities and Uses: Scientific Research

ID No.	Description	Status	Comments/Discussion
ACT-12	Ensure input by OMKM, MKMB, and Kahu Kū Mauna on all scientific research permits and establish system of reporting results of research to OMKM.	Ongoing	HAR § 20-26-62 authorizes the University to grant permits that allow activities for scientific, educational, or management purposes if they are consistent with the approved management plan, are compatible with the functions and purpose of the UH management areas, and do not have undue adverse effect on existing or previously approved research or on the surrounding resources. Proposals requiring ground disturbing activities or potential impact to the cultural and/or natural
			landscape are reviewed by Kahu Kū Mauna and MKMB. Permit by DLNR as appropriate.
Source: 2	2020 Annual Report to BLNR: Appendix F		

ID No.	Description	Status	Comments/Discussion
P-1	Comply with all applicable federal, state, and local laws, regulations, and permit conditions related to activities in the UH Management Areas.	Ongoing	This is a condition of UH's leases with DLNR. Rangers monitor activities. Regular communication with DLNR's Division of Conservation and Resources Enforcement, County of Hawaii police, and Sheriff's department continues as demonstrated during TMT protests. Since 2006, Maunakea Rangers have been conducting biannual inspections of all facilities on the UH Management Areas for compliance with their CDUPs, and the University has undertaken or monitored corrective action as appropriate.
P-2	Strengthen CMP implementation by recommending to the BLNR that the CMP conditions be included in any Conservation District Use Permit or other permit.	Ongoing	Relevant CMP management actions were incorporated into the CDUA for the Thirty Meter Telescope project. The MKMB requires proposals for projects for Maunakea include a review and comments on how the proposer will comply with CMP action items relevant to the project.
P-3	Obtain statutory rule-making authority from the legislature, authorizing the University of Hawai'i to adopt administrative rules pursuant to Chapter 91 to implement and enforce the management actions.	Completed	The Legislature granted UH authority to promulgate administrative rules in 2009. Act 132.
P-4	Educate management staff and users of the mountain about all applicable rules and permit requirements.	Ongoing	Included as part of the orientation and with new project start-up meetings. This will be addressed in administrative rules. Public hearings seeking public comments on a proposed draft were held in 2018.
Source: 2	2020 Annual Report to BLNR: Appendix F		

Table 4.16 Implementation Status of Items Related to Permitting and Enforcement: Laws and Regulations

Table 4.17 Implementation Status of Items Related to Permitting and Enforcement: Laws and Enforcement

ID No.	Description	Status	Comments/Discussion
P-5	Continue coordinating with other	Ongoing	OMKM coordinates with DOCARE on enforcement activities. Ranger observations are sent to
	agencies on enforcement needs.		DLNR, NAR, DOFAW, and US Fish & Wildlife Service.
P-6	Obtain legal authority for establishing, and then establish, a law enforcement presence on the mountain that can enforce rules for the UH Management Areas.	Completed	
P-7	Develop and implement protocol for oversight and compliance with Conservation District Use Permits.	Ongoing	OMKM Rangers conduct twice yearly inspections of all astronomy facilities for CDUP compliance.
P-8	Enforce conditions contained in commercial and Special Use permits.	Ongoing	Rangers' responsibilities includes oversight of commercial tour activities and special use permits issued by OMKM.
Source: 2	2020 Annual Report to BLNR: Appendix F		

ID No.	Description	Status	Comments/Discussion
IM-1	Develop and implement an OMMP.	Completed/ Ongoing	An Operations Monitoring and Maintenance Plan (OMMP) was reviewed by Kahu Kū Mauna and approved by the MKMB. Implementation is ongoing.
IM-2	Reduce impacts from operations and maintenance activities by educating personnel about Maunakea's unique resources.	Ongoing	A cultural and natural resources orientation program has been developed and is implemented. Orientation sessions on resources and safety are conducted for OMKM and MKSS staff. This will be addressed in administrative rules. Public hearings seeking public comments on a proposed draft were held in 2018.
IM-3	Conduct historic preservation review for maintenance activities that will have an adverse effect on historic properties.	Ongoing	OMKM coordinates with DLNR and SHPD specifically often. Information regarding maintenance projects and proposals are provided to DLNR, they are then reviewed and approved as deemed appropriate by DLNR. Routine maintenance activities that do not involve ground disturbance or occur on previously disturbed land are performed as needed and do not require historic preservation review.
IM-4	Evaluate need for and feasibility of a vehicle wash station near Halepōhaku, and requiring that vehicles be cleaned.	Completed/ Ongoing	OMKM funded a study to evaluate the efficacy current measures to prevent the introduction of invasive species, including vehicle and equipment wash practices.
IM-5	Develop and implement a Debris Removal, Monitoring and Prevention Plan.	Ongoing	Trash from the HP facilities and VIS are removed daily. Each astronomy facility removes trash from their respective facilities. Rangers routinely check for and pick up trash and debris while on their daily patrols. Rangers pick up and map the location of trash at the parking lot near the trail head to Lake Waiau (NAR). The amount of trash decreased following the installation of a portable toilet. A draft plan is under review.
IM-6	Develop and implement an erosion inventory and assessment plan.	Ongoing	OMKM partnered with UH Hilo geography department to study surficial geology and cinder cone erosion issues. It is anticipated the inventory will be completed in 2021
IM-7	Prepare a plan, in collaboration with the Department of Defense, to remove military wreckage from a remote area of the UH Management Areas, while ensuring protection of natural and cultural resources. 2020 Annual Report to BLNR: Appendix 1	Ongoing	An inventory of all known aircraft and military wreckage was submitted to the Department of Defense for review and updating. OMKM is working with DOD, OCCL, and SHPD to determine appropriate plans for removal or preservation in place.

Table 4.18 Implementation Status of Items Related to Infrastructure and Maintenance: Routine Maintenanc	e
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ID No.	Description	Status	Comments/Discussion		
IM-8	Assess feasibility of paving	Completed/	An engineering study related to the paving of the Mauna Kea Access Road from Halepohaku to the summit		
	the Mauna Kea Access	Ongoing	was completed in 1984. This study was the basis for paving the road from the summit to about the boundary		
	Road.		of the MKSR. Another study was prepared in 2017 of the damage caused by large storms over the past ten		
			years. The report assessed repairs needed and potential cost		
IM-9	Evaluate need for additional	Ongoing	As part of the CIP ingress/egress project at the VIS, additional parking was assessed and parking added. With		
	parking lots and vehicle		TMT a recreational parking plan for Batch Plant (Park 3) was submitted to DLNR and approved. A visitor		
	pullouts and install if		study initiated in 2019 by UH Mānoa will further inform any future efforts.		
	necessary.				
IM-10	Evaluate need for additional	Ongoing	Initial consideration of converting the presentation room building into a rest and eating stop for commercial		
	public restroom facilities in		tours as a means of reducing congestion at the VIS and providing greater access by the independent travelers,		
	the summit region and at		has been put on hold until completion of the ingress/egress project is completed, or if another solution		
	Halepōhaku, and install		presents itself.		
	close-contained zero waste		MKSS is considering options for handling overcrowding at the VIS.		
	systems if necessary.		Additional portable toilets are available at the summit to address restroom facilities needs at the summit.		
			Waterless urinals were installed in the VIS men's restroom.		
Source: 2	2020 Annual Report to BLNR: Appendi	ix F			

Table 4.19 Implementation Status of Items Related to Infrastructure and Maintenance: Infrastructure

Table 4.20 Implementation Status of Items Related to Infrastructure and Maintenance: Sustainable Technologies

ID No.	Description	Status	Comments/Discussion
IM-11	Encourage existing facilities and new development to incorporate sustainable technologies, energy	Ongoing	The proposed Thirty Meter Telescope is incorporating energy efficiency in its design. MKSS installed a photovoltaic system at Halepōhaku; Gemini and Keck have installed
	efficient technologies, and LEED standards,		photovoltaic systems on their respective summit facilities.
	whenever possible, into facility design and operations.		Free states of the second s
IM-12	Conduct energy audits to identify energy use and system inefficiencies, and develop solutions to	Ongoing	Energy audits are part of the photovoltaic system design process, completed or in progress at Gemini, Keck, and Halepōhaku.
	reduce energy usage.		
IM-13	Conduct feasibility assessment, in consultation with	Ongoing	MKSS installed a photovoltaic system at Halepohaku. Additional energy conservation
	Hawaii Electric Light Company, on developing		and sustainable generation possibilities are discussed by UHH, MKSS, and astronomy
	locally-based alternative energy sources.		facilities as opportunities arise.
IM-14	Encourage astronomy facilities to investigate	Ongoing	With the development of new technology, astronomy facilities are beginning to reduce
	options to reduce the use of hazardous materials in		their need to use hazardous materials. An example, is the TMT observatory, which will
	astronomy operations.		not be using mercury.
Source: 2	2020 Annual Report to BLNR: Appendix F		

Table 4.21 Implementation Status of Items Related to Construction Guidelines: General Requirements

ID No.	Description	Status	Comments/Discussion
C-1	Require an independent construction monitor who has oversight and authority to insure that all aspects of ground based work comply with protocols and permit requirements.	Ongoing	Included as part of the proposed TMT Management Plan in its CDUA.
Source:	2020 Annual Report to BLNR: Appendix F	•	

Table 4.22 Implementation Status of Items Related to Construction Guidelines: Best Management Practices

ID No.	Description	Status	Comments/Discussion
C-2	Require use of Best Management Practices Plan for	Ongoing	Included as part of the proposed TMT Management Plan in its CDUA. A
	Construction Practices.		template for adaptation and use by others is also available.
C-3	Develop, prior to construction, a rock movement plan.	Ongoing	Included as part of the proposed TMT Management Plan in its CDUA.
C-4	Require contractors to provide information from construction activities to OMKM for input into OMKM information databases.	Ongoing	Included as part of the proposed TMT Management Plan in its CDUA.
C-5	Require on-site monitors (e.g., archaeologist, cultural resources specialist, entomologist) during construction, as determined by the appropriate agency.	Ongoing	Included as part of the proposed TMT Management Plan in its CDUA.
C-6	Conduct required archaeological monitoring during construction projects per SHPD approved plan	Ongoing	Included as part of the proposed TMT Management Plan in its CDUA.
C-7	Education regarding historical and cultural significance	Ongoing	Included as part of the proposed TMT Management Plan in its CDUA.
C-8	Education regarding environment, ecology and natural	Ongoing	Included as part of the proposed TMT Management Plan in its CDUA.
	resources		
C-9	Inspection of construction materials	Ongoing	Included as part of the proposed TMT Management Plan in its CDUA.
Source: 2	2020 Annual Report to BLNR: Appendix F		

Table 4.23 Implementation Status of Items Related to Site Recycling, Decommissioning, Demolition and Restoration

ID No.	Description	Status	Comments/Discussion
SR-1	Require astronomy facilities to develop plans to recycle or demolish	Ongoing	This will be part of the TMT decommissioning plan, with the TMT
	facilities once their useful life has ended, in accordance with their		decommissioning funding plan approved by the MKMB in 2014.
	sublease requirements, identifying all proposed actions.		
SR-2	Require astronomy facilities to develop a restoration plan in	Ongoing	Included as part of the proposed TMT Management Plan in its CDUA.
	association with decommissioning, to include an environmental		
	cost-benefit analysis and a cultural assessment.		
SR-3	Require any future astronomy facilities to consider site restoration	Ongoing	Included as part of the proposed TMT Management Plan in its CDUA.
	during project planning and include provisions in subleases for		
	funding of full restoration.		
Source: 2	2020 Annual Report to BLNR: Appendix F		

ID No.	Description	Status	Comments/Discussion
FLU-1	Follow design guidelines presented in the 2000 Master	Ongoing	The Design Review Process, which incorporated the 2000 Master Plan's design
	Plan.		guidelines, were used in the review of the Thirty Meter Telescope project
FLU-2	J-2 Develop a map with land-use zones in the Astronomy Precinct based on updated inventories of cultural and natural resources, to delineate areas where future land use will not be allowed and areas where future land use will be allowed but will require compliance with prerequisite studies or analysis prior to approval of Conservation District Use Permit.		Areas previously mapped as off-limits for future land use through plans such as the 2000 Master Plan or CMP are used to limit any proposed activity. UH President Lassner confirmed that TMT was the last astronomy facility to be built on undisturbed land. Resource data must be part of any proposal for major land use requests. HAR § 13-5 allows for different types of land uses with each having its own requirements for preparing a land use application. Thus a single pre-prepared map cannot possibly address all potential scenarios.
FLU-3	Require cataloguing of initial site conditions for use when conducting site restoration.	Ongoing	TMT project completed a photo documentation of its site.
FLU-4	Require project specific visual rendering of both pre- and post-project settings to facilitate analysis of potential impacts to view planes.	Ongoing	TMT project completed a photo documentation.
FLU-5	Require an airflow analysis on the design of proposed structures to assess potential impacts to aeolian ecosystems.	Ongoing	Incorporated into the TMT project.
FLU-6	Incorporate habitat mitigation plans into project planning process.	Ongoing	Incorporated into the TMT project
FLU-7	Require use of close-contained zero-discharge waste systems for any future development in the summit region, from portable toilets to astronomy facility restrooms, if feasible.	Ongoing	Incorporated into the TMT project
Source: 2	2020 Annual Report to BLNR: Appendix F		

Table 4.24 Implementation Status of Items Related to Considering Future Land Use: Facility Planning Guidelines

ID No.	Description	Status	Comments/Discussion
OI-1	Maintain OMKM, MKMB, and Kahu Kū Mauna in current roles, with OMKM providing local management of the UH Management Areas, and MKSS providing operational and maintenance services.	Completed	The MKMB meets regularly, holding numerous public meetings, which includes consultation with Kahu Kū Mauna Council. OMKM continues to submit CMP management actions (such as the OMMP) to MKMB. MKSS continues to maintain the road and public services, financially supported by the MKOs.
OI-2	Develop training plan for staff and volunteers.	Completed	OMKM requires all staff and volunteers to attend the Maunakea orientation. A training plan was submitted and approved by the MKMB; bi-monthly trainings of all staff is being conducted.
OI-3	Maintain and expand regular interaction and dialogue with stakeholders, community members, surrounding landowners, and overseeing agencies to provide a coordinated approach to resource management.	Ongoing	OMKM has frequent contact in particular with its neighbor, DLNR on resource management issues. Rangers report unusual or suspicious behavior observed on DLNR lands to DLNR including DOCARE.
OI-4	Establish grievance procedures for OMKM, to address issues as they arise.	Complete/ Ongoing	The public has the opportunity to address grievances at the MKMB publicly held meetings. Public hearings seeking public comments on a proposed grievance procedure were held in 2018.
OI-5	Update and implement emergency response plan.	Ongoing	Emergency response plan is reviewed annually.
Source: 2	2020 Annual Report to BLNR: Appendix F		

Table 4.25 Implementation Status of Items Related to Operation and Maintenance

Table 4.26 Implementation Status of Items Related to Monitoring, Evaluation, and Updates

ID No.	Description	Status	Comments/Discussion
MEU-1	Establish a reporting system to ensure that the MKMB, DLNR, and the public	Ongoing	Reports are provided at the publicly held MKMB Meetings.
	are informed of results of management activities in a timely manner.		UH has prepared and submitted annual reports to DLNR.
MEU-2	Conduct regular updates of the CMP that reflect outcomes of the evaluation	Ongoing	Five-year CMP revision interval was initiated in 2014.
	process, and that incorporate new information about the resources.		EnVision Maunakea and administrative rules will play a
			role in the updating the CMP.
MEU-3	Revise and update planning documents, including the Master Plan, leases, and	Ongoing	UH is preparing an EIS for a new Maunakea land
	subleases, so that they will clearly assign roles and responsibilities for		authorization. A Prep Notice was prepared and published
	managing Maunakea and reflect stewardship matters resolved with DLNR.		in February 2018. UH is reviewing comments and is
			considering them in the development of the draft.
Source: 2	2020 Annual Report to BLNR: Appendix F		

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Appendix A.2020 Annual Report to the Board of Land and Natural
Resources, Status of the Implementation of the Mauna Kea Comprehensive
Management Plan



2020 Annual Report to the Board of Land and Natural Resources

Status of the Implementation of the Mauna Kea Comprehensive Management Plan

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Executive Summary

Comprehensive Management Plan Historical Perspective

Following the recommendation of the Office of the Auditor's 2005 report, *Follow-up Audit of the Management of Mauna Kea and the Mauna Kea Science Reserve*, the Office of Maunakea Management continued with its preparation of what was referred at the time as an integrated management plan. The process involved the development of two separate plans, cultural and natural resources management plans, with the intention of merging the two documents into one integrated plan, later coined Comprehensive Management Plan (CMP) by the Auditor.

Approval of the CMP by the Board of Land and Natural Resources formalized the State's management requirements for the University's management areas on Maunakea. The University's Board of Regents' acceptance of the responsibility to implement the CMP also delegated CMP implementation to the Office of Maunakea Management as the single entity to manage a comprehensive integrated plan.

Office of Maunakea Management

The Office of Maunakea Management (OMKM) was created when the Board of Regents approved the *Mauna Kea Science Reserve Master Plan* in June 2000. Together with two community-based volunteer advisory groups, Kahu Kū Mauna and Maunakea Management Board, the Board of Regents committed to community-based management. The Master Plan identified the need for a single entity to manage a comprehensive integrated plan to be based on the Island of Hawai'i housed within the University of Hilo and funded as a separate, ongoing program unit. Housing OMKM within the University system made a clear statement that the University accepted the responsibility for OMKM's function.

The role and responsibilities of OMKM involves not only land stewardship with the main focus on protecting the cultural, natural and scientific resources and managing public and commercial activities, but overseeing the project review process including construction and decommissioning processes. The latter is not the same as proposing projects that can range from camera and weather instrument installation to the addition of safety features to facilities to observatory development. *Projects are proposed by the respective facility or the University and the role of OMKM, Kahu Kū Mauna, and Maunakea Management Board is to review these projects for compliance with the CMP, 2000 Master Plan, rules and regulations including DLNR's Conservation District rules, and subleases and leases.* The Master Plan does not include as part of OMKM's, Kahu Kū Mauna's and Maunakea Management Board's scope of responsibilities the determination of the number of telescopes to construct and/or decommission. Those determinations are made outside of OMKM.

Implementation of Comprehensive Management Plan on Track

The CMP contains 103 management actions covering protection of the resources, managing access, activities and uses, education and outreach to management of mountain operations and the built environment. OMKM categorized its efforts in implementing the CMP's diverse range of responsibilities into five major categories: research and monitoring; resources management programs; education, training and outreach; visitor management; and permitting, enforcement and facility oversight. All of the CMP actions have either been implemented (completed), are ongoing, or are in stages of undergoing implementation. The majority of CMP actions are ongoing and are essential components of OMKM's stewardship responsibilities, in other words, as long as OMKM has land management stewardship responsibilities on Maunakea those activities will continue to be implemented.

In addition to Appendices listing descriptions of OMKM's activities and status of implementation for each CMP management action, this year's annual report contains additional Appendices detailing OMKM's stewardship functions and activities since its inception that are related to OMKM's categories of implementation.

1. Comprehensive Management Plan (CMP) Background

The State Auditor recommended in the December 2005 *Follow-Up Audit of the Management of Mauna Kea and the Mauna Kea Science Reserve*, State Auditor that the University of Hawai'i "develop, implement, and monitor a comprehensive management plan for natural, cultural and historic resources of the summit and Hale Pohaku area". The University prepared a Comprehensive Management Plan (CMP), and 2009, the Board of Land and Natural Resources (BLNR) approved the CMP. Upon approval, the CMP became the State's management plan for the University's management lands on Maunakea.

The CMP is consistent with the purposes and values of the State's Conservation District lands and OMKM's mission of achieving sustainable management and stewardship through "community involvement and programs that protect, preserve and enhance the natural, cultural and recreational resources of Mauna Kea while providing a world class center dedicated to education, research and astronomy." The CMP's overarching goal is to provide management strategies that protect, preserve, and enhance Maunakea Kea's resources.

A requirement of the Board of Land and Natural Resources approval of the CMP is the submittal of annual reports on the status of the implementation of the CMP.

2. Annual Report

As identified in the 2009 Mauna Kea Comprehensive Management Plan, management action MEU-1 states: OMKM shall produce an annual progress report on the management goals, objectives, and actions for the year and what progress was made towards meeting them. "This Progress Report is not intended to be a status report on the resources in the UH Management Areas; rather, it is meant to inform management and stakeholders of the progress of the program and direction it is to take in the future."

2.1 Overview of CMP Management Actions

Table 1 CMP component plans

The CMP contains 103 management actions categorized into four component plans which are further subdivided into sub-components (Table 1).

	P component plans.				
CMP					
SECTION	COMPONENT PLAN				
7.1	Understanding and Protecting Mauna Kea's Resources				
7.1.1	Native Hawaiian Cultural Resources				
7.1.2	Natural Resources				
7.1.3	Education and Outreach				
7.1.4	Astronomy Resources				
7.2	Managing Access and Use				
7.2.1	Activities and Uses				
7.2.2	Permitting and Enforcement				
7.3	Managing the Built Environment				
7.3.1	Infrastructure and Maintenance				
7.3.2	Construction Guidelines				
7.3.3	Site Recycling, Decommissioning, Demolition and Restoration				
7.3.4	Considering Future Land Use				
7.4	Managing Operations				
7.4.1	Operations and Implementation				
7.4.2	Monitoring, Evaluation, and Updates				

2.2 Assigning Categories and Priorities

Each management actions was assigned into one of four categories. These categories represent time periods during which it was estimated the actions would be implemented.

Immediate	1 - 3 years
Short term	4 - 6 years
Mid-term	7 - 9 years

Long-term 10 + years

In a change from earlier reports, for the 2020 report OMKM has updated the five priority categories for reporting. These changes reflect evolving concerns regarding "Visitor Management" following the adoption the of administrative rules; interest in the "Permitting, Enforcement and Facility Oversight" of facility compliance with Conservation District Use Permits, and infrastructure improvements at Halepōhaku and decommissioning progress of two telescopes. Research & Monitoring have been combined into a single reporting category as these programs have matured. "Education, Training and Outreach" and "Printed Materials & Public Forums" were consolidated having similar purposes. Efforts have been initiated in all of the categories and are described below.

Priority Categories

- 1) Research & Monitoring
- 2) Resources Management Programs
- 3) Education, Training, and Outreach
- 4) Visitor Management
- 5) Permitting, Enforcement and Facility Oversight

2.3 Reporting Definitions

2010-2011 Each management action was initially assigned one of four progress status designations: **As Needed**, **Short to Long Term**, **Ongoing**, or **Completed**.

2012 In 2012 the Ongoing category was further divided into two groups, Ongoing and In Progress, to distinguish management actions that are part of OMKM's regular responsibilities (ongoing) and those that require specialized implementation (in progress).

2014-present Based on feedback from the Office of the Auditor, State of Hawaii, beginning with 2014, the definitions for Ongoing and In Progress were further refined. **Ongoing** refers to activities that have established processes in place and are performed as part of OMKM's daily responsibilities. For example, processes for reporting disturbances to historic properties are established while actual reporting is **Ongoing** as necessary. **In Progress** refers to actions that require specialized implementation such as the development of policies or hiring consultants and researchers, and while efforts are **In Progress** the action or process is not yet complete.

Table 2. Evolution of the Definition of the Terms Ongoing and In-Progress (years 2010 through 2014)							
2010 – 2011	2012	- 2013	2014				
Ongoing are actions that are being	Ongoing was divid	ded into two groups	Auditor's recommendation				
implemented	Ongoing are activities that are performed as part of OMKM's daily responsibilities	In–Progress are actions that require specialized implementation, e.g., development of policies or hiring of consultants	Ongoing was further defined as activities that have established processes in place and are performed as part of OMKM's daily responsibilities. In-Progress are actions that requires specialized implementation and while efforts are in- progress, the action or process is not yet complete.				

Table 2. Evolution of the Definition of the Terms Ongoing and In-Progress (years 2010 through 2014)

Used in this report, the definitions are:

- Short to Long Term: Management action still to be implemented during its scheduled time period.
- In Progress: Management action that requires specialized implementation has been initiated, process is not yet complete.
- **Ongoing**: Management action is implemented and processes are in place to fulfill this requirement, actions will continue indefinitely because they are part of OMKM's continuing management responsibilities.
- **Completed**: Management action is completed.

2.4 Annual Reports are Cumulative

Each successive report builds upon the previous year's report, thereby the annual reports beginning with 2011 are cumulative. As an annual report, this submission provides additional detail on activities occurring in calendar year 2019.

3. Summary of Implementation Activities

Most management actions have either been implemented or are in progress. Many actions are considered 'ongoing' as they are long term, continuous land management responsibilities. Appendix F details the implementation status with explanations for individual CMP management actions. Appendix G details the cumulative annual progression of implementation status from 2010 to present.

Below is a summary of implementation activities in support of the management action status determination.

3.1 Research & Monitoring (Appendix A)

Following the implementation of studies and establishing baseline inventories to determine the presence, distribution, and abundance of a resource, the next step is monitoring to assess the status of the resource over time. Along with inventories and monitoring, data from research provides the basis for the development of resource protection programs. OMKM utilizes resources available within the UH system including faculty, graduate and undergraduate students, in its efforts to fulfill CMP mandates. Details on OMKM's activities related to research and monitoring is presented in Appendix A.

Cultural Resources

Historic Property Monitoring (

Following the completion of an archaeological inventory survey of the Maunakea Science Reserve and summit access road, annual assessments of the archaeological sites (historic properties) began in 2012. In compliance with the Long Term Historic Property Monitoring Plan, approved by SHPD in 2014, assessment of historic properties in the Astronomy Precinct and alongside the summit access road is conducted annually while the more remote sites are assessed on a three and five year rotational basis. Annual reports for these efforts are submitted to SHPD after consultation with the Kahu Kū Mauna Council on management action recommendations.

Collecting Information on Traditional and Customary Practices

In consultation with Kahu Kū Mauna, OMKM's process for collecting information on traditional and customary practices is through published documents from studies, oral histories, or through other formal methods of information gathering, such as environmental assessments and impact statements. Examples of published works include the 1999 "Oral History and Consultation Study for the Mauna Kea Science Reserve and Hale Pōhaku Complex Development Plan Update", 2005 archival project and oral history "Mauna Kea-Ka Piko Kaulana o Ka 'Āina", 2009 "Cultural Resource Management Plan", and various cultural assessments completed as part of HRS Chapter 343 mandates. Similar third party materials, such as the USGS Open File Report 2017-1043 "Conversing with Pelehonuamea: A workshop combining 1,000+ years of traditional Hawaiian knowledge with 200 years of scientific thought on Kīlauea volcanism" also incorporate information on Maunakea's traditional and customary practices. Additional partnerships within the UH-system and other State-agency partners, continue to be pursued.

Biological Resources

Arthropod (Wēkiu Bug and Alien Species) Monitoring

Monitoring of the wēkiu bugs and alien arthropods, which began in 2002 and 2007 respectively, is conducted annually. Beginning in 2013 monthly surveys are also made in and around the surrounding areas of the facilities at the 9,200 foot elevation while quarterly arthropod surveys are conducted at facilities at the summit.

Biodiversity of Arthropods

Field work for the 2011 study of the biodiversity of arthropods in the summit region in the Halepōhaku area is complete. Specimen curation and report writing are anticipated to be complete in 2020. As a result of OMKM's research and monitoring efforts, the species of native moth previously documented at Halepōhaku and the summit region were formally described in the scientific literature; https://biotaxa.org/Zootaxa/article/viewFile/zootaxa.4545.2.7/38727 and found to actually be two distinct species. Additional state-of-the-science DNA PhD-level research is augmenting this research. The "Metabarcoding Maunakea Project" includes three objectives: (1) update existing databases of the arthropod species on Maunakea, (2) understand the diet (food webs) of native and endemic species using metabarcoding, and (3) use of this dietary data to understand the impacts of invasive species. This study is anticipated to continue into 2022.

<u>Wēkiu Bug</u>

A study of the characterization and mapping of wēkiu bug habitat was completed in 2016. A study on the restoration of wēkiu bug habitat that was initiated in 2015 culminated in the publication of a thesis in early 2018. A PhD candidate is studying wēkiu bug microbial endosymbionts (i.e. gut bacteria) to understand the evolutionary shifts in diet and habitat from seed eating *Nysius* to the carnivorous wēkiu bug. This research is also anticipated to continue into 2022.

Botanical Monitoring

Monitoring of botanical resources is completed in conjunction with the yearly historic property monitoring.

Vertebrate Biology

Begun in 2017 and continuing through 2021, the study on the distribution of native Hawaiian birds and bats within the University of Hawai'i management areas uses radar and acoustic technologies to identify the areas of bird and bat habitat use on Maunakea.

Geology, Hydrology, and Erosion

Lake Waiau Photo Monitoring

While not part of UH's managed lands, in a cooperative effort with DLNR's Natural Area Reserve, OMKM rangers photo document monthly the level of Lake Waiau in the Mauna Kea Ice Age Natural Area Reserve, and periodically hike to the adze quarry to assess conditions.

Study of Erosion Processes

A multi-year study of surface erosion processes on cinder cones that was initiated in 2014 is anticipated to conclude in 2020. A second iteration of terrestrial LiDAR mapping (detailed digital elevation mapping) was completed in 2017. In 2018 field work included data collection in the Halepōhaku area while in 2019 the Maunakea Summit Access Road corridor was added to the study area. A final round of data collection occurred in 2020. This study will help to better understand natural erosion as well as help characterize arthropod habitat.

Permafrost

OMKM funded a study to assess the presence of permafrost and whether conditions for the formation of permafrost still exist—this project is transitioning to a monitoring phase to document the long-term status of permafrost on Maunakea. The publication "The Coldest Places in Hawaii: The Ice-Preserving Microclimates of High-Altitude Craters and Caves on Tropical Island Volcanoes" characterized unique climate phenomena found on Maunakea (https://doi.org/10.1175/BAMS-D-17-0238.1).

Groundwater Hydrology

A groundwater hydrology study was begun in late 2017 and is anticipated to include up to 5 years of data collection, looking at sources of groundwater in west Hawai'i, including sensors at the summit and at Halepōhaku.

Observatories Assist with Volcano Threat Assessment

The U.S. Geological Survey national volcanic threat assessment was updated, addressing the ongoing Kīlauea eruption as well as Maunakea and other Hawaiian volcanoes. Low-light cameras developed by the astronomical observatories installed at the summit with views of the eruption and lava flow areas, proved extremely helpful in monitoring eruption activities.

Weather and Climate Research

Climate Change Models

A multi-year study developing climate change models to determine impacts to the summit ecosystem 50years in the future is available in a public data archive (http://thredds.soest.hawaii.edu:8080/thredds/catalog/downscaling/catalog.html).

Long-Term Temperature Records

A separate study integrating long-term temperature records and other types of climate data for earlier years when temperature was not recorded was completed and a journal manuscript is in review. Research into climate processes for this plan was published as "Temperature Trends in Hawai'i: A Century of Change, 1917–2016"; <u>https://rmets.onlinelibrary.wiley.com/doi/abs/10.1002/joc.6053.</u> The article "Snow cover in Hawai'i (1893–1953) and its effect on ground temperature" was published as a result of coordination across several research projects, with a Farrington High School graduate (now a college undergraduate) as the lead author; <u>https://doi.org/10.1080/15230430.2019.1600963</u>.

Vog Monitoring

Sulfur dioxide sensors were installed at Halepōhaku to help assess vog distribution and allow visitors to better manage public health concerns; <u>https://tatacenter-airquality.mit.edu/hawaii-vog</u>.

Weather Monitoring

The above studies in conjunction with development of a plan to improve weather monitoring on the summit as part of a sea level to summit network of weather stations will help to track changes in weather and climate over the long term and will provide data to evaluate altitudinal changes and impacts on ecosystems from sea level to the summit.

Invasive Species Threats

Measures to Prevent Introduction of Invasive Species

In 2015, OMKM initiated a study to evaluate measures to prevent the introduction of invasive species, in particular the inspections of vehicles and equipment. This included an analysis of the feasibility of a vehicle washing facility as a means of helping to prevent the introduction of invasive species. This study concluded in early 2018 and provides management-specific recommendations as part of a MS thesis.

Invasive Species Protocols - Updates

Invasive species prevention protocols were updated in 2018 addressing relevant recommendations from the 2018 MS thesis research (above).

Other Studies

Visitor and Commercial Tour Capacity Study

In collaboration with UH Mānoa's School of Travel Industry Management, OMKM initiated a study in 2019 to assess the capacity for commercial tour operations and public visitation on UH's managed lands. Data collection efforts have been hampered by road closures associated with the 2019 start-up efforts of the Thirty Meter Telescope project and reduced activity in 2020 due to COVID-19 pandemic.

3.2. Resource Management Programs (Appendix B)

Resource management programs may be policies, plans, or long-term action programs which purpose is to preserve or protect the resources, or to help ensure the health and safety of those visiting and working on the mountain. The adoption of administrative rules in January 2020 will necessitate careful review of policies related to resource management, with potential concurrent updates to practices and procedures. Details on OMKM's resource management programs are listed in the Appendix B.

Cultural Resources

OMKM, together with Kahu Kū Mauna, developed policies for the construction of new cultural features, including the stacking of rocks, the scattering of human remains, placement of offerings, buffers around historic properties and visitation and use of ancient shrines. The Maunakea Management Board (MKMB) approved these policies in early 2018 after extensive community consultation held over a period of several years by Kahu Kū Mauna.

Invasive Species

Data from surveys and studies provide valuable information for developing management programs to protect the resources such as the endemic wēkiu bug. Invasive flora and fauna are a concern because of their potential impact not only on the wēkiu bug, but also on other native species, and on the "health" of Maunakea's unique ecosystem. OMKM's invasive species prevention, response and control plan is actively being implemented, especially regarding observatory related activities. Preventing the introduction of predatory ants remains a high priority. The adaptive-management invasive species plan is periodically reviewed and updated, with annual reports prepared and made publicly available.

Removal of Invasive Weeds

OMKM continues its efforts to remove fireweed (*Senecio madagascarensis*). While on patrol, rangers remove fireweed found along the road and in the summit areas. OMKM's invasive weed pull program brings community volunteers to the Halepōhaku area to pull fireweed, mullein and other invasive plants. It is OMKM's goal to manage invasive weeds and to revegetate the area with native vegetation.

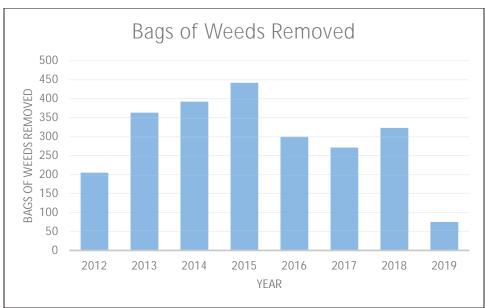


Figure 1. Bags of weeds removed from UH managed lands by volunteers. The 2019 quantity is lower than otherwise due to the extended road closure associated with Thirty Meter Telescope (TMT) start-up attempts and corresponding lack of access by staff and volunteers.

Inspections to Mitigate Risk

As part of its invasive species prevention and control program a qualified biologist conducts inspections of construction materials and other activities as identified in the "Maunakea Invasive Species Management Plan". Inspections document materials being delivered, remediation required, deliveries denied entry, and other aspects of activity on Maunakea.

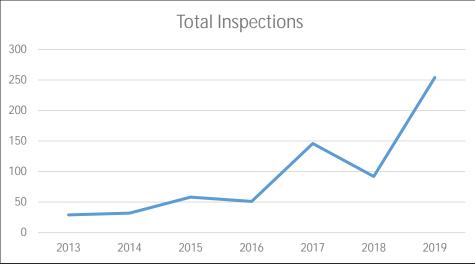


Figure 2. Number of invasive species inspections conducted each year. Quantities have been increasing due to awareness as the program presence becomes well-established. The elevated numbers in 2019 reflect construction activity associated with Visitor Information Station parking improvements. 2020 data not shown.

Native Plant Propagation

A Capital Improvement Project (CIP) that created new parking at the Visitor Information Stations (see *Infrastructure Safety Improvements* below) included approval for the installation of a greenhouse for propagating native plants, including māmane to replace trees removed in addition to other native plants for revegetating the Halepōhaku area. Planning and community outreach for this new greenhouse is ongoing.



Figure 3. A feral pig near the summit of Maunakea in October 2014. Such observations of animals is unusual in the Maunakea Science Reserve. Hunting rules fall under the jurisdiction of the Department of Land and Natural Resources (DLNR). The Office of Maunakea Management supports DLNR wildlife management by reporting such sightings, monitoring for impacts, and providing support as requested.

3.3 Education, Training, and Outreach (Appendix C)

One of the key tenets of the Public Access Plan is that "an informed public is best prepared to make good decisions and act responsibly." OMKM also recognizes the importance of establishing community relationships and keeping them informed of OMKM's activities. Details on OMKM's activities related to outreach, education and training are provided in Appendix C.

Education and outreach efforts include the development of educational materials, such as brochures, signage and the dissemination of materials, OMKM regularly updates its heritage and resources guide (brochure). This guide along with the safety brochure, "*Visiting Maunakea Safely and Responsibly*," are distributed at the Visitor Information Station (VIS) at the 9,200 foot elevation and at the 'Imiloa Astronomy Center. OMKM also seeks opportunities to speak to community groups and organizations about OMKM's activities.

After preparation by staff and consultation with the community, a draft "Maunakea Education & Outreach Plan: Maunakea Comprehensive Management Plan Management Action EO-1" was submitted to the Maunakea Management Board for review and approval in December 2019. The Board deferred taking action on the item to allow the University of Hawai'i system additional time for discussions regarding the reorganization of the Office of Maunakea Management into a to-be-determined structure. After additional time to review and discuss the plan, it was ultimately approved by the Board in July 2020.

Orientation

The OMKM Maunakea Orientation program was launched in 2012. It is a requirement that all observatory and support staff (both office and on-mountain), vendors, construction workers, mid-level support and VIS staff, UH employees, and commercial tour drivers attend the orientation. An online version with an assessment quiz is available as a more efficient means of delivery and an alternative to in-person sessions. A video orientation for visitors will also be developed to be shown in the VIS. An orientation

plan, approved by the Management Board and DLNR guides implementation and identifies a renewal requirement every 3 years unless otherwise mandated by a permit. See Appendix C for a list and number of orientation sessions and number of certificates issued by OMKM since 2012.

Training

Beginning in 2016, a staff/employee training program was initiated. All OMKM and Maunakea Observatory Support Services employees are required to attend.

Volunteer Program

Since its inception in the Spring of 2012, OMKM 's community volunteer weed pull program has held 58 events, filled over 2,400 bags of weeds by nearly 1,500 volunteers putting in over 10,400 hours. Groups participating in 2019 include various UH Hilo student groups, local primary school students and families, Observatories, and employee organizations, and environmental science students.

Outreach

OMKM seeks opportunities to share with the community its activities. OMKM also participates in school and community events showcasing the natural resources found on Maunakea, fun science and keiki activities.

As part of their educational efforts with young children, researchers working on OMKM projects have been going to schools to demonstrate the use of equipment that is used in their scientific studies, such as unmanned aerial vehicles (drones), shares examples of resources such as insect collections, and conducts experiments with the students. Others mentor students, including those who wish to conduct and enter the results of their studies in the State science fair.

3.4 Visitor Management (HAR 20-26) (Appendix D)

OMKM Maunakea Rangers

The Maunakea Rangers monitor activities on UH's managed lands on a daily basis. They record pertinent data including the number of vehicles by type (4- vs. 2-wheel drive, observatory, commercial and motorcycles) and observations of visitor activities, including hikers, bikers, vehicle speeds, trash, etc. Through their interactions with the public they help to educate people about Maunakea, including the cultural significance, environmental uniqueness, science, and how to visit safely. Many of the management actions relating to public and commercial activities, along with trash pick-up and removal, are carried out by the Rangers as part of their daily responsibilities. Rangers provide first responder first aid and assist in the coordination with County of Hawai'i emergency responders in search and rescue efforts. In addition, twice annually the rangers conduct inspections of the summit and Halepōhaku facilities for compliance with their conservation district use permits.

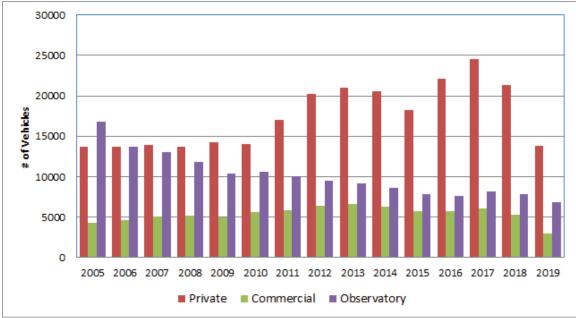


Figure 4. Total Yearly Vehicle Counts by Types of Users. Since 2005: Observatory vehicles have declined, commercial vehicles slightly, private vehicles have greatly increased and dominate traffic.

The Maunakea Summit Access Road is a unique public resource in the State. Maunakea Observatories Support Services (MKSS), an operation of the Maunakea Observatories, operates the only snow removal operations in Hawai'i. The steep road presents both safety challenges as well as is demanding of both vehicles and drivers. Road maintenance by MKSS also provides safe access for the public.

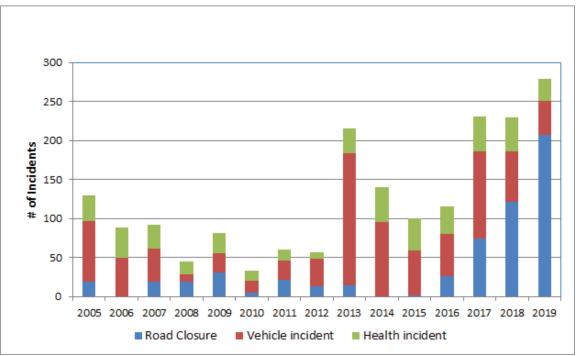


Figure 5. Yearly road closures, vehicle incidents, and health incidents; 2005 to 2019. Consistent road closure data record-keeping was first fully implemented in 2017 after addressing issues with use of road-ice sensors for safety purposes and installation of the automated vehicle counter.

The Maunakea Ranger corps has a target staffing level of seven full-time and one part time rangers. This allows OMKM to schedule three rangers for duty and ensures a minimum of two rangers on duty should one ranger be sick or on vacation.

UH Internal Audit of Maunakea Support Services and Office of Maunakea Management

A UH internal audit of OMKM's and MKSS' finances was performed in 2018 and a report was presented to the UH Board of Regents Committee on Independent Audit in December 2018. The audit concluded that the "University entities involved with Maunakea have developed processes and procedures to appropriately account for their respective transactions in connection with their management of Maunakea." The audit evaluated university funds, lease payments and external funds received in support of stewardship, management, education and other activities related to Maunakea.

Administrative Rules

In 2018 draft administrative rules were reviewed by Kahu Kū Mauna and the Mauna Kea Management Board and a recommendation was submitted to the Board of Regents who approved the draft rules for public hearings. In July 2018, Governor Ige gave his approval to move ahead with public hearings. Pursuant to HRS Chapter 91, public hearings were held in September 2018. Changes to the rules based on public comments received were made and a second round of public hearings held in 2019. The UH Board of Regents adopted the rules on Nov. 6, 2019 after a special 11-hour meeting at UH Hilo, where 99 people testified.

There are 15 CMP management actions that require administrative rules for implementation. These include categories involving natural and astronomy resources, education and outreach, infrastructure and maintenance, infrastructure and maintenance, and in particular, activities and uses. Administrative rules were approved by Governor Ige in January 2020.

Vehicle Counter

An automated vehicle counter was installed in 2015 to count the number of vehicles that drive above Halepōhaku. This counter, through a radio-frequency identification system, is able to identify observatory, UH, and commercial tour vehicles that drive to the summit. A portable vehicle counter installed in 2018 is being used in conjunction with the automated counter to help determine the number of vehicles go only to the VIS.

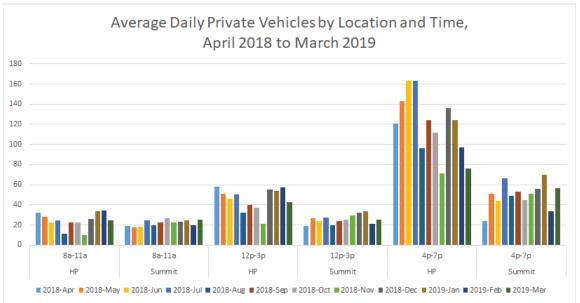


Figure 6. Average Daily Private Vehicles by Location and Time, April 2018 thru March 2019. Each day, the heaviest summit traffic occurs during sunset. Yet, even during the heavy sunset period, most vehicles stay at HP rather than continue to the summit.

Road Condition Sensors

A test road condition sensor installed in 2013 has shown the device accurately senses the presence of ice on the road. Two additional sensors have been installed along hazardous road sections prone to the development of ice, in particular black ice. When ice is detected the sensors automatically send email notifications to rangers who take action such as closing the road to protect the safety of the visiting public. Installation of additional sensors will be based on demonstrated utility of the first three in a network configuration.

3.5 Permitting, Enforcement, and Facility Oversight (Appendix E)

The CMP identifies oversight of Conservation District Use, commercial tour, special use, and other permit compliance as a critical function of OMKM. Such oversight is essential for both resource protection as well as public safety. Oversight functions for commercial tour, special use, and other permit types is addressed in preceding sections of this report. This portion addresses facilities, including observatories, support functions, and the Visitor Information Station facilities.

Operations Monitoring, and Maintenance Plan (OMMP)

An OMMP is implemented and identify maintenance needs, protocols and strategies that minimizes impacts to the resources and ensures that permittees comply with the conditions of their CDUPs. As part of the OMMP each observatory and MKSS is required to submit a description of anticipated projects over a five-year period. These five-year outlook of projects are updated annually and presented to Kahu Kū Mauna who determines the level of review for each project. When projects are submitted to OMKM for approval, those not requiring further review can be taken directly to the MKMB. Those requiring further review are presented first to Kahu Kū Mauna followed by review and approval by the MKMB.

CMP Compliance

Twice annually OMKM rangers conduct inspections of all summit facilities for compliance with their Conservation District Use Permits.

CMP Actions and Mitigation

As a requirement of the MKMB, applicants of projects are required to review the CMP and submit measures to comply with relevant CMP actions as part of the project's proposal. When applicable, mitigation measures are also included in the proposals.

Infrastructure Safety Improvements

Parking, vehicle and pedestrian flow, and visitor capacity concerns are addressed in the improvements to parking and safe drop off and pickup of visitors at the VIS. In compliance with CMP IM-9, the project involved the construction in 2019 of a new paved parking lot and an ingress access lane both are which are on the same side of the road as the VIS. Summit Access Road repair and improvements were also evaluated. The permit for this project included the requirement that a minimum of 130 māmane trees be planted within two years of completion, with no less than an 80% survival rate (104 trees). As of December 26, 2019 there were 121 māmane, 17 'āweowe, 1 puakala, 25 pāwale, and 12 'ena'ena surviving seedlings in the project area. While restoration efforts in 2019 benefitted from relatively moist climate conditions, mortality rates associated with 2018-2019 efforts for this project often exceed 50% due to frost or dry conditions. Thus, sustained revegetation efforts will continue in 2020. Capital improvement project funds were provided for this project.

Observatory Decommissioning

The Caltech Submillimeter Observatory (CSO) announced their intent to decommission in 2009. They submitted a "Notice of Intent" (NOI) to decommission to UH for approval under the auspices of the 2010 Mauna Kea Observatories Decommissioning Plan, and their NOI was approved in 2016. In January 2020 Caltech provided a detailed schedule which anticipates concluding the deconstruction, removal, and restoration processes in 2022.

The UH Hilo "Hōkū Ke'a" Educational Observatory submitted their NOI in 2015 for approval by the Maunakea Management Board. Their NOI was approved by MKMB in February 2020 after assurances

were made by UH Hilo that undergraduate astronomy opportunities would not be lost. UH Hilo is proceeding with the decommissioning process as described in the 2010 Mauna Kea Observatories Decommissioning Plan and anticipates completing restoration efforts in 2023.

Observatory Planning & Construction

Thirty Meter Telescope (TMT) construction permits were approved by the Board of Land and Natural Resources (BLNR) in 2017 and upheld through various court challenges. Construction start-up efforts were attempted on July 15, 2019—however no access to UH managed lands on Maunakea occurred by TMT partners due to a protest-related road closure. The road closure ended on December 28, 2019.

Planning and project scoping for a new educational telescope for UH Hilo, to replace the Hōkū Ke'a facility but at a location other than the Maunakea summit region, began in 2015 and is ongoing.

Appendix A: Research & Monitoring

Research & Monitoring of Cultural and Natural Resources

CULTURAL RESOURCES





2012	Draft Report, [Revised] 2012 Assessment of Historic Properties within Three University of Hawaii Management Areas on Mauna Kea, Ka'ohe Ahupua'a, Hāmākua District, Hawai'i Island, State of Hawai'i. September, 2017. Pending final review by SHPD.
2013	Draft Report, 2013 Assessment of Historic Properties within Three University of Hawaii Management Areas on Mauna Kea, Ka'ohe Ahupua'a, Hāmākua District, Hawai'i Island, State of Hawai'i. March, 2018. Pending review by SHPD
2014	Draft Report, Long-Term Monitoring of Historic Properties within Three University of Hawaii Management Areas on Mauna Kea, Ka'ohe Ahupua'a, Hāmākua District, Hawai'i Island, #3 (2014). October, 2016. Pending review by SHPD
2015	Draft Report, 2015 Assessment of Historic Properties within Three University of Hawaii Management Areas on Mauna Kea, Ka'ohe Ahupua'a, Hāmākua District, Hawai'i Island, State of Hawai'i. May, 2018. Pending review by SHPD
2016	Draft Report, 2016 Assessment of Historic Properties within Three University of Hawaii Management Areas on Mauna Kea, Ka'ohe Ahupua'a, Hāmākua District, Hawai'i Island, State of Hawai'i. June, 2018. Pending review by SHPD
2017	Draft Report, 2017 Assessment of Historic Properties within Three University of Hawaii Management Areas on Mauna Kea, Ka'ohe Ahupua'a, Hāmākua District, Hawai'i Island, State of Hawai'i. July, 2018. Pending review by SHPD
2018	Draft Report, 2018 Assessment of Historic Properties within Three University of Hawaii Management Areas on Mauna Kea, Ka'ohe Ahupua'a, Hāmākua District, Hawai'i Island, State of Hawai'i. December, 2018. Pending review by SHPD
2019	Draft Report, 2019 Assessment of Historic Properties within Three University of Hawaii Management Areas on Mauna Kea, Ka'ohe Ahupua'a, Hāmākua District, Hawai'i Island,

State of Hawai'i. February, 2020. Pending review by SHPD

NATURAL RESOURCES

2002	Annual surveys of the wēkiu bug begin
2007	Annual surveys of other arthropods begin
2007-2008	Results of the 2007-2008 Alien Species and Wekiu Bug (Nysius wekiuicola) Surveys on the Summit of Mauna Kea, Hawai'i Island. http://www.malamamaunakea.org/uploads/environment/EnvironmentDocuments/BM_200 7-2008_AlienArthropod-WekiuBug.pdf
2009	Results of the 2009 Alien Species and Wēkiu Bug (Nysius wekiuicola) Surveys on the Summit of Mauna Kea, Hawai'i Island. http://www.malamamaunakea.org/uploads/environment/EnvironmentDocuments/BM_200 9_AlienArthropod-WekiuBug.pdf
2010	Results of the 2010 Alien Species and Wēkiu Bug (Nysius wekiuicola) Surveys on the Summit of Mauna Kea, Hawai'i Island. <u>http://www.malamamaunakea.org/uploads/environment/EnvironmentDocuments/BM_201</u> <u>0_AlienArthropod-WekiuBug.pdf</u>
2011	Results of the 2011 Alien Species and Wēkiu Bug (Nysius wekiuicola) Surveys on the Summit of Mauna Kea, Hawaiʻi Island.

	http://www.malamamaunakea.org/uploads/environment/EnvironmentDocuments/BM_201 1_AlienArthropod-WekiuBug.pdf
2012	Results of the 2012 Alien Species and Wēkiu Bug (Nysius wekiuicola) Surveys on the Summit of Mauna Kea, Hawai'i Island. <u>http://www.malamamaunakea.org/uploads/environment/EnvironmentDocuments/BM_201</u> 2_AlienArthropod-WekiuBug.pdf
2013	Results of the 2013 Alien Species and Wēkiu Bug (Nysius wekiuicola) Surveys on the Summit of Mauna Kea, Hawai'i Island. <u>http://www.malamamaunakea.org/uploads/environment/MKISMP/OMKM_2013InvasiveS</u> <u>peciesReport_20150521.pdf</u>
2014	2014 Invasive & Native Species Monitoring Report <u>http://www.malamamaunakea.org/uploads/environment/MKISMP/OMKM_2014InvasiveS</u> <u>peciesReport.pdf</u>
2015	2015 Invasive & Native Species Monitoring Report – in review
2016	2016 Invasive & Native Species Monitoring Report – in preparation
2017	2017 Invasive & Native Species Monitoring Report – in preparation
2018	2018 Invasive & Native Species Monitoring Report – in preparation
2019	2019 Invasive & Native Species Monitoring Report – in preparation

Photo Documentation

Photographic monitoring of the Road Corridor helps document the distribution, abundance, and seasonality of fireweed (Senecio madagascariensis) on Maunakea. http://www.malamamaunakea.org/uploads/environment/EnvironmentDocuments/RdCorridorSummary.pdf

Lake Wai'au time series of water level photographs, 2012 – present. <u>http://www.malamamaunakea.org/uploads/environment/EnvironmentDocuments/LakeWaiau_2012-present-all_PhotoComparison.pdf</u>

Research Activities

Surveys and studies on	2005 – 2009. Archaeological inventory of historic properties of the		
Historic Properties and	Science Reserve, summit access road and Halepohaku.		
cultural resources	2004 - 2006. Archival study and compilation of native traditions, historical		
	accounts, and oral history interviews for Mauna Kea.		
	2005 – 2009. Archaeological inventory of historic properties of the		
	Science Reserve, summit access road and Halepohaku.		

Surveys and studios on:	2006 – Climatological analysis of meteorological observations at the
Surveys and studies on:Geology and erosion	summit of Maunakea
 Geology and erosion Climate and weather 	 2007 – Review Mauna Loa weather data dating back to 1958 to assess climate conditions on Maunakea to help with wēkiu bug research 2012 – 2018. Study to assess presence of permafrost and whether conditions for formation of permafrost still exist.
	2011–2017. A multiyear study on the development of a climate change modeling program to help forecast climate change on the summit to help determine impacts to the summit ecosystem.
	 2012 – High Altitude Climate of the Island of Hawai'i publication. 2013 – ongoing. OMKM is working with the Department of Geography at UH Manoa on the development of a sea level to summit weather monitoring network to help track climate change. OMKM's participation is to help the location and installation on weather station
	on the summit. 2014 –ongoing. Surficial study of the geology and erosion in cinder cone environments above 12,500'. High-resolution topographic maps, and imagery have been completed.
	2013 – 2016. Study to extend the long term temperature records for the State of Hawaii by integrating other climate data for earlier years when temperature was not recorded.
Surveys on human activities and needs:	2001 – ongoing. Rangers continue to submit daily reports on human activities; data are input in a database.
	 2015 – ongoing. An automated vehicle counter keeps a real time count of all vehicles traversing above Halepõhaku. Rangers also conduct daily counts of vehicles identifying 2 wheel vs 4 wheel drive vehicles.
	2018 – ongoing. Rangers install an axle vehicle counter to assess in conjunction with the automated vehicle counter, the number of vehicles that go only to Halepōhaku.
	2019 – ongoing. A study of visitor activities and carrying capacity.
Ongoing surveys and	2006 – 2011 Modeling the ecology of the wēkiu bug's Maunakea
studies of the wēkiu bug and other arthropods	environment 2011 – A study of how geology (pu'u and terrain), wind speeds and
	direction influence insect and snow pack deposits on the summit to help supplement wēkiu bug research.
	2011 – 2018. Multi-year survey of the summit region and at the mid-level area at 9,200 ft elevation to assess the biodiversity of arthropods.
	Including a 2016 MS Thesis on biodiversity in the Halepōhaku area. 2012 – 2018. Study to assess presence of native and non-native plant and arthropod species.
	2014 – 2016. A study evaluating the characterization and mapping of wēkiu bug habitat has been completed.
	2015 – ongoing. A multi-year wēkiu bug habitat restoration plan is being implemented, also part of the TMT CDUP requirements. OMKM is currently supporting this management action.
	2016 – Habitat mapping of wēkiu bugs using existing remote sensing and arthropod trap data.
	2017 – ongoing. Study to investigate diet and parasite loads in alpine arthropods.
Alien and invasive species	2012 – 2015. Development of an invasive species management plan. It is composed of modules addressing various aspects of the invasive species prevention, response, and control. Implementation is
	ongoing 2015 – 2018. A study to evaluate measures to prevent the introduction of invasive species, in particular the inspection of vehicles and equipment was initiated in 2015.

Other (Flora and Fauna)	2016 – ongoing. Initiated seabird, forest bird and bat inventory study
Studies	

Monitoring Activities

Historic Properties	2011- ongoing. On a monthly basis, OMKM Rangers photo document
(archaeological sites)	 the level of Lake Waiau in DLNR's Maunakea Ice Age Natural Area Reserve (MKIANAR). Rangers also periodically hike to the adze quarry in the MKIANAR) to assess conditions. Rangers pick up and remove trash from their hikes into the MKIANAR. 2012 – ongoing. Annual archaeological monitoring of historic properties (archaeological sites). The Long-Term Historic Monitoring Plan was approved by State of Hawaii Historic Preservation Division (SHPD) in 2014.
	2014 – SHPD approved the Long Term Historic Properties Monitoring Plan for UH Managed lands on Maunakea.
Wēkiu bug and alien species.	 2002 – ongoing. Annual surveys on wekiu bug have been conducted since 2002. 2007 – ongoing. Annual surveys of alien species are conducted on UH Managed lands
Invasive species	 2013 – ongoing. Monthly surveys for invasive species are conducted at the facilities at the mid-level, 9,200 ft elevation, including the VIS and the support facilities. 2013 – ongoing. Quarterly surveys for invasive species are conducted at all the summit facilities for invasive species. 2013 – ongoing. Natural resources personnel accompany archaeologists in their annual monitoring to assess sites and surrounding areas for native and invasive species
Flora	2013 – ongoing. Annual surveys of historic properties and wēkiu bug habitat include collection of vegetation presence and abundance.

Appendix B: Resource Management Programs

Selected publications related to resource management programs along with a summary of activities, are listed below.

Maunakea Invasive Species Management Plan and appendices

Maunakea Invasive Species Management Plan. 2015. PCSU Technical Report v191.

Standard Operating Procedures (SOPs): detail and instructions for all mountain users. SOP 01: Cleaning of Vehicles and Personal Belongings. v1.3. (pdf)

SOP 02: Inspection of Vehicles, Construction Materials, Scientific Equipment, & Supplies. v1.3. (pdf)

SOP 03: Cafeteria Food Shipments (Receiving). v1.0. (pdf)

SOP 10: Invasive Invertebrate Early Detection Surveys of Facilities. v1.0. (pdf)

SOP 11: Annual Alien Invertebrate Early Detection & Wēkiu Bug Monitoring. v1.1. (pdf)

SOP B: Maunakea Vertebrate Threats, Identification, Collection, and Processing Guide. v1.1. (pdf)

SOP C: Maunakea Invertebrate Threats, Identification, Collection, & Processing Guide. v1.0. (pdf)

SOP D: Maunakea Plant Threats, Identification, Collection & Processing Guide. v2.2.(pdf)

SOP Z: Revising the Invasive Species Management Plan. v1.1. (pdf)

Invasive Species Inspections

Inspections of large vehicles and their loads for invasive species began in 2013. To date 808 large vehicles and loads have been inspected. Of the total number of vehicles inspected 782 vehicles passed inspections and were approved immediately or after quick remediation, 17 were rejected and required reinspection, and 9 were non-compliant, that is no requests for inspections were made prior to proceeding to the mountain

	2013	2014	2015	2016	2017	2018	2019	2020
Keck	2		14	11	15	21	51	17
Subaru	3	8	17	11	30	16	10	4
JCMT							1	
UKIRT						2	5	
UH88			1	1	57	2	8	7
IRTF	2			1	1	10	2	1
CFHT	11		3		4	10		3 6
SMA				10	19	16	21	6
CSO			4					
UH24						3		
VLBA			4			2	1	
Gemini	4	12	9	13	13	9	6	
TMT*		14	18				75	
MKSS/VIS	6	11	4	5	8	2	150	1
Subtotal Total	28	45	74	52	147	94	330	39
Rush	NR	NR	NR	NR	NR	NR	110	16
No Rush	NR	NR	NR	NR	NR	NR	220	23
Remediation	4	12	19	8	15	10	58	2
No Remediation	24	33	55	44	132	84	272	37
Approved	28	43	71	52	146	90	316	37
Rejected		2	3		1		11	
Non-compliance						4	3	2

*The majority of invasive species inspections for the TMT were conducted by the Big Island Invasive Species Committee (BIISC).

<u>Rush/No Rush</u>: Note: Information on whether a request was a rush was not recorded (NR) until 2019. Rush inspections are those that were not requested in advance (four days prior) to the scheduled delivery.

<u>Remediation/ No remediation</u>: Remediation occurred when there was a cleanliness or invasive species concern with the load or vehicle. Most remediation actions entailed pressure washing or vacuuming. *No remediation* are vehicles or loads that did not have a cleanliness or invasive species concern.

<u>Approved/ Rejected/ Non-compliance</u>: Vehicles and loads that were clean and free of invasive species passed inspection and were *approved*. Vehicles and loads for which remediation could not occur quickly such as from power washing or vacuuming were *rejected* and required re-inspection after the concern was addressed. *Non-compliance* was documented when vehicles or loads did not request an invasive species inspection and traversed to UH managed lands without approval.

Resource Management Programs

Polices and plans	2012 – 2014. A burial treatment plan was reviewed by the Hawaii Island
related to cultural resources	Burial Council and approved by the Division of Historic Preservation. It contains a schedule for monitoring.
	2012 – 2018. Policies relating to the placement and removal of offerings, the
	scattering of human remains, the construction of new cultural features
	including the stacking of rocks were developed by Kahu Kū Mauna. In 2016 following public consultation Kahu Kū Mauna approved the policies.
	The MKMB felt that more community consultation was required before
	finalizing the policy. Community consultation on these policies then
	resumed and following this additional consultation, MKMB approved in 2018.
	2016 – ongoing. The U.S. Department of Defense was contacted to begin the
	review process prior to any removal efforts of military aircraft. 2016 – 2017 Kahu Kū Mauna initiates consultation with Native Hawaiians on
	protocols per CMP. Advertisements placed in Hawai' i Tribune Herald,
	Honolulu Star Advertiser December, 11, and 18, 2016; January 5,
	February 12, March 19, April 16 and Ma7 7, 2017; West Hawai'i Today, similar dates as Hawai Tribune for 2017; Office Hawaiian Affairs, Ka Wai
	Ola, Months of December 2016 thru May 2017. Kuka Kuka session held
	on May 21, 2016, including petitioners of TMT contested case, OHA,
	DHHL, DLNR, and members of the Hawaiian community.
Invasive species control	2012 – ongoing. An active volunteer program to remove fireweed (<i>Senecio madagascariensis</i>) and other invasive plants continues at the mid-level
	area. Rangers continue to remove fireweed in the upper elevations.
	2013 – ongoing. The Hawaii Ant Lab and Big Island Invasive Species
	Committee continue to support implementation of the Invasive Species Management Plan by providing technical support, and assisting with
	inspections and monitoring work.
	2015 – ongoing. The Maunakea Invasive Species Management Plan was
	approved by the MKMB. It is composed of modules addressing various aspects of the invasive species prevention, response, and control.
	Implementation is ongoing.
Wēkiu bug management	Data from wēkiu bug, invasive/alien arthropod, biodiversity arthropod studies,
plan and habitat restoration plan.	topography and wēkiu bug food distribution, and climate studies inform updates to management plans and habitat restoration plans for the bug.
Public facilities	2013 – ongoing. Road condition ice-sensor installed on the summit ridge to
	test the concept. After proving to be reliable, 2 additional sensors

Develop and maintain a GIS and database program.	 installed and integrated into road condition assessments and decision-making regarding safe operations. 2014 – 2018. CIP funds are used to construct improvements to the ingress and egress at the VIS and to address parking and pedestrian flow. An Environmental Assessment was prepared and published in 2017. A CDUA was submitted for DLNR and a CDUP was approved in June 2018. Funds were also used to study the condition of the summit loop road, make recommendations for repair, including estimated costs. 2015 – ongoing. An automated vehicle counter was installed to count the number of vehicles (differentiating: public, commercial, tour, observatory, etc.) that drive above Halepōhaku. 2018 – ongoing. Rangers install an axle vehicle counter to assess in conjunction with the automated vehicle counter, the number of vehicles that go only to Halepōhaku. 2013 – ongoing. A GIS-based data storage and reporting system has been developed. The system is continuously being expanded and enhanced. 2001 – ongoing. Rangers have been and continue to submit daily reports summarizing their observations and their activities, including documenting number of vehicles, hikers, incidents, permitted and uppermitted commercial tour, opperations, etc.
	unpermitted commercial tour operators, etc.
	2014 – ongoing. An automated vehicle data collection system is operational recording individual observatory, permitted commercial tours, and OMKM vehicles using radio frequency identification tags (RFID) and general public vehicles.
Native Plan Restoration	2013 – 2014. Community volunteers plant over 200 'Āhinahina (silversword)
Other Plans and	 for DLNR in the Forest Reserve. 2015. Construct benches for native plant restoration 2016 – 2017. Summer interns test seed collection and propagation methods for native plants. 2018. Propagation and outplanting of māmane, 'aweoweo, pāwale, puakala, 'ena'ena under CDUP HA-3812 (VIS parking improvements). 2019. Continued propagation and out planting of māmane, 'aweoweo, pāwale, puakala, 'ena'ena under CDUP HA-3812 (VIS parking improvements). 2001. OMKM ranger program established.
activities	2007 – ongoing. Biannual inspection of facilities for compliance with their
	 CDUPs 2009. BLNR approved the Maunakea Comprehensive Management Plan (CMP) 2010. BLNR approved the Cultural and Natural Resources Management Plans, Public Access Plan and the Decommissioning Plan, sub-plans to the CMP. 2012 – ongoing. Beginning in 2012 applicants of projects are required to review the Comprehensive Management Plan (CMP) and submit measures to comply with relevant CMP actions as part of their project
	 proposals. When applicable, mitigation measures are included in the project proposal. 2016 – Completed/ongoing. An Operations, Monitoring, and Maintenance Plan has been developed. The plan recognizes the need to identify maintenance needs, protocols and strategies that minimizes impacts to the resources and ensures that permittees comply with the conditions of their CDUPs. It also serves as a reporting mechanism for CMP compliance activities calls for the coordination of maintenance activities and schedules. 2015. Caltech Submillimeter telescope submitted its Notice of Intent (NOI) to decommission initiating the decommissioning process for its observatory

	 on the summit. MKMB approved the NOI in 2016. Pursuant to the Decommissioning Plan (DP) for Mauna Kea Observatories, OMKM is overseeing the decommissioning process and Caltech is preparing all necessary documents, including Environmental Assessment (EA), Conservation District Use Permit application and DP requirements. An EA is currently being prepared. 2015. UH Hilo submitted its Notice of Intent to decommission initiating the decommissioning process for its summit observatory, Hōkū Ke'a. Public testimony against the decommissioning of UH Hilo's educational telescope resulted in the MKMB deferring approval of the NOI. OMKM is overseeing the decommissioning process and UH Hilo is responsible for carrying out the DP requirements. In 2018, UH Hilo removed the non-operational telescope from inside its summit facility. 2016 – ongoing. A staff/employee training plan was prepare and has been implemented. All OMKM and Maunakea Observatory Support Services are required to attend. 2017 – ongoing. A Sign Plan was approved by the MKMB. This plan helps ensure appropriate review and consistency in sign design and use. 2018 – ongoing. An Orientation plan was prepared, approved by the Maunakea Management Board and Department of Land and Natural Resources. This plan addresses requirements for visitors, employees/permittees/contractors, as well special orientation requirements as may be mandated in permits.
Signs	 2012 – An inventory and map of all the signs on UH's managed lands was completed. The inventory of the signs on UH managed lands is being updated. 2017 – ongoing. A Sign Plan was approved by the MKMB. Installation of signs
	still requires DLNR approval, the plan helps ensure appropriate review and consistency in design and use. With input from Rangers and Kahu Kū Mauna, signs were installed to highlight cultural awareness and safety issues.

Appendix C: Education, Training, and Outreach

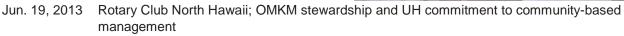
OMKM community engagement and outreach

OMKM COMMUNITY UPDATES (CMP EO-3)

Oct. 9, 2008	Rotary Club of Volcano, OMKM stewardship
Aug. 16, 2009	UH Hilo Chancellor's advisory group; OMKM stewardship
Apr. 8, 2009	Board of Land and Natural Resources, OMKM stewardship
Oct. 1, 2009	UH President M.R.C Greenwood; OMKM stewardship
Oct. 14, 2009	Senate Higher Education Committee; OMKM stewardship
Dec. 5, 2009	Visitor Information Station, Universe Tonight; OMKM stewardship
Mar. 25, 2010	Board of Land and Natural Resources; OMKM's proposed CMP subplans
Apr. 8, 2010	Board of Land and Natural Resources, update of CMP implementation; OMKM stewardship
Sept. 9, 2010	Kona Town Hall at Old Airport; OMKM stewardship
Apr. 2 2011	Visitor Information Station, Universe Tonight; update on OMKM stewardship
Oct. 10, 2011	OHA visit to Maunakea; OMKM stewardship
Feb. 28, 2012	Administrators and Educators; OMKM stewardship
Jun, 15, 2012	Institute for Astronomy External Review; OMKM stewardship
Jul. 3, 2012	OMKM's resource library
Jul. 24, 2012	UH Manoa Chancellor; OMKM stewardship
Sept.14, 2012	Hawaii Island Realtors Tradeshow; OMKM stewardship and UH commitment to community-based management
Dec. 12, 2012	Big Island Representatives; OMKM stewardship and commitment to community-based management
Dec. 27, 2012	Big Island Invasive Species Committee; outreach needs for invasive species management
Feb. 5, 2013	Rotary Club of South Hilo; OMKM stewardship and UH commitment to community-based management
Feb. 7, 2013	Hawaii Island Chamber of Commerce; General membership

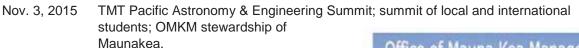
- meeting; 12 Years of communitybased management of the summit of Mauna Kea
- Feb. 22, 2013 Rotary Club of Hilo; OMKM stewardship and commitment to community-based management
- Mar. 22, 2013 Hawaii Leeward Planning Conference; OMKM stewardship
- Rotary Club of Pahoa; OMKM stewardship and UH commitment to community-based Apr. 9, 2013 management
- May 10,2013 Board of Land and Natural Resources; update on CMP implementation & OMKM stewardship

- May 16, 2013 Rotary Club of Volcano; OMKM stewardship and UH commitment to community-based management
- May 20, 2013 Lions Club of Kona; OMKM stewardship and UH commitment to communitybased management
- Jun. 5, 2013 Rotary Club of North Hawaii; OMKM stewardship and UH commitment to community-based management
- Jun. 8, 2013 Keawe Vredenburg, Hui Kako`o; Decommissioning Plan

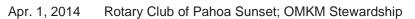


O Ka Aina I Ka Feno

- Jul. 22, 2013 Keawe Vredenburg; OMKM stewardship and UH commitment to communitybased management
- Jul. 24, 2014 UHH Astronomy and Physics Department; OMKM stewardship
- Aug. 14, 2013 David Tarnas; OMKM stewardship and UH commitment to community-based management
- Sept. 18, 2013 Keaukaha Community Association; update on OMKM activities
- Sept. 20, 2013 Kiwanis; OMKM Stewardship and commitment to community-based management

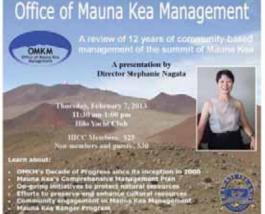


- Nov. 12, 2013 Association of Hawaiian Civic Club Convention; OMKM Presentation
- Nov.13, 2013 Keaukaha Community Association; OMKM up dates
- Nov. 13, 2013 Association of Hawaii Civic Club Hawaii Council; Decade of Stewardship
- Dec. 5, 2013 Rotary Club of Kona; OMKM Stewardship and commitment to community-based management
- Dec. 7, 2013 Pi'ihonua Hawaiian Homestead Association; update on OMKM stewardship activities



May 9, 2014 Board of Land and Natural Resources; update of CMP implementation; OMKM stewardship





Oct. 27, 2014	Association of Hawaiian Civic Club Convention Waikoloa; educational display
Nov. 16, 2014	Department of Hawaiian Homelands; partnership proposal Humuula sheep station and shuttle program involving beneficiaries' participation
May 2, 2015	Kau Coffee Festival; OMKM Outreach table ongoing stewardship efforts on Maunakea
May 19, 2025	Hamakua Development Corporation; series of presentation during the TMT protest; OMKM stewardship
Jun. 12, 2015	Board of Land and Natural Resources, update of CMP implementation; OMKM stewardship
Sept. 9, 2015	Community meeting with the Governor; Community involvement with Maunakea Management and OMKM stewardship
Jan. 28, 2016	Association of American University Women; OMKM stewardship
Apr. 1, 2016	Hawaii Leeward Planning Conference; update on OMKM activities
Mar. 16, 2016	Presentation on resources and stewardship of Maunakea to Hawaii Community College "Forest Team" class
Mar. 23, 2016	Japanese Chamber of Commerce & Industry Hawaii General Membership Meeting; expo display
Mar. 26, 2016	Panaewa Hawaiian Home Lands Community Association; update on OMKM stewardship activities
Mar. 30, 2016	Rotary Club of North Hawaii; OMKM stewardship activities
Apr. 1, 2016	Hawaii Leeward Planning Conference; OMKM stewardship activities
Apr. 5, 2016	Kona Kohala Chamber Luncheon with Mayor Kenoi and Business Expo; Informational booth
Apr. 22, 2016	UH Hilo Earth Day OMKM Booth Coloring station centered on native plants and animals.
May 02, 2016	Maunakea site tour Tom Callis, Hawaii Tribune-Herald; environmental resources; cultural connections, OMKM stewardship activities
May 17, 2016	Rotary Club of Kona Mauka; OMKM stewardship activities
May 19, 2016	Rotary Club of Kona; OMKM stewardship activities
May 20, 2016	Rotary Club of Hilo; OMKM stewardship activities
May 24, 2016	Native Hawaiian Presentation; Keahi Warfield, Patrick Kahawaiolaa, Bill Brown, Mapuana Waipa - Pueo committee; Herc Freitas Beneficiary; Bill Walter, Kamaʿaina/business; Mike Kaleikini, Hawaiian/business; Kirstin Kahaloa, Hawaiian /business; Kalepa Babayan, Hawaiian/navigator; Newton Chu, PUEO attorney; Jacque Hoover, Hawaiian/business; Greg Mooers, Maunakea Management Board (MKMB); Greg Chun, MKMB; Leningrad Elarinoff former County Councilman; Rich Matsuda, local community/astronomy; Paul Coleman, Hawaiian/astronomy, Heather Kaluna, Hawaiian/astronomy; Mailani Neal Hawaiian/astronomy; Mary Begier, business; Barry Taniguchi, community/business; Ron Terry, community/environment; Hannah Springer, MKMB
May 26, 2016	Rotary Club of Kona; OMKM stewardship activities
May 27, 2016	Rotary Club of Hilo; OMKM stewardship activities
Jul. 14, 2016	Community meeting with the Governor; Paul Coleman, Heather Kaluna, Mike Kaleikini, Nikki Thomas (student), Dash Stevens, Kevin Silva (student), Devin Chu (grad student),

Ron Terry, Hannah Springer, Myles Yoshioka, Russell Arikawa, Marianne Takamiya, Pierre Martin, Thayne Curry

- Jul. 19, 2016 Rotary Club of South Hilo; OMKM stewardship
- Jul. 29, 2016 Rotary Club of Hilo; OMKM stewardship
- Sept. 15, 2016 Meeting with Mayor Kim; OMKM stewardship
- Sept. 26, 2016 Rotary Club of Kona ; OMKM stewardship activities
- Oct. 3, 2016 State Legislative visit to Maunakea; OMKM stewardship
- Oct 12, 2016 Senator Kai Kahele; Senator Lorraine Inouye, Representative Mark Nakashima; Representative Cindy Evans; Representative Clift Tsuji; Representative Richard Onishi; Governor's East Hawaii Liaisons, Will Oakbe and Susan Kim
- Oct. 13, 2016 Legislative visit to Maunakea; OMKM stewardship
- Jan. 8, 2017 Media site visit to Mauna Kea with Tom Callis
- Mar. 2, 2017 Kona-Kohala Chamber of Commerce Mayor's Luncheon; OMKM Outreach table ongoing stewardship efforts on Maunakea
- Aug. 28, 2017 Regent Higaki, briefing on UH's proposed Administrative Rules
- Sept. 7, 2017 Hawaii Business Roundtable, Honolulu; OMKM Stewardship
- Sept. 27, 2017 Hawaii Island Chamber of Commerce Board of Directors: history of astronomy and UH process for review of astronomy projects and limiting impacts, such as the TMT project
- Oct. 3, 2017 Hawaii Island Chamber of Commerce Government Affairs Committee; Ongoing stewardship efforts on Maunakea
- Oct. 24, 2017 Sherry Bracken interview with Stephanie Nagata talks in-depth about OMKM and its dayto-day management of Maunakea Science Reserve. Engaging 30-minute interview.
- Nov. 7, 2017 House Finance Committee; OMKM stewardship
- Nov. 14, 2017 Rotary Club of Kona Mauka; ongoing stewardship on Maunakea
- Nov. 17, 2017 State House Finance Committee visit to Maunakea; OMKM stewardship
- Dec. 1, 2017 Hilo Kiwanis; OMKM stewardship
- Dec. 5, 2017 Wendy Laros, Executive Director Kona Kohala Chamber of Commerce; briefing on OMKM stewardship
- Dec. 5, 2017 Susan Kim, Governor's Hawaii Island Liaison; briefing on update on OMKM stewardship



- Dec. 5, 2017 Jacqui Hoover, Executive Director for Leeward Planning Conference and Hawaii Island Economic Development Board; update on OMKM stewardship
- Dec. 14, 2017 DLNR Admin staff: OMKM Stewardship
- Dec. 20, 2017 Mayor Kim; Barry Taniguchi, former chair of MKMB and Stephanie Nagata, Director of OMKM on the management of Maunakea and the Mayor's vision for Maunakea
- Jan. 16, 2018 Board of Land and Natural Resources; update on OMKM stewardship
- Feb. 20, 2018 Kona Kohala Chamber of Commerce; update on stewardship of Maunakea

- Mar. 2, 2018 Waimea Community Association Presentation; ongoing stewardship efforts on Maunakea
- Mar. 6, 2018 Hawaii Island Chamber of Commerce; General membership meeting, OMKM's long-term management milestones and stewardship
- Mar. 29, 2018 Visitor Information Station staff; OMKM stewardship
- Apr. 7, 2018 Hawaii Leeward Planning Conference; legislative update
- Apr. 23, 2018 Arcadia Retirement Residence, Honolulu; OMKM stewardship
- May 14, 2018 Japanese Chamber of Commerce & Industry of Hawaii; OMKM update of stewardship of Maunakea
- Sept. 4, 2018 RCUH Board; OMKM stewardship
- Sept. 18, 2018 Kona Lions, OMKM update of stewardship of Maunakea
- Oct. 11, 2018 Hawaii County Administration Cabinet; presentation to Mayor Kim's cabinet about OMKM long-term stewardship of Maunakea
- Oct. 16, 2018 Maunakea Observatories Outreach Committee: OMKM stewardship of Maunakea
- Oct. 24, 2018 Kiwanis Club Kona; OMKM briefing, OMKM stewardship
- Oct. 26, 2018 Speaker Saiki visit to Maunakea; briefing on start of astronomy on Maunakea, creation of OMKM and OMKM's stewardship of Maunakea
- Nov. 8, 2018 West Hawaii Community Forum; panel discussion and Q & A about stewardship of the mountain. Panelists: Stephanie Nagata, Director, OMKM; Greg Chun, Maunakea Management Board; Fritz Klasner, Natural Resources Program Manager, OMKM, Wally Ishibashi, Senior Advisor, OMKM; Scotty Paiva, Chief OMKM Ranger
- Nov. 9, 2018 Rotary Club of Hilo; update on OMKM stewardship of Maunakea
- Nov. 13, 2018 Maunakea Task Force; update on OMKM stewardship of Maunakea
- Nov. 27, 2018 Business law class, UH Hilo. Peter Kubota instructor; OMKM stewardship role and responsibilities, commitment to community-based management
- Nov. 28, 2018 Dru Kanuha; briefing on OMKM stewardship of Maunakea
- Dec. 14, 2018 Maunakea Management Board; OMKM presentation to board members on Management of Maunakea, UH commitment to community-based management
- Dec. 19, 2018 Rotary Club of Hilo Bay; update on OMKM's management of Maunakea
- Feb. 7, 2019 Rotary Club of Kona; OMKM Stewardship
- Jan. 25, 2019 Board of Land and Natural Resources: updated on OMKM stewardship
- Feb. 5, 2019 Waikoloa Lions; OMKM stewardship
- Jan. 16, 2019 Leimomi Kahn, President, Hawaiian Affairs Caucus of the Democratic Party; briefing on OMKM stewardship
- Feb. 19, 2019 Hawaiian Affairs Caucus, Democratic Party; overview of OMKM's stewardship of Maunakea
- Mar. 5, 2019 Hawaii Electric Light Company; OMKM stewardship
- Mar. 15, 2019 Kona-Kohala Chamber of Commerce Luncheon with Mayor Kim; OMKM information table and display on stewardship
- Apr. 2, 2019 Hawaii Island Portuguese Chamber of Commerce: OMKM stewardship

- Apr. 4, 2019 Carpenters Union; OMKM stewardship
- Jul. 3, 2019 Staff for US. Congresswoman, Tulsi Gabbard; briefing on OMKM's stewardship of Maunakea
- Jul.19, 2019 Pohakuloa Advisory Council (PAC) at Pohakuloa Training Area; OMKM stewardship and admin rules
- Jul. 30, 2019 Rotary Club of Kona Mauna; OMKM stewardship
- Aug. 27, 2019 Board of Regents; OMKM stewardship
- Oct. 16, 2019 House Higher Education Committee; OMKM stewardship
- Jan 4-8, 2020 American Astronomical Society convention; OMKM outreach booth display and materials on OMKM's stewardship activities on Maunakea
- Mar.11, 2020 Rotary Club of North Hawaii; OMKM stewardship of Maunakea and misinformation about management of the mountain.

COMMUNITY OUTREACH EVENTS (CMP CR-3 and EO-6)

- Sep. 1, 2012 Universe Tonight presentation at the Onizuka Center for International Astronomy Visitor Information Station, on arthropods and stewardship.
- Mar. 4, 2013 Presentation to UH Hilo undergraduate astronomy class on Maunakea's resources, stewardship and heritage.
- Mar. 19, 2013 Support a "Flat Stanley" traveling primary school visit to Maunakea Observatory base facilities and OMKM.
- Jul. 11, 2013 Presentation to visiting University of Victoria, Canada graduate biology class on Maunakea biology.

Nov. 27, 2013 Permafrost presentation at Hilo Intermediate School by Dr. Kenji Yoshikawa of University of Alaska-Fairbanks; including discussion of permafrost on Maunakea and installation of soil-temperature probe network in the school-yard.

- Dec. 7, 2013 OMKM participated in the 'Imiloa Palila Palooza with displays on resources and provided youth activities.
- Mar. 25, 2014 Hawai'i Academy of Arts and Sciences (HAAS) presentation on Maunakea's resources.



- Oct. 24, 2014 Permafrost presentation at Hilo Intermediate School by Dr. Kenji Yoshikawa of University of Alaska-Fairbanks.
- Dec. 13, 2014 Waikoloa Elementary and Middle School Winter Festival. Children's science activities and stewardship display
- Apr. 23, 2015 Kealakehe Elementary School Science Showcase; coordinated with OMKM researchers, other state agencies and Maunakea children activities related to native plants and animals including coloring activities, natural resources trading cards, science stations
- May. 16, 2015 Hawai'i Volcanos National Park 'BioBlitz; provided entomological technical support
- May 28, 2015 OMKM Open House at Halepōhaku on OMKM stewardship for those protesting the TMT project a total of 22
- Jun. 8, 2015 OMKM sponsor Mike Lee's presentation on Kilo Hokū
- Aug. 2, 2015 Organized and sponsored "Aloha Art Festival at 'Imiloa; event organized by OMKM's PIPES intern as a way of bringing together stakeholders on Maunakea in midst of the TMT protest
- Aug. 14, 2015 Permafrost presentation at Hilo Intermediate School by Dr. Kenji Yoshikawa of University of Alaska-Fairbanks
- Feb. 26, 2016 16th Annual Dryland Forest Symposium; display and educational booth on OMKM stewardship
- Apr. 21, 2016 Kealakehe Elementary School Science Day; coordinate with other State agencies on

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- Apr. 22, 2016 Earth Day at UH Hilo; youth activities and information on OMKM stewardship
- Apr. 22, 2016 Presentation at Ke Ana La'ahana PCS career day on resource management careers and Maunakea.
- Apr. 26, 2016 Panaewa and Keauhaka Homestead Associations Prince Kuhio Day Celebration; OMKM and Maunakea Observatories provide children's science activities, display of Maunakea arthropods and coloring activities and solar telescopes booth displays, science and children activities
- Apr. 30, 2016 AstroDay, an annual science and astronomy education event sponsored by the Maunakea Astronomy Outreach Committee (MKAOC); OMKM stewardship display and children's activities
- Jun. 28, 2016 Jessica Kirkpatrick presents "Endemic Insects of Maunakea" at Lyman Museum
- Jul. 12, 2016 OMKM UH Hilo sponsored research graduate students "What's Bugging the Mountain", entomological research on Maunakea; as part of the Hawai'i Volcanoes National Park "After Dark in the Park" series.
- Aug. 27, 2016 Hawai'i Volcanoes National Park "BioBlitz" citizens science effort; provided entomological technical support.
- Sept. 1-5, 2016 Volunteer support at the IUCN World Conservation Congress in Honolulu.
- Sept. 15, 2016 Presentation and demonstration at UH Hilo on non-intrusive geophysical techniques, such as permafrost measurements, by Dr. Matthias Leopold (University of Western Australia).
- Sept. 24, 2016 PUEO-KOYD Hōkūalaka'i Work Day, Sea-Sky event; youth activities; OMKM stewardship
- Feb. 23, 2017 Kealakehe Elementary School Science Day; children science activities, coloring station and trading cards featuring native plants and animals.
- Mar. 21, 2017 Aunty Mimi's AstroBash at Kailua-Kona Library; educational table with children's natural resources activities.
- Apr. 8, 2017 Presentation at Hawaii Academy of Arts & Sciences elementary school on Maunakea resources.
- Apr. 8, 2017 Tropical Living Festival, Hawaii Academy of Arts and Sciences; Children's natural resources coloring and trading card activities.
- Apr. 11, 2017 Presentation to Dept. of Education staff on Maunakea stewardship, organized by Gemini Observatory.
- Apr. 21, 2017 Earth Day at UH Hilo; OMKM Outreach table ongoing stewardship efforts on Maunakea
- May 6, 2017 Visitor Information Station Universe tonight series at Halepōhaku on OMKM stewardship
- May 6, 2017 AstroDay Event in Hilo; OMKM kids activities table and OMKM stewardship information
- July 8, 2017 Hawai'i Volcanoes National Park "BioBlitz" citizens science effort; provided entomological technical support.





- Oct. 14, 2017 Presentation to volunteer appreciate dinner for volunteers of the Visitor Information Station on Maunakea resources.
- Oct. 21, 2017 Na Kilo Palekai, Keaukaha community wa'a, science, navigation event; OMKM exhibit and educational display
- Nov. 4, 2017 Inaugural AstroDay Kona; OMKM stewardship and educational display
- Dec. 8, 2017 Presentation to Dept. of Education staff on Maunakea stewardship, organized by Gemini Observatory
- Mar. 1, 2018 Kealakehe Elementary School Science Day; children science activities, coloring station and trading cards featuring native plants and animals
- Mar. 9, 2018 Mountain View Elementary Open House; displays
- Mar. 28, 2018 Waikoloa Elementary School presentation on the wēkiu bug
- Apr. 20, 2018 UH Hilo Earth Day; OMKM Outreach table ongoing stewardship efforts on Maunakea
- Apr. 26, 2018 Keaukaha Elementary School Ohana Night; OMKM exhibit on stewardship and educational display



May 5, 2018 Astroday Hilo; annual event sponsored by the Maunakea Observatories Outreach Committee featuring children's science activities; OMKM stewardship exhibits and natural resources displays

Jun. 30, 2018 Presentation on Science Camps of American as part of weed pull event

Sept. 17, 2018 Volcano School of Arts and Sciences presentations on entomology.

Nov. 26, 2018 Windward Community College geology class, presentation on vegetation of Maunakea.

- Dec.12, 2018 If A hosts PUEO Open House; OMKM Outreach table ongoing stewardship efforts on Maunakea
- Jan. 14, 2019 Present to TCBES graduate course in Organizational Management and Logistics as related to Natural Resource Management on Maunakea.
- Mar. 1, 2019 DLNR's Division of Forestry and Wildlife's Napu'u Conservation Project Bio-Cultural Festival at Pu'uwa'awa'a; mini arthropod trapping and identification field activities for elementary students
- Apr. 11, 2019 Kealakehe Elementary School Science Night; OMKM table and display on stewardship.
- Apr. 18, 2019 Mountain View Public Library; Bug-ology for school grade school kids; display of Maunakea bugs
- Apr. 23, 2019 Keaukaha Science Technology Engineering Art Math (STEAM) night; OMKM outreach table ongoing stewardship efforts on Maunakea; activities for kids

- Apr. 26, 2019 UH Hilo Earth Day; OMKM outreach table ongoing stewardship efforts on Maunakea
- May 4, 2019 AstroDay, an annual science and astronomy education event sponsored by the Maunakea Astronomy Outreach Committee (MKAOC); OMKM stewardship display and children's activities
- Jun. 5, 2019 Wēkiu bug presentation and interactive activity for 'Imiloa's Insect Camp
- Jul. 24, 2019 Wēkiu bug presentation and interactive activity for 'Imiloa's Insect Camp
- Oct. 25, 2019 Imiloa Halloween event; theme cool, creepy, and crawly insects of Maunakea, youth activities
- Oct. 25, 2019 Presentation to Institute for Astronomy graduate student seminar on Maunakea stewardship



- Oct. 27, 2019 HE'E Hawaii Explorations Expo; Information booth at Afook-Chinen Civic Auditorium on OMKM stewardship of Maunakea
- Nov. 2, 2019 Presentation at 'Imiloa teachers workshop on Maunakea stewardship
- Feb. 14, 2020 Mountain View Elementary School visit/Open House at Institute of Astronomy in Hilo; Wēkiu bug life cycle, bug headbands, arthropod collection
- Feb. 23, 2020 'Imiloa Astronomy Center birthday celebration; Theme: Reduce, Reuse, Recycle, Refuse, Re purpose; OMKM display related to stewardship and critters found on Maunakea.



- Apr. 13, 2020 Presentation on resources and stewardship of Maunakea to Hawaii Community College "Forest Team" class.
- May 6 2020 Record a video session for upcoming "Imiloa @ Home" series on the wēkiu bug.

CMP CULTURAL POLICIES OUTREACH (CMP: CR-1, , 5, 6, 7, 8, 9, and 12)

Kahu Kū Mauna through OMKM invites the community to talk story. Ads were run for several months in the *Hawaii Tribune Herald*, *West Hawaii Today*, *Honolulu Star Advertiser*, and Office of Hawaiian Affairs' *Ka Wai Ola*. to reach a wide as possible audience. Pursuant to the CMP, Kahu Ku Mauna also met with the Office of Hawaiian Affairs and the Royal Order of Kamehameha to discuss cultural matters related to Maunakea.

Oct. 13, 2010	Meeting with representatives of the Royal Order of
	Kamehameha regarding care taking of the summit lele.

- Oct. 18, 2011 Presentation to OHA trustees and staff on OMKM's stewardship role and responsibilities while on their visit to Maunakea
- Feb. 4, 2013 Presentation given OHA trustees and staff on OMKM's stewardship role and responsibilities on their visit to Maunakea.
- Dec. 17, 2020 Kahu Kū Mauna met with OHA representatives to discuss ahu building and removal on Maunakea.



- May 21, 2016 Kahu Kū Mauna convenes a talk session with members of Native Hawaiian community to discuss Cultural Resources management actions regarding setting polices and/or guideless related to cultural activities. Attendees included representatives from DLNR, OHA, DHHL, petitioners of the TMT contested case, and others from the Hawaiian community.
- Dec.2016 Ads were run in the following newspapers and OHA's *Ka Wail Ola* newsletter inviting members of the community to talk story.

Date of Ad	Hawaii Tribune Herald	Honolulu Star Advertiser	West Hawaii Today	Office of Hawaiian Affairs Ka Wai Ola
Dec. 11, 2016	Х	Х		Dec. 2016
Dec. 16, 2016	Х	Х		Dec. 2010
Jan. 5, 2017			Х	Jan. 2017
Jan. 15, 2017	Х	Х		Jan. 2017
Feb. 12, 2017	Х	Х	Х	Feb. 2017
Mar. 19, 2017	Х	Х	Х	Mar. 2017
Apr. 16, 2017	Х	Х	Х	Apr. 2017
May 7, 2017	Х	Х	Х	May 2017

Nov. 19, 2019 Correspondence with the Royal Order regarding the caretaking of the summit ahu.

SYMPOSIUMS, CONFERENCES AND SPECIAL EVENTS (CMP EO-3)

- Jun. 6, 2012 Transit of Venus viewed from Maunakea; OMKM and Maunakea Observatories Support Services coordinated anticipated heavy public attendance to view the rare transit of Venus event. Organized commercial tour operators to provide free public transportation to the summit; police and emergency services.
- Aug. 4-8, 2012 OMKM sponsored and hosted an international scientific symposium titled "Vulnerable Islands in the Sky: Science and Management of Tropical Island Alpine & Sub-Alpine Ecosystems". Symposium was co-coordinated by UH Hilo Professor Jim Juvik. Symposium site was Hawaii Pacific Academy in Waimea. Symposium participants came from England, Scotland, Canary Islands, South Africa, Australia, Japan, and the US, including Hawaii. Symposium was funded in part by the Gordon and Betty Moore Foundation
- Nov. 27, 2012 National Park Service climate change scenario planning workshop for Hawai'i Island parks and protected areas; participated in workshop activities.
- May 20, 2014 Hawaii Geographic Information Coordinating Council Geospatial Expo. Presentation by Amber Stillman on "3D Landscape Maps for University Managed Lands on Maunakea".
- Jun. 3-4, 2014 West Hawai'i Science Technology Engineering & Math (STEM) camp. Present on maps and drones to primary schools students at summer camp. A partnership with STEM Works and Kealakehe Robotics.
- Jun. 25, 2014 Hawai'i Ecosystem Meeting. Rapid-presentation on Arthropod Monitoring on Maunakea.
- Jul. 15, 2014 Hawaii Conservation Conference, presentations by Jessica Kirkpatrick (Monitoring Arthropod Communities on Maunakea) and Amber Stillman (3D Landscape Maps for University Managed Lands on Maunakea).
- Nov. 1, 2014 Special issue of Arctic, Antarctic, and Alpine Research, Volume 46, No. 4 (2014 University of Colorado) on "Losing the High Ground: rapid transformation of tropical island alpine and subalpine environments". This issue is devoted to the proceedings of the 2012 symposium, "Vulnerable Islands in the Sky: Science and Management of Tropical Island Alpine & Sub-Alpine Ecosystems" sponsored by OMKM.
- Nov. 17, 2014 Entomological Society of America, presentation by Dr. Jesse Eiben with Jessica Kirkpatrick as co-author. "Life tables and population growth modeling guide conservation actions for an alpine restricted rare insect, the wēkiu bug, Nysius wekiuicola, in Hawai'i"
- Apr. 4, 2015 Pacific Entomology Conference in Honolulu, presentation titled "The Variability in Taxa, Distribution, and Abundance of Species on Maunakea: Comparing 3 years of data: 2013 -2015"
- Apr. 20, 2015 Attend UH Hilo TCBES Research Symposium, presentations titled "Maunakea Natural Resource Program" and "The Variability of Taxa, Distribution, and Abundance of Arthropods on Maunakea: Comparing 2 years of data 2013 & 2014".
- Apr. 5, 2016 Pacific Entomology Conference in Honolulu with poster titled "Arthropod Monitoring on Maunakea: Biodiversity & Threats" and presentation titled "Intra- and inter-annual distribution and density fluctuations of high alpine restricted arthropods on the summit of Maunakea, Hawaii"
- Jan. 9, 2017 Pacific Islands Climate Change Cooperative's multi-year Hawaiian Islands Terrestrial Adaptation Initiative—Hawai'i Vulnerability Assessment & Scenario Planning Workshop: participate to contribute to discussions on high-elevation habitats.

- Feb. 15, 2017 Big Island Weed Management Forum; presentation on the OMKM's Maunakea Invasive Species Management Plan.
- Jun. 20, 2017 American Association for the Advancement of Science (AAAS) Pacific Division meeting in Waimea: OMKM sponsored session on High Altitude Climate Change Trends and Alpine Ecosystem Impacts in Hawai`i
- Jun. 20, 2017 American Association for the Advancement of Science (AAAS) Pacific Division meeting in Waimea: OMKM sponsored session: "Student Science Conference" for middle and High School student science projects. A partnership which also included the Hawaii Science and Technology Museum, AAAS, and Mary Begier Realty.
- Jul. 18, 2017 Hawaii Conservation Conference, presented poster titled "Collaborative and Integrative Management of Invasive and Rare Species on UH Managed Lands of Maunakea".
- Jul. 10, 2018 Hawaii Conservation Conference, presented poster titled "An Assessment of Wēkiu Bug Populations on Cinder Cones of the Maunakea Volcano, Hawai'i Informs Habitat Restoration and Conservation Efforts".
- Nov. 19, 2019 Entomological Society of America; presented: "Describing two diurnal Agrotis species (Lepidoptera: Noctuidae) in the subalpine and alpine regions (3000-4205m) on Hawai'i Island, Hawai'i".

COMMUNITY VOLUNTEERS MĀLAMA MAUNAKEA (CMP EO-8)

The monthly Mālama Maunakea campaign focuses to protect the fragile resources on the mountain from the gravel road section of the Mauna Kea Access Road from the approximate 9,000' to 12,000' elevation.

The volunteer day begins with project orientation and acclimation to the high elevation. From 10 am until 12 noon volunteers pull fireweed along the Mauna Kea Access Road followed by lunch. Wrap up fireweed pulling and



a brief tour of Mauna Kea resources completes this fulfilling day on the mountain.

In 2013, OMKM and volunteers assisted DLNR's Division of Forestry and Wildlife with planting several hundred 'Ahinahina (silversword) in the Mauna Kea Forest Reserve.



Mālama Maunakea Volunteer Weed Pull and Planting Facts

- Invasive species weed pull Mālama Maunakea campaign began in 2012 in an effort to protect the mountain's native resources and landscape
- Held generally on a Saturday morning
- While volunteers acclimate, they are given a project orientation, before pulling weeds for about two-hours.
- They are given an interpretive walk pointing out native plants and discussion on the native ecosystem
- Weed pull help prepare areas for future native plan restoration projects
- 58 separate weed pull events
- 1,493 community volunteers
- 10,457 volunteer hours
- 2,414 garbage bags of weeds pulled
- Planted than 300 native plants near Halepōhaku
- OMKM is propagating plants for future restoration efforts in the Halepōhaku area

Volunteer Groups

Volunteer groups who participated in the OMKM's weed pull and planting events:

- Hawaii Island Chamber of Commerce
- Circle K (Kiwanis youth)
- Interact (Rotary Youth)
- Hawaii National Guard Youth Challenge Academy
- Pohakuloa Training Area staff
- UH Hilo classes and groups
- Observatory staff
- Commercial Tour permittees
- Hawaii Government Employees Association



- University faculty and staff
- school groups (Ke Ana La'ahana, Waiakea High School, Hilo High School, Christian Liberty Academy)
- members of the general community





Year	No. of Projects	No. of Volunteers	Hours	Bags of Weeds
2012	8	114	873	205
2013	8	236	1747	363
2014	9	283	1,945	392
2015	7	228	1.710	442
2016	8	200	1.500	300
2017	6	165	1238	271
2018	8	200	1,080	323
2019*	3	44	308	75
2020**	1	23	58	43
 Road closed to public access from mid-July to late December due to protest activity 				

** Only one event held due to the Covid-19 pandemic

ORIENTATION (CMP EO-2)

Consistent with an orientation plan prepared with input from Kahu Kū Mauna and the Maunakea Management Board, and approved by DLNR, OMKM conducts orientations relating to the cultural and environmental significance to those who work on UH's managed lands including observatory and UH personnel, contractors and vendors, and commercial tour operators. Sessions are usually held in Hilo, with rotating visits by presenters to West Hawai'i tour companies and observatories.

In 2016 OMKM launched an online video version of the orientation as a more efficient means of reaching contractors, vendors, visiting staff, or other interested parties.

Regular feedback is solicited from Kahu Kū Mauna and attendees. A three-year refresher interval requirement has been adopted unless otherwise mandated by permit.

Currently there are approximately 1,500 individuals with a current, valid orientation certificate.

Orientation Sessions

onomation con		The Maunakea Comprehensive Management Plan includes a requirement of an orientation for all observatory staff, tour operators, support staff, contractors, vendors, Rangers, etc. prior to working
Orientation So 2012	essions 6 successfully completed orientations Sessions held: 2 November	on or in support of activities on UH Managed lands (see page 7-22, Management Action ED-2 for details, <u>thtt://www.malamamuneate.com/ublackimmangement/Johan</u> (<u>CMR_2009.PDEFpages233</u>). This orientation must be repeated overy three (3) years, more frequently if required by a permit, or as directed by the Maunakea Management Board. To attend on orientation session, see the Office of Maunakea Management calendar at: <u>http://www.malamamaunakea.org/about.us/calendar</u>
2013	568 successfully completed orientations Sessions held: 22 April, 6 June, 21 15 July, August, 27 August, 5 September, 10 September, 19 September, 1 October, 9 October, 23 October, 1 November, 5 November, 8 November, 14 November, 18 November, 26 November, 9 December, 13 December, 16 December, 19 December	Email <u>maunakea orientation and Thevali day</u> if you have questions. *Required Maunakea User Orientation video Maunakea User Orientation
2014	361 successfully completed orientations Sessions held: 13 March, 21 March, 24 March, 31 March, 14 April, 16 May, 18 June, 11 July, 6 August, 12 August, 14 August, 15 August, 26 August, 4 September, 15 September, 29 September, 27 October, 20 November, 12 December	
2015	561 successfully completed orientations Sessions held:13 January, 9 February, 19 February, 23 Febr March, 16 March, 23 March, 30 March, 13 April, 28 April, 11 June, 14 July, 27 July, 24 August, 2 September, 17 Septemb 21 October, 6 November, 10 November, 3 December, 17 De	May, 26 May, 5 June, 29 ber, 1 October, 14 October,
2016	429 successfully completed orientations Sessions held: 8 January, 25 January, 9 February, 25 Febru April, 26 April, 9 May, 10 May, 12 May, 16 May, 25 May, 9 Ju July, 11 August, 29 August, 7 September, 21 September, 12 October, 7 November, 29 November, 2 December, 15 Decem	une, 23 June, 12 July, 27 October, 14 October, 25
2017	528 successfully completed orientations Sessions held: 11 January, 18 January, 8 February, 7 March April, 8 May, 17 May, 22 June, 12 July, 22 September, 10 Oc December	
2018	498 successfully completed orientations Sessions held: 16 January, 14 February, 6 March, 12 April, 2 July, 6 August, 10 August, 12 September, 16 October, 29 Oc December	
2019	786 successfully completed orientations Sessions held: 9 January, 13 February, 8 April, 15 May, 15 A December	August, 7 November, 3
2020	217 successfully completed orientations as of 31 May 2020 Sessions held: 22 January, 6 February, 19 March, 15 April, 5 May	

Maunakea User Orientation &

To receive credit for the Maunakea User Orientation with the Office of Maunakea Management (OMKM):

(OMMAN): 1) Watch the video below (or at <u>https://wortu.be/k6h/2/EFA088</u>) 2) Complete the assessment guiz below, answering all questions. You must correctly answer at least 75% of the questions to receive credit. 3) OMMA staff will review your assessment guiz acore and ether issue a certificate or notify you if the assessment medis to be retaken (in which case well remail you are well remailyou are well remailyou are the assessment on the video in the assessment ends to be retaken (in which case well remailyou.) Certificates are typically issued within two (2) working days after the assessment is completed.

Assessment

INFORMATION MATERIALS (CMP EO-3)

OMKM developed and prints brochures and other printed materials for distribution at community and are available for public distribution at the VIS, 'and other public venues, or distributed at public and outreach events

2002 – ongoing Visiting Maunakea Safely and Responsibly brochure.

- "What is OMKM" brochure role and responsibility of OMKM and community-based management
- 2012 OMKM social media presence initiated with a Facebook page.
- 2013 Maunakea Resource brochure
- 2015 Social media posts (Instagram, Twitter and Facebook) about resources of Maunakea, issues and relevant science

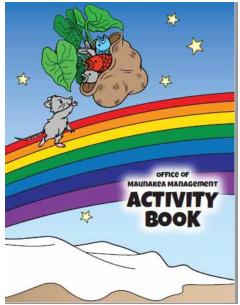
Line art of Maunakea flora and fauna prepared for use as "coloring" sheet with youth activities.

Temporary tattoos of Maunakea resources prepared for public distribution.

Trading cards of the wekiu bug, mamane, Palila, 'Ahinahina, and cydia moth prepared.

Life Cycle of a Wēkiu bug! Wheel diagram prepared in partnership with DLNR's Division of Forestry and Wildlife

- 2016 ongoing. Update of resource brochure containing information about the resources and significance of Maunakea incorporating community and Kahu Kū Mauna input. The revised brochure is entitled "Maunakea Heritage and Natural Resource Guide" and is available both online, in print, and in Japanese courtesy of translation support provided by Subaru Telescope. The back side is also available as a poster.
- 2016 Maunakea 'Ahinahina (silversword) postcard produced for public distribution
- 2016 YouTube video: Maunakea 3D perspective flyover animation: https://youtu.be/6Guol97jftM
- 2017-ongoing Youth activity book prepared. Updated and reprinted in 2019.
- 2019 Book published: The Hawaiian Wēkiu Bug Laurie Waite Flores. A bilingual non-fiction book written in both English and Hawaiian on the Hawaiian Wēkiu Bug. Illustrations by children of Hawaii



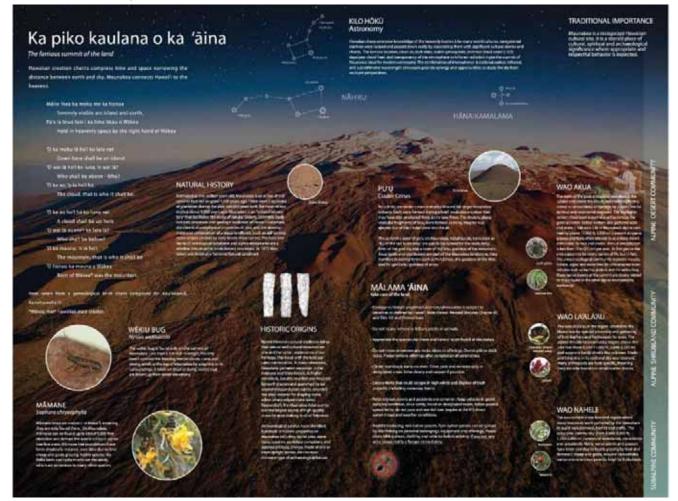
Social media posts begins emphasizing public events and news releases, minimizing "attractive" element that would tend to draw additional visitors to Maunakea

EDUCATIONAL PROGRAMS (CMP EO-6) Science Fair/Project mentoring support

- 2012-2013 Anne Nakamoto, Waiakea Intermediate School student. Project titled "Two Bees or Not Two Bees... (Pollinating Invasive Fireweed?), That is the Question."
- 2013-2014 Anne Nakamoto, Waiakea Intermediate School student. Project titled "Ant Appetites: A study of the Food Preferences of the Recent Invader *Cardiocondyla kagutsuchi* in Hale Pōhaku".
- 2014-2015 Israel Stillman, Kamehameha Schools Senior Legacy Project. Halepōhaku area native plant documentation and restoration.



2016-2017 Megan Nakamoto, Waiakea Intermediate School student. Project titled "The Itsy Bitsy Spider—That Lives on Mauna Kea".



Class Project

- Jan- Jul, 2013 UH Hilo Computer Science class project "Team Poliahu" won the 2013 U.S. Imagine Cup and competed in the worldwide finals in Russia. Dr. Keith Edwards was the class instructor, Dr. Don Thomas and Fritz Klasner provided assistance in developing a project proposal. They initially developed a software app that could track native and invasive plant species using smart phones and GPS functionality.
- Feb. 2013 UH Hilo graduate entomology class visited Halepōhaku to learn about arthropod collecting methods.
- Jun. 2018 Christian Liberty School, 7th grade Environmental Science class visited Maunakea and assisted with arthropod collections, learned about analyzing data, presenting results, and Maunakea stewardship.

Research

In order to gain a better understanding and to develop management programs to protect the resources it is necessary to first identify and study the resources. OMKM funded numerous studies utilizing the expertise within the University System. These studies engaged a principal research investigator and graduate students. The following graduate students and internships are or were engaged to research or assisted OMKM with its stewardship responsibilities:

PhD Graduates/Candidates

Jesse Eiben	UH Mānoa; Entomology. 2012. Applied conservation research of the wēkiu bug in Hawai'i: Life table analysis, population genetics, and phylogenetics create a holistic view of a rare and unique species
Brad Reil	UH Mānoa; Entomology. In Progress. Food web study in the summit ecosystem
Heather Stever	UH Mānoa; Entomology. In Progress. Study of diet and parasite loads in alpine arthropods

Master's Degree Graduates/Candidates

Sarah da'Cote	UH Mānoa. Meteorology. 2006. Climatological Analysis of Meteorological Observations at the Summit of Mauna Kea.
Leigh Anne Eaton	UH Mānoa. Meteorology. 2011. Modeling the Ecology of the Wēkiu Bug's Mauna Kea Environment.
Heather Stever	UH Hilo. Tropical Conservation Biology and Environmental Science. 2016. Arthropod Diversity Estimates for Three Native Subalpine Plant Species on the Maunakea Volcano of Hawai'i Island. In 2016 Ms. Stever was awarded first place in the 15-minute graduate student oral competition at the 2016 International Congress of Entomology in Orlando, Florida.
Nathan Stephenson	UH Hilo. Tropical Conservation Biology and Environmental Science. 2016. High Resolution Habitat Suitability Modeling for a Narrow-Range Endemic Alpine Hawaiian Species.
Marie McKenzie	UH Mānoa. Geography. 2016. Regional Temperature Trends in Hawaiʻi: A Century of Change, 1916-2015.
Jessica Kirkpatrick	UH Hilo. Tropical Conservation Biology and Environmental Science. 2018. An Assessment of <i>Nysius wekiuicola</i> Populations and Thermal Microhabitat Conditions on Cinder Cones of the Maunakea Volcano, Hawai'i.

Jorden Zarders	UH Hilo. Tropical Conservation Biology and Environmental Science. 2018. Invasive Arthropod Monitoring Assessments of Construction and Facility Activities on Maunakea, Hawai'i.
Bret Mossman	UH Hilo. Tropical Conservation Biology and Environmental Science. In progress. Seabird and bat inventory
Interns	
2012	Jessica Kirkpatrick – arthropod monitoring (partnered with Dr.J.Eiben, UH Hilo)
2013:	Kerri Nakatsu – invasive species plan development (partnered with Hawaii Ant Lab)
2013:	Amber Stillman – spatial data support (partnered with Dr.R.Perroy, UH Hilo)
2014.	Derey Vegi investive encodes plan development (pertnered with Howeii Ant Leb)

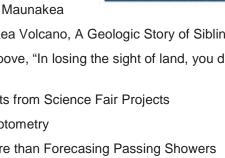
- 2014: Darcy Yogi invasive species plan development (partnered with Hawaii Ant Lab)
- 2014: Margaux Mellot erosion monitoring (partnered with Dr.R.Perroy, UH Hilo)
- 2015: Christian Kapono Aloha Art Festival (partnered with 'Imiloa)
- 2015: Tisha Piilani-Pelanca monitoring implementation (partnered with HCC Forest Team)
- 2015: Sean Kirkpatrick erosion monitoring (partnered with Dr.R.Perroy, UH Hilo)
- 2016: Kuʻupua Kiyuna review of draft administrative rules
- 2016: Kialoa Mossman erosion monitoring (partnered with Dr.R.Perroy, UH Hilo)
- 2016: Koa Akima monitoring implementation (partnered with HCC Forest Team)
- 2017: Jake Martin snowcover and permafrost (partnered with Dr.N.Schorghofer, UH Mānoa)
- 2017: Shola Kahiapo vegetation restoration
- 2018: Sebastian Wells bird, bat, and arthropod monitoring (partnered with Dr.P.Hart, UH Hilo)
- 2018: Uli'i Miyajima permafrost and snow-cover (partnered with Dr.N.Schorghofer, UH Mānoa)
- 2018: Timothy Aaron Medina erosion monitoring at Halepōhaku (partnered with Dr. R.Perroy, UH Hilo)
- 2019: Pili Quinories information sheets of Maunakea plant species
- 2020: To Be Determined Summer 2020 intern for the seabird and bat acoustic data analysis project (partnering with Dr. P.Hart, UH Hilo)

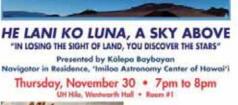
MAUNAKEA SPEAKER SERIES (CMP EO-3)

OMKM in collaboration with 'Imiloa Astronomy Center and the Department of Physics and Astronomy, University of Hawai'i Hilo. Launched a monthly lecture series giving community members unprecedented access to scholars and their knowledge-based work.

The Maunakea Speakers Series brings scholars to Hilo to present on diverse subjects including culture, fauna, biodiversity, climate change, botany, geophysics and other topics; all components of the immense resource diversity found on Maunakea.

- Oct. 24, 2014: K.Yoshikawa, University of Alaska-Fairbanks. Tropical Mountain Permafrost
- Nov. 20, 2014: N.Schorghofer, UHM. The History of Snow & Ice on the Summits of Hawai'i
- Feb. 9, 2017: R.Fleischer, Smithsonian. Birds of Paradise Lost: Evolution, Extinction and Conservation of Hawaii's Birds
- Mar 23, 2017: JB Friday, UH Mānoa CTAHR. Raising Awareness of Rapid 'Ōhi'a Death
- Apr. 20, 2017: H.Stever, UH Hilo TCBES. Arthropod Diversity in the Subalpine Region of Maunakea
- May 18, 2017: J.Licata, Rutgers U. A Study of a Tropical Alpine Lake, Past and Present
- May 31, 2017: N.Stephenson, UH Hilo TCBES. Using Environmental Data to Model Habitat Suitability on Maunakea
- Jun. 15, 2017: M.B.Laycheck & D.Simons, CFHT. Maunakea Scholars Share their Observation Experience
- Aug 24, 2017: P.Mills. Tracing the Movement of Ancient Hawaiian Adzes through the Islands
- Sept. 26, 2017: S.Businger. Past and Future Climate on Maunakea
- Oct. 17, 2017: K.Hon. Growth and Evolutino of Maunakea Volcano, A Geologic Story of Sibling Rivalry
- Nov. 17, 2017: K.Baybayan. He Lani Ko Luna, A Sky Above, "In losing the sight of land, you discover the stars"
- Jan. 11, 2018: Big Island High School Students: insights from Science Fair Projects
- Feb. 1, 2018: E.Schmidt. 10 Years of Lunar Elipse Photometry
- Feb. 22, 2018: R.Lyman. Maunkea Weather Center More than Forecasing Passing Showers
- Mar.14, 2018: M.Chun.Maunkaea What Makes it the Best Astrononical Site in the World
- Apr. 26, 2018: R.Perroy. Mapping Changes at the Maunakea Summit
- May 10, 2018: R.Hart. Keeping up with the Coast: Quantifying Shoreline Change on Hawai'i Island
- June 21, 2018: D.Thomas. New Insights into the Groundwater Hydrology of Mauna Kea and Hawaii Island
- Jul. 19, 2018: M.B. Laychack & D.Simons. Dark Nebula, Dwarf Galaxies from Students who explore them, Honoka'a Maunakea Scholars





MAUNAKEA SPEAKER SERIES



- Sept. 20, 2018: M.Montgomery. Managing Ants on the Big Island: How to keep the Beasts at Bay
- Oct. 18, 2018: S.Cordell. USFS/IPIF/HETF, The Hawaii Experimental Tropical Forest
- Nov. 15, 2018: G.Gerrish. The Plants and Vegetation of Maunakea from Tree-line to Summit
- Dec. 20, 2018: J.Eiben. What's Up on Maunakea? Insect diversity and Ecosystem Monitoring for Conservation and Land Management
- Jan. 10, 2019: Hilo School Students, Sharing Science Fair Projects
- Mar. 21, 2019: J.Juvik. The Only Way is Up? How are Mauna Kea and Mauna Loa Alpine Plants Responding to Rapid Climate Change?
- Apr. 4, 2019: E.Rehm. What's Slowing Forest Restoration at Hakalau Forest National Wildlife Refuge?



- May 30, 2019: H.Stever/J.Eiben. Evolution of an Oddity: An Exploration of the Wēkiu Bug's Isolation and Adaptations on Maunakea
- June 19, 2019: L.Hunter. Tapping into Local Science and Technology Talent—The Akamai Internship Program
- Jul 3, 2019: M.B. Laychak & D.Simons. Hot Stars and Dark Matter from the students of Maunakea Scholars

OMKM AND ASTRONOMY Enewsletters (CMP EO-3) OMKM eNews

In 2012 OMKM began publishing an eNewsletter about OMKM activities. The eNews is distributed to about 3,500 individuals. Our newsletters are reviewed by approximately 32% compared to open industry rate of 12%.

OMKM eNewsletters	Date Sent
OMKM Volunteer Call	July, 2012
OMKM Symposium	Sept, 2012
Hawaii Island Realtors Trade Show	Sept, 2012
Maunakea Safety	Nov, 2012
New MKMB Members (Chun & Springer)	Dec, 2012
OMKM Volunteer Call	Jan, 2013
Invasive Species Mgt Plan in Progress	Jan, 2013
Armandroff Appointed	Feb, 2013
Science Project (Ann Nakamoto)	Mar, 2013
OMKM Cultural Mission	April, 2013
OMKM Community Hero Award	April, 2013
OMKM Volunteer Call	May, 2013
Volunteers Plant Silverswords	May, 2013
Hawaii Island Students Earn National Distinction	June, 2013
Babayan Viewpoint and Kahu Ku Mauna chair	June, 2013
OMKM Volunteer Call	Sept, 2013
Maunakea Wekiu Bug	Oct, 2013
OMKM Volunteer Call	Oct, 2014
Setting the Record Straight	Oct, 2014
Sponsored Talk "History of Snow & Ice	Nov, 2014
Volunteer Hours Spent Recap	Dec, 2014
Alpine Study Released	Dec, 2014
Master Lease EIS Call for Comments	Jan, 2015
Completion of MKISP	March, 2015
Kealakehe School Science Fair	May, 2015
OMKM Rule Making Open House	May & June, 2015
OMKM Volunteer Call	Nov, 2015
OMKM Volunteer Call	Jan, 2016
OMKM Hire (Ruddle)	Feb, 2016
UH OpEd "On Track"	Feb, 2016
OMKM Volunteer Call	April, 2016
OMKM Panaewa Community Outreach	April, 2016
OMKM Kealakehe Elementary School Outreach	May, 2016
OMKM, A Decade Plus of Stewardship	June, 2016
Kirkpatrick Lecture	June, 2016

OMKM eNewsletters	Date Sent
Kona Kohala Chamber of Commerce Pualu Award	June, 2016
OMKM Heritage Guide Brochure	July, 2016
OMKM Volunteer Call	August, 2016
OMKM Volunteer Saturday	August, 2016
Draft rules for Maunakea lands	October 10, 2016
Stever Wins Competiion	October 21, 2016
Advancing the Mission of OMKM: A Look Back	December 20, 2016
West Hawaii today balance article	January 2017
Volunteer Call	March 11, 2017
Announces a Public Comment Period	March 8, 2017
EnVisioning Maunakea's Future	March 17, 2017
Alpine Lake Atop Mauna Kea (WHT article)	March 20, 2017
Astro Bash	March 24, 2017
Kealkehe Science Day	March 30, 2017
OMKM Honored by HHF	April 19, 2017
Fostering Science Discoveries in Young Students	April 24, 2017
Lassner Recognizes OMKM Award	April 27, 2017
Graffiti Damage	May 9, 2017
OMKM Volunteer Summer	June 30, 2017
OMKM Chamber Award	July 3, 2017
OMKM Successful Management	August 28, 2017
Final EA on VIS Improvements	Sept. 6, 2017
OMKM PIPES Yogi	Sept. 27, 2017
Last Permafrost in Hawaii	October 18, 2017
OMKM on LAVA 105 Community Corner	October 24, 2017
OMKM Successful Management (Repeat)	November 9, 2017
OMKM 2017 Weed Pull Review	November 30, 2017
OMKM CSO Decommission	December 4, 2017
Preserving and Protecting Cultural Resources	Jan. 30, 2018
Public Hearing on Proposed Land Use within the Conservation District	Feb 14, 2018
Honolulu Star Advertiser Poll	Feb 23, 2018
ESPIN Maunakea Land Authorization	March 6, 2018
EnVision Maunakea Report Released	April 5, 2018
Rep Nakashima letter of recommendation	April 17, 2018
OMKM PIPES Kiyuna	April 30, 2018
A New Era of Stewardship on Maunakea	May 24, 2018
Volunteer Call	June 15, 2018
Update on University's Administrative Rules Process for Maunakea	August 1, 2018
UH Asking for Public Input on Maunakea Rules for Public and Commercial Activities	August 20, 2018

The molulu Star Advertiser Article August 31, 2018 Hawaii Business magazine's article on the economic and educational contributions of astronomy to Hawai'i Island Sept. 17, 2018 UH BOR approved the appointments of six members of the community-based Maunakea Management Board Sept. 21, 2018 UH BOR approved the appointments of six members of the community-based Maunakea Management Board Sept. 24, 2018 UH BOR approved the appointments of six members of the community-based Maunakea Management Board Sept. 29, 2018 Help Malama Maunakea Oct. 30, 2018 MAUNAKEA: Stewardship of the Mountain Forum Nov. 1, 2018 Maunakea Visitor Information Station begins improvements; stargazing and operating hours impacted Dec. 18, 2018 Internal Audit Finds No Irregularities Dec. 27, 2018 Honolulu Star Advertiser Viewpoint Dec. 27, 2018 The University of Hawai'i is asking for public comment on the latest draft of the proposed administrative rules for public and commercial Feb. 25, 2019 Maunakea Permafrost Mar. 11, 2019 Mar. 13, 2019 The University of Hawai'i is asking for public comment on the latest draft of the proposed administrative rules for public and commercial Mar. 25, 2019 OMKM joins DLNR DOFAW's Napu'u Conservation Project Bio-Cultural Biltz at Pu'uwa'awa'a Mar. 13, 2019	OMKM eNewsletters	Date Sent
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Gov. Ige Approves Regulations Jan. 14, 2020	The University of Hawai'i Board of Regents approved a draft of the	
	Gov. Ige Approves Regulations	Jan. 14, 2020

OMKM eNewsletters	Date Sent
Volunteer Call	Jan 30, 2020
A Highlight of Administrative Rules for Public Activities	Feb 3, 2020
Malama Maunakea Mahalo	Feb 14, 2020
Decommissioning of two telescopes on University of Hawai'i-managed lands	Mar 2, 2020
Volunteer Call	Mar 9, 2020
Maunakea visitor center closing temporarily	Mar 16, 2020



UNIVERSITY of HAWAI'I'NEWS

Arademir Basearch Basele Co. ecommissioning of 2 Maunakea telescopes expected to be complete by 20

decommissioning of two copes on University of Hawai'iaged lands on Maunakea is atively scheduled to be pleted by 2023. This is rding to an update provided by iniversity to the UH Board of ents (BOR) at the board's uary 20 meeting H West O'ahu. The California



expected to be complete by 2023

tute of Technology (Caltech) millimeter Observatory and the UH Hilo Hoku Ke'ateaching telescop making progress in the extensive decommissioning process, accordin H Executive Director of Maunakea Stewardship Greg Chun, who ided the update to the regents.

BOR adopted a resolution in November 2019 directing UH leadership ngthen its stewardship of Maunakea and report back regularly on the ress of 11 action items. The first action item in the resolution is the



Astronomers Discover Class Of Strange Objects Near Our Galaxy's Enormous Black Hole

Posted January 15, 2000

Maunakea, Hawaii - Astronomers from UCLA and W. M. Keck Observatory have discovered four more bizarre objects at the center of our galaxy, not far from the supe Sagittarius A*, that are now forming a class of their own. ive black hole called

The study, which is part of UCLA's Galactic Center Orbits Initiative, consists of 13 years of data taken from Keck Observatory on Maunakea in Hawaii; the results published online today in the journal Nature.

"These objects look like gas but behave like stars," said co-author Andrea Ghaz, UCLA's Lauren B. Leichtman and Anthur E. Levine Professor of Astrophysics and director of the UCLA Galactic Center Group.

This new class of objects, called G objects, look compact most of the time and stretch out when their orbits bring them closest to the black hole. Their orbits range from about 100 to 1,000 years, said lead author Anna Clurto, a UCLA postdoctoral researcher.



light as the brightest globular cluster within the Milky Way. The spectrum, obtained by Keck Observatory, shows the calcium absorption lines used to determine the velocity of this object. 10 clusters were observed, providing the informat needed to determine the mass of the galaxy, revealing its lack of dark matter.



Advancing the Mission of OMKM: A Look Back by Stephanie Nagata, OMKM Executive Director

As 2016 comes to a close, I thought I would take this time to reflect on how the Office of Maunakea Management (OMKM) has advanced its mission since our formation in 2000. The priority at OMKM has, and continues to be the protection of Maunakea's unique cultural, natural and scientific resources for generations to come. The successful management of the large, diverse and remote acreage on Maunakea under OMKM's care is the result of a deliberate process involving the Hawaii Island community.



At the time of our formation in 2000, one of OMKM's first priorities was to identify the resources and establish baseline data to be used to assess the status of the resources over time. Surveys, each involving multiple years of field work, were put into action. We now have baseline data for archaeological sites, wekiu bug, other native arthropods, botanical resources, climate, and weathering/erosion processes.

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OBSERVATORY/NSF/AURA/J. MILLER/J. POLLARD

Astronomy eNews

The Astronomy e-news focuses on discoveries and scientific advances made by observatories on Maunakea. The newsletter is distributed to approximately 2,500 individuals with an open rate of 27% compared to the 12% open rate industry average.

Astronomy eNewsletters	Publication Date
50 Years of Astronomy	February 25, 2015
Journey Through the Universe Celebrating Exploration and The Joys of	•
Science and Astronomy	February 26, 2015
Mauna Kea Telescopes: The Business of Astronomy Is Not an Easy One	May 5, 2015
Statewide Economic Impact of Astronomy Tops \$168 Million	March 23, 2015
Students Seek Maunakea Observatories' Internships and Job Opportunities At	October 15, 2015
UH Hilo Career Expo	0000001 10, 2010
W. M. Keck Observatory Celebrates	Nov. 24, 2015
25 Years Since First Light	- ,
Island Voices: UH engaged in positive stewardship of Mauna Kea for	December 9, 2015
generations to come NASA Honors Keck Observatory for Opening its Archive to the Public	December 14, 2015
2016 Akamai Summer Internship Program	Feb 5 2016
Stargazing at Imiloa Astronomy Center	February 24, 2016
Maunakea Scholars, a new programs being launched	March 4, 2016
Kapolei Students chosen for telescope time	March 7, 2016
Governor Ige proclaims "Journey through the Universe Week" in support of	
Maunakea Observatories	March 9, 2016
Waiakea High Students Win Opportunity to Use Mauna Kea Telescope	March 17, 2016
HI STAR Astronomy Camp Celebrates 10 Years of Success Weeklong	March 19, 2016
Residential Camp Mentors High School Students	March 18, 2016
Camp 'IMI-Possible: Mapping the Night Time Sky with Keiki Explorers	March 28, 2016
UH Hilo undergraduate Jasmin Silva conducting astronomy research on	April 28, 2016
structure of galaxies	7.pm 20, 2010
UH Hilo undergraduate Derek Hand Conducting Astronomy Research on	May 4, 2016
Merging Galaxies	-
AstroDay	May 10, 2016
Akamai Workforce Initiative Announces 2016 Summer Interns	May 25, 2016
Maunakea Scholars Program Wraps Up Its First Year Pioneering Education Through Innovative Partnerships	June 1, 2016
Earth-like planets among 100+ identified by UH, astronomers and NASA	June 18, 2016 July 18, 2016
Working Together, Mauna Kea Observatories Help Discover More Than 100	5dly 10, 2010
New Planets	July 28, 2016
More students to view the stars; UH-Hilo undergrads allotted telescope time	August 2, 2016
Astronomy Benefits Hawaii	September 9, 2016
Imiloa Presents Dr. Richard Green,	•
Director of UKIRT Observatory	September 16, 2016
Daniel K. Inouye Solar Telescope on track to be operational in 2019	October 10, 2016
Solar System Walk Canada-France-Hawai'i Telescope and W.M. Keck	November 2, 2016
Observatory host beloved annual event	
Maunakea Scholars To Provide More Hawai'i Students With World-Class	November 9, 2016
Telescope Time	
CFHT Producing Great Science Since 1979	December 2, 2016
Summer 2017 Akamai Internship Program Application Process Opens	December 19, 2016
Three Kalani High School students were awarded time; Mauna Kea Scholars	December 28, 2016
program	

Astronomy eNewsletters	Publication Date
Maunakea Observatories Award Nanakuli and Kapolei High School Students	
With Research Time	February 8, 2017
The arrival of SCExAO at Subaru	February 17, 2017
Some of the most amazing discoveries are being made from the telescopes on Maunakea.	March 8, 2017
Aunty Mimi's Astro Bash	March 17, 2017
Free stargazing program at the Maunakea Visitor Information Station (VIS)	April 5, 2017
Dr. Brittany Kamai Presents "Catching Waves from Black Holes" Tonight at UH Hilo Science and Technology!	April 17, 2017
W. M. Keck Observatory Achieves First Light with New Instrument	April 21, 2017
Celebrate Hawai'i Astronomy at AstroDay	April 26, 2017
W. M. Keck Observatory Hosts Quadruple Whammy	May 11, 2017
UH Institute for Astronomy Open House Highlights	May 8, 2017
Student at Kea'au High School Wins 2017 Maunakea Coin Contest!	May 26, 2017
Astronomy Shines at 16th Annual Hilo AstroDay	June 1, 2017
UH News	June 2, 2017
W. M. Keck Observatory data leads to first of its kind test of Einstein's theory	
of General Relativity	June 16, 2017
Maunakea Skies	July 18, 2017
Research Team Using Data from James Clerk Maxwell Telescope Makes	
Discoveries	July 28, 2017
Could they be a future target for interstellar colonization?	August 10, 2017
Akamai Internships Produce Successful Astronomy Projects	August 29, 2017
Hawaii Students Participate in Summer HI STAR Program	August 30, 2017
Canada France Hawaii Telescope to Host Manufacturer Open House Oct. 6 Call to Big Island Manufacturing Network!	September 26, 2017
Astronomy to be Featured at Hawaii Innovation Initiative Forum in Honolulu	October 2, 2017
Maunakea Scholars	October 26, 2017
AstroDay is Coming to Kona	October 23, 2017
UH News	October 30, 2017
First AstroDay in West Hawaii a Success!	November 7, 2017
Celebration of Fifty Years of Astronomy on Maunakea	November 13, 2017
Akamai	November 29, 2017
Astronomy Student Stars Kick Off Maunakea Scholars Awards Season	December 1, 2017
Unexpected Discovery	December 28, 2017
W. M. Keck Observatory Awarded NSF Grant	January 5, 2018
Presentation by Dr. Kip Thorne, Nobel Prize Winner and World-Renowned Astrophysicist	January 2, 2018
A discovery made by a Hilo High School alumnus	March 8, 2018
Applications are now being accepted for the 2018 Women's STARS (STEM Aerospace Research Scholars) Program,	March 30, 2018
	April 12, 2019
Dark Matter is a No Show in Ghostly Galaxy	April 12, 2018
Celebrate Science at AstroDay!	April 25, 2018
Andrea Ghez, Director of the UCLA Galactic Center Group Presents "The Monster at the Heart of our Galaxy	July 24, 2018
UH Asking for Public Input on Maunakea Rules for Public and Commercial Activities	August 21, 2018
AstroDay Returns to Kona	September 21, 2018
Hawaii High School Student scores highly coveted telescope time to study 'Tatooine' at Keck Observatory	November 30, 2018
Selection of Hawaiian names for two major astronomical discoveries.	January 29, 2019
UH News: Manoa Academy teams up with Maunakea scholars	January 11, 2019
Submillimeter Array (SMA) Call for Standard Proposals	February 12, 2019

Unusual Galaxies Defy Dark Matter Theory March 28, 2019 Astronomers this morning are set to unveil the first image of a black hole using the combined power of a global network of telescopes. April 10, 2019 Was Einstein Right? Hawaii and the Event Horizon Telescope April 12, 2019 The 18th Annual AstroDay Comes to Hilo Saturday, May 4! April 17, 2019 Powehi Day Proclamation April 23, 2019 Mt. View Elementary School Visits Institute for Astronomy Hilo April 23, 2019 Keck Observatory Welcome Riley Atkinson June 21, 2019 UH News UH team successfully locates incoming asteroid June 26, 2019 Two UH astronomers part of international team that agrees on a natural origin for 'Ounuamua July 15, 2019 Hawai'i Astronomer Wins Canadian Award July 15, 2019 W.K. Keck Observatory presents A Primitive Planetesimal In The Kuiper Belt July 18, 2019 Astronomers to deploy breakthrough technology at UH telescope August 15, 2019 Critical observation made on Maunakea during first night of return to operations September 6, 2019 Two Maunakea telescopes were part of an international collaboration that won the \$3 million 2020 Breakthrough Prize in Fundamental Physics award September 13, 2019 UCLA astronomers notice brightest light in 24 years of observations September 19, 20	Astronomy eNewsletters	Publication Date
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Astronomers See Cosmic Ring of Fire May 28, 2020	New Direct Images Captured with W. M. Keck Observatory's Upgraded Adaptive Optics System Lead to First Independent Confirmation of PDS 70	
		May 28, 2020

STEWARDSHIP RECOGNITION

Mar. 6, 2013 Mary Begier awarded the *Community Hero Award* by the Hawaii Invasive Species Council as a shining example of dedication to prevent invasive species. Ms. Begier assisted OMKM in developing and implementing the volunteer weed pull program

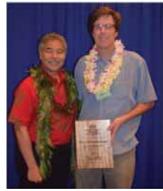
Jun. 24, 2016 Kona Kohala Chamber of Commerce. OMKM awarded Pualu Award for Environmental Awareness

- May 19, 2017 Historic Hawaii Foundation; OMKM recognized with Preservation Commendation Award for its Long-term Historic Property Monitoring Plan for UH Managed Lands on Maunakea
- Jun. 30, 2017 Kona Kohala Chamber of Commerce; OMKM awarded the Pualu Award for Culture and Heritage.









Appendix D: Visitor Management (HAR 20-26)

Hawai'i Administrative Rules, Chapter 20-26

Approved rules are available online at <u>https://www.hawaii.edu/offices/bor/adminrules/chapter26.pdf</u>.

ADMINISTRATIVE RULES (HAR 20-26)- (CMP P-3)

In the1998 audit report on the management of Maunakea, the State Auditor recommended that the University develop administrative rules to address public activities including access to protect the resources. Development of rules was one of the first matters addressed by OMKM during the month the MKMB was established in October 2000. In early 2001 OMKM began drafting rules, but later discovered UH did not have legal authority to promulgate rules. It took several years, until 2009 when the Legislature granted UH rule making authority. The 2010 BLNR approved CMP supplemental Public Access Plan provided principals and policies for the development of the rules. In January 2020, Governor Ige approved the rules.

Administrative rules "provide for the proper use, management, and protection of cultural, natural, and scientific resources of the UH management areas; to promote public safety and welfare by regulating public and commercial activity within the UH management areas; to ensure safe and appropriate access to the UH management areas for the public; and to foster co-management with the Department of Land and Natural Resources in UH management areas."

COMMUNITY ENGAGEMENT AND OUTREACH

Oct. 10, 2000	Maunakea Management Board (MKMB) begin drafting rules
Mar. 13, 2001	MKMB update: OMKM drafting rules
Mar. 29, 2001	Kahu Kū Mauna update: OMKM drafting rules
July 22, 2003	MKMB update: OMKM requests review whether UH has statutory authority to promulgate administrative rule making
Oct. 28, 2003	MKMB update: OMKM and UH System discuss UH's process for rule making
Aug. 31, 2005	MKMB update: UH was unsuccessful in obtaining legislative authority to promulgate rules
Nov. 15 2005	Kahu Kū Mauna update: UH was unsuccessful in obtaining legislative authority to promulgate rules; will go back to the legislature seeking statutory authority
Jan. 21. 2007	Kahu Kū Mauna update: suggested rules of conduct for visitors and rangers
Sept. 11, 2007	MKMB update: UH to review making rule making as part of the Comprehensive Management Plan development process
Sept. 25, 2007	Kahu Kū Mauna update: reported that DLNR believed UH had authority to develop rules but that authority was unclear
Feb. 5, 2009	MKMB update: Again seeks legislative authority to promulgate rules
June 25, 2009	Kahu Kū Mauna update: Governor Lingle approved Act 132 granting UH authority to promulgate rules
May 19, 2010	MKMB update: UH legal counsel to assist OMKM with the development of rules and establish procedures for handling fines
Feb. 9, 2011	Kahu Kū Mauna update: consultant Jeff Melrose provided a summary of the draft rules
Mar. 22, 2011	Consultation with OHA
Mar. 2011	Note: rule making put on hold due to concerns of ex parte communication between UH and DLNR while UH was involved in a contested case proceeding
Apr. 13, 2011	Kahu Kū Mauna update: Council members raised concerns, including ensuring commercial tour providing passengers with correct information
May 19, 2011	Consultation with OHA
June 6, 2013:	Big Island Legislative Briefing; OMKM briefing on rule making

- June 17, 2013: Big Island Legislative Briefing; Representatives Mark Nakashima, Richard Onishi, and Clift Tsuji; OMKM briefing on rule making
- June 19, 2013: Big Island Legislative Briefing; Senator Malama Solomon and Representative Cindy Evans; Discussion Topic: OMKM briefing on rule making
- July 29, 2013: Big Island Legislative Briefing; Senator Russell Ruderman and Representative Faye Hanohano; OMKM briefing on rule making
- Aug. 1, 2013 Ross Birch, Executive Director Big Island Visitors Bureau; OMKM briefing, rule making
- Aug. 14, 2013 MKMB update: Rule making will resume following issuance of permit to the TMT.
- Oct. 4, 2013: Keawe Vredenburg; OMKM briefing on rule making
- Oct. 16, 2013: David Tarnas OMKM briefing on rule making
- Nov 13, 2013: Rotary Club of North Hawaii; OMKM briefing on rule making
- Mar. 12, 2014 Kahu Kū Mauna update: provided an overview of commercial tour permits and they addressed in the administrative rules
- May 12, 2014 Kahu Kū Mauna update: reviewed a draft of the rules
- June 19, 2014 OMKM rule making community outreach: Mike Kaleikini, Hawaii Island Chamber of Commerce; Jon Miyata, Hawaii Island Chamber of Commerce and Ivan Nakano, Japanese Chamber of Commerce & Industry of Hawaii
- June 24, 2014 OMKM rule making community outreach; Mary Begier, Hawaii Island Realtors & Hawaii Island Chamber of Commerce; Bill Brown, Panaewa Hawaiian Homes Community Assoc.; Chuck Erskine, Hawaii Island Chamber of Commerce; David Honma, Japanese Chamber of Commerce & Industry of Hawaii; Lillian Kaeha, Panaewa Community Alliance; Ka'iu Kimura, 'Imiloa & Hawaii Island Chamber of Commerce; Susan Lee Loy, Hawaii Island Realtors; Toby Taniguchi, KTA Super Stores; Nico Verissimo, UH Foundation
- July 9, 2014 OMKM rule making community outreach; Bill Brown, Panaewa Hawaiian Homes Community Association, Roberta Chu, Hawaii Island Economic Development Board; Louis Hao, Dept. of Hawaiian Home Lands; Nani Kaeha, Panaewa Community Alliance; John McBride, Hawaiian Village Tours; Judi Meyers, ILWU & Hilo Pensioneers' Club; Alika Toledo, Miles Yoshioka, Hawaii Island Chamber of Commerce
- July 17, 2014 OMKM rule making community outreach; Thomas Anthony, Hui Pu Laka Hawaiian Civic Club; Dean Au, Carpenter's Union; Jo-Anna Herkes, SSFM International; Harvey Keliikoa, Hui Lu Laka; Kimo Lee, Kimo; Hawaii Island Chamber of Commerce; Mike Miyahira, Japanese Chamber of Commerce & Industry of Hawaii; Craig Shiroma, Japanese Chamber of Commerce & Industry of Hawaii; Barry Taniguchi, KTA Super Stores; Jere Usui, Japanese Chamber of Commerce & Industry of Hawaii
- Aug. 1, 2014 OMKM rule making community outreach; Tracey Fosso, Kona-Kohala Chamber of Commerce; Vivian Landrum, Kona-Kohala Chamber of Commerce; Dale Suezaki, Kona-Kohala Chamber of Commerce
- Aug. 13, 2014 OMKM rule making community outreach; Patrick Kahawaiola'a, Keaukaha Community Association; Laua'e Kekahua, Maku'u Farmers Assn.; Kekoa, Jeffrey, Ka'u Hawaiian Homelands Association ; Bea Iwalani Masoe, Panaewa Hawaiian Homelands Community Association; Howard Pe'a, Keaukaha-Panaewa Farmers Association; Shirley Pedro, Maku'u Farmers Assn.; Skylark Rossetti, Kaumana Hawaiian Homestead Association; Duncan Seto, Kaumana Hawaiian Homelands Association

- Aug. 20, 2014: OMKM rule making community outreach; Keaukaha Community Association: Alberta Andaya, Herks Freitas, Leife Hao, Louis Hao, Mike John, E Raynette Kahawaiola'a, Herring Kalua, John Kanui, Lillian Keliipio, Darren Lee, Darren, John McBride, Lorraine Medeiros, Lorena Nelson, Raynette Shibata, Herbert Suganuma, Nathan Suganuma. Panaewa Hawaiian Homes Community Association: Milton Kalai, Ronald Kodani, Elizabeth-Ann Kaeha, Nani Kaeha, Camille Mehau, Terri Napeahi, Marissa Harman, Kamehameha Schools; Aoloa Santos, Department of Hawaiian Homelands. Alika Toledo
- Aug. 25, 2014 OMKM rule making community outreach; Krista Anderson, North Hawaii Community Hospital; Jim Du Pont, Department of Hawaiian Homelands, West Hawaii District; Jacqui Hoover, Hawaii Island Economic Development Board; Pete Lindsey, Retired Laborers' International Union, Local 368; Nancy Carr Smith, Waimea Community Association; Keawe Vredenburg, Hawaiian Historian.
- Aug. 28, 2014 OMKM rule making community outreach with UH permitted commercial tours: Doug Arnott, Arnott's Lodging & Hiking Adventures; Glory Guerpo, Arnott's Lodging & Hiking Adventures; Eldon Lindsey, Robert's Hawaii Tours; Aki Miyatani, Hawaiian Haoles dba Hawaiian Eyes; Kenji Mizoguchi, Meridian H.R.T.; Hiroko Monson, Robert's Hawaii Tours; Emmy Ogawa, Taikobo; Rob Pacheco, Hawaii Forest & Trail; Kasi Sagawa, Jack's Tours; Mike Sessions, Mauna Kea Summit Adventures; Sunny Takeishi, Taikobo; Pat Wright, Mauna Kea Summit Adventures
- Sept. 2, 2014 OMKM rule making community outreach; Tommy Hickcox, Ahuena Heiau Inc.; Shane Nelsen, Kuakini Hawaiian Civic Club, OHA & Kahu Ku Mauna; Chris Ramos, Kuakini Hawaiian Civic Club; Alana Yamamoto, Kuakini Hawaiian Civic Club
- Sept. 3, 2014 OMKM rule making community outreach; Maile David, Deputy County Clerk & Councilperson-Elect; Karen Eoff, HI County Council Dist. 8; David Kaapu, Kona Attorney/Commissioner Department of Hawaiian Homelands; Maurice Kahawaii, Kona Hawaiian Civic Club and Royal Order of Kamehameha; Dru Kanuha, HI County Council Dist. 7 – Kona; Nicole Lui, Cultural Consultant for La'aloa Ext.; Byron Moku, Hokuli'a Cultural Resources Management; Cindi Punihaole, The Kohala Center; James Resor, Pacific Media Group (KAPA); Sharon Sakai, Kohanaiki Marketing Director
- Sept. 9, 2014 Kahu Kū Mauna update: Council suggested restricting access to manage for safety and to have more on managing visitors
- Sept. 11, 2014 OMKM rule making community outreach; Colin Aspin, UH 2.2 Telescope; Lars Bergnut, NASA Infrared Telescope; Rob Christensen, Smithsonian Submillimeter Array; Diego Correa, Gemini Telescope; Sandra Dawson, Thirty-Meter Telescope; Richard Green, University of Arizona; Bill Hancock, Very Long Baseline Array; Kevin Ho, Canada-France-Hawaii Telescope; Stewart Hunter, Mauna Kea Observatories Support Services; Chris Laude, Chris, Joint Astronomy Center; Rich Matsuda, W.M.Keck Observatory; Joe McDonough, Visitor Information Station; Ralph Toyofuku, Subaru Telescope
- Sept. 16, 2014 MKMB update: OMKM conducts community engagement on rules; next step is to hold open houses
- Oct. 14, 2014 Kahu Kū Mauna update: draft rules update
- Nov. 18, 2014 Kahu Kū Mauna update: draft rules update

May 6, 2015	Kahu Kū Mauna update: timeline on rules development	PUBLIC OPEN HOUSE
June 23, 2015	UH Administrative Rules Public Open House Kona; West Hawaii Civic Center; 35 signed in.	In accordance to Hawaii State Legislature Act B2, the Office of Munakea Management is currently working on content for Administrative Rules for public and commercial activities within UH
June 24, 2015	UH Administrative Rules Public Open House, Hilo; Imiloa Astronomy Center in Hilo; 74 signed in	managed lands on Munakea. The purpose of rules is to provide proper protection of the natural, cultural and scientific
June 25,2015	UH Administrative Rules Public Open House; Waimea; Kuhio Hale; 28 signed in	resources and maintain public safety and welfare. OMEM welcomes the community and their input. Kona – Tuesday, June 23 – 5:00 to 7:30 p.m.
Jul. 16, 2015	Consultation with OHA	West Hawaii Gvic Center County Council Chambers, Hdg A.
Aug. 25, 2015	MKMB update: Report on open houses, including mini surveys taken by attendees	Hilo – Wednesday, June 24 – 5:00 to 7:30 p.m. Imiloa Astronomy Center 600 Imiloa Place
Oct. 16, 2015	Kahu Kū Mauna update: reported OMKM consulting with OHA	Waimea – Thursday, June 25 – 5:00 to 7:30 p.m. Kuhio Hale, DHLLWest Hawai'i District Office
June. 2, 2016	Kahu Kū Mauna update: expressed concern on about enforceability	64-756 Mamalahoa Hghway (Mle Marker 55) For more information, contact:
June 22, 2016	MKMB update: Legal review of draft of rules completed	OVKM 200 W Kawili Street Hio, H 96720
Sept. 8, 2016	Kahu Kū Mauna update: update rules development	Anagement 808-933-0734
Oct. 4, 2016	MKMB reviewed and approved draft of adr BOR request the Governor to authorize ho	ninistrative rules and recommended that the Iding public hearings
Feb. 4, 2017	MKMB update: reported that the Governor him; he was working on a multi-stakeholde together on the rules that would help support	
Nov. 28, 2017	MKMB update: No word from the Governor seeking legal opinion on what authority ON	
Feb. 16, 2018	Consultation with OHA	
Jan 8, 2018	Consultation with OHA; President Lassner	and J. Doane
Jan. 30, 2018	MKMB update: Rules are going through a	nother review by legal counsel
Apr 13, 2018	Consultation with OHA	
May 22, 2018	MKMB update: Governor gives UH the go	-ahead to proceed with rule making
June 7, 2018	BOR approves request seeking Governor's	s approval to hold public hearings on draft rules
July 23, 2018	Governor approves UH's request to hold p	ublic hearings
Aug. 20, 2018	Consultation with OHA	
Aug. 28, 2018	Consultation with UH Permitted commercia	al tour operators
Sept.24, 25,	UH proposed administrative rules (Chapter	r 20-26, HAR) Public Hearings – Oahu:

26 & 28, 2018 Cancer Center; Hawaii Island – Imiloa, Waikoloa Elementary and Middle School; and Maui - Maui College Oct. 9, 2018 Kahu Kū Mauna update: Council reviews rules Feb. 6, 2019 Community consultation on UH Administrative Rules Feb. 8, 2019 Community consultation on UH Administrative Rules Feb. 12, 2019 Kahu Kū Mauna update: summary of public hearings Feb. 26, 2019 Consultation with staff of Kona Kohala Chamber of Commerce Feb. 26, 2019 Consultation with staff of Island of Hawaii Visitors Bureau Feb. 27, 2019 Consultation with Waimea Community Association Mar. 3, 2019 Consultation with UH Manoa faculty Mar. 4, 2019 Consultation with OHA Mar. 27, 2019 Kahu Kū Mauna update: progress on development of rules Apr. 2, 2019 MKMB update: Reviewed rule making development starting with the 1998 audit of the management of Maunakea; summarized the content of the current draft of the rules; Consultation with OHA Apr. 4, 2019 June 7, 2018 BOR approves request seeking Governor's approval to hold public hearings on draft rules July 23, 2018 Governor approves UH's request to hold public hearings Sept.24, 25, UH proposed administrative rules (Chapter 20-26, HAR) Public Hearings – Oahu: 26 & 28, 2018 Cancer Center; Hawaii Island - Imiloa, Waikoloa Elementary and Middle School; and Maui – Maui College. Oct. 18, 2018 BOR instructs administration to draft revisions to the rules and return with revisions fore review Feb.-Mar. 2019 Community consultation on rules are held; revisions are made based on testimony received in Sept. 2018 hearings and 2019 community consultation Apr. 18, 2019 BOR approves request to hold a second round of public hearings UH proposed administrative rules (Chapter 20-26, HAR) Public Hearings -June 3, 4, 5, Oahu: Manoa Elementary & School; Hawaii Island - Waiakea Elementary School and 7,2019 Waikoloa Elementary and Middle School; and Maui -Pomaikai Elementary School Aug. 13, 2019 MKMB update: reported changes were made to the rules based public comments during the September 2018 public hearings leading to a second round of public hearings Sept. 17, 2019 Kahu Kū Mauna update: Suggested clarifying language for the rules; Council to draft statement supporting enforcement of rules Sept. 27, 2019 MKMB update: reported minor clarifying changes are being made including those requested by Kahu Kū Mauna Nov. 6, 2019 BOR approves to adopt rules, with deletion of section 20-26-62, HAR. Jan. 13, 2020 Governor Ige approved rules. Rules became effective on January 23, 2020.

Appendix E: Permitting, Enforcement, and Facility Oversight

Community project review and compliance

COMMUNITY PROJECT REVIEW (CMP OI-1 and IM-1)

The foundation of the 2000 Maunakea Science Reserve Master Plan is community-based management of the University's managed lands on Maunakea. The Master Plan called for the establishment of the MKMB and Kahu Kū Mauna, two advisory boards comprised of volunteers from the Hawai'i Island community. Proposed projects are reviewed first by OMKM for compliance with the DLNR Conservation District Rules, and since 2009, the CMP. OMKM submits and reviews the projects with Kahu Kū Mauna whose views and suggestions are included in OMKM's report to the MKMB. The MKMB reviews projects in meetings that are publicly noticed according to Sunshine requirements, and approves, or in the case of major projects, makes recommendations to the University.

CMP OI-1 calls for maintaining "OMKM, MKMB and Kahu Kū Mauna in current roles, with OMKM providing local management of the UH Management Areas". In their capacity as advisory boards to the University, they review projects proposed projects. CMP IM-1, Operations, Monitoring and Maintenance Plan includes an annual reporting requirement by all observatories and Maunakea Observatory Support Services describing projects each facility anticipates will occur over the next 5-years.. Kahu Kū Mauna reviews the outlook plans and if they rate the project as having minimal impact or routine they do not need to review the project when it is submitted to OMKM. Those classified as "In Depth Consultation" require review by Kahu Kū Mauna. MKMB reviews all projects regardless of classification.

Since 2000, OMKM, Kahu Kū Mauna and MKMB have reviewed over 300 projects.

CDUP PERMIT INSPECTIONS (P-1 and P-7)

The CMP calls for compliance with all applicable regulations, and permit conditions related to activities in the UH managed areas. These include compliance with the DLNR's permits. Since 2006, OMKM has been conducting biannual inspections of all facilities for compliance with DLNR's permits. If a facility is out of compliance it is required to take remedial action.

Appendix F: Implementation Status

Implementation Status of Maunakea CMP Management Actions.

MKMB = Maunakea Management Board; MKSS = Maunakea Observatories Support Services; OMKM = Office of Maunakea Management; VIS = Visitor Information Station

	COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES	IG AND PROTECT	NG MAUNA KEA'S RESOURCES
		Implementation Status	Comments
	NATIVE HAWAII	NATIVE HAWAIIAN CULTURAL RESOURCES	SOURCES
Management	ment		
			Identification of lineal and historical connections was part of the development and State Historic Preservation division approval (2014) of the Burial Treatment Plan (see CR-13). Solicitations were made through announcements in the daily newspapers and the OHA newsletter.
	Kahu Kū Mauna shall work with families with lineal and historical connections to Maunakea, cultural practitioners, and		There were no responses to the solicitations but OMKM continues to seek out individuals as part of its interaction and relationship building with the community.
CR-1	other hauve nawarian groups, including the mauriakea Management Board's Hawaiian Culture Committee, toward the development of appropriate procedures and protocols	Ongoing	Fall 2013 the Hawaii Island Burial Council officially recognized several individuals as cultural descendants of Ka'ohe Ahupua'a.
			OMKM places ads over a period of several months in <i>Hawaii Tribune</i> <i>Herald, West Hawaii Today, Honolulu Star Advertiser</i> and OHA's <i>Ka</i> <i>Wai Ola</i> inviting community to participate in talk story sessions. Kahu Kū Mauna. May 21, 2016, Kahu Kū Mauna hosts a talk story session on matters related to CMP management actions, representatives from DLNR DHHL OHA and members of the Native Hawaiian community attended.
CR-2	Support application for designation of the summit region of Mauna Kea as a Traditional Cultural Property, per the National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470 et seq. in consultation with the larger community.	Ongoing	An application for the designation of the summit region of Maunakea as a Traditional Cultural Property has not yet been prepared for filing by State Historic Preservation Division with the appropriate Federal agency.
			Rangers through their interactions with the visiting public help to educate and raise awareness about Mauna Kea.
			An informational brochure on cultural and natural resources was developed in 2014, revised in 2016, with periodic updates since then.
CR-3	Conduct educational efforts to generate public awareness about the importance of preserving the cultural landscape.	Ongoing	OMKM sends out eNewsletters informing the public about OMKM and its activities.
			Resource orientation of those who work on the mountain including observatory personnel, VIS and MKSS staff, rangers, commercial tour operators and staff, and construction workers commenced in 2013. An online orientation is also available. A brief public / visitor orientation is complete and provided for scheduled group visits.

BLNR 2020 Annual Report: Appendix F

Implementation Status Status Completed of offerings. of offerings. of offerings. completed completed n determining completed completed remated completed ly completed		COMPONENT PLAN: UN	DERSTANDING A	COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES
Status Status a process for ongoing collection of n on traditional, contemporary, and cultural practices. Ongoing adopt guidelines for the culturally e placement and removal of offerings. Ompleted adopt guidelines for the visitation f adopt guidelines for the visitation Completed f ancient shrines. Completed f adopt a management policy for the C			Implementation	
a process for ongoing collection of n on traditional, contemporary, and cultural practices. Ongoing cultural practices. Completed adopt guidelines for the culturally e placement and removal of offerings. Completed f ancient shrines. Completed adopt guidelines for the visitation of adopt guidelines for the Visitation f ancient shrines. Completed f ancient shrines. Completed f ancient shrines. Completed f ancient shrines of constructing new Hawaiian oriateness of constructing new Hawaiian atures. Constructing new Hawaiian f adopt a management policy for the treas on the scattering of cremated mains. Completed f and to be developed by Kahu Kū o med to be developed by Kahu Kū o med to be developed by Kahu Kū volcanoes National Park.	Cultura	Practices	Status	Comments
Develop and adopt guidelines for the culturally Completed appropriate placement and removal of offerings. Completed abpropriate placement and removal of offerings. Completed Develop and adopt guidelines for the visitation and use of ancient shrines. Completed Kahu Kū Mauna shall take the lead in determining the appropriateness of constructing new Hawaiian cultural features. Completed Develop and adopt a management policy for the UH Mgt. Areas on the scattering of cremated human remains. Completed A management policy for the culturally appropriateness of building ahu or "stacking of cremated by Kahu Kū Completed by Kahu Kū A management policy for the culturally appropriateness of building ahu or "stacking of cremated by Kahu Kū Completed by Kahu Kū	CR-4	Establish a process for ongoing collection of information on traditional, contemporary, and customary cultural practices.	Ongoing	Archival and oral history (Mauna Kea-Ka Piko Kaulana o Ka 'Āina); Cultural Resources Management Plan; various cultural analyses completed as part of Chapter 343 mandates; Maunakea topics included by related agencies such as USGS subject matter reviews; and other studies.
Develop and adopt guidelines for the culturally appropriate placement and removal of offerings. Completed appropriate placement and removal of offerings. Completed bevelop and adopt guidelines for the visitation and use of ancient shrines. Completed Kahu Ku Mauna shall take the lead in determining the appropriateness of constructing new Hawaiian cultural features. Completed Develop and adopt a management policy for the UH Mgt. Areas on the scattering of cremated human remains. Completed A management policy for the culturally and on "stacking of cremated but man remains. Completed by Kahu Kū Mauna shall take the cultural by Hawaii volscances of building ahu or "stacking of cremated by Hawaii volscances National Park.				In 2016, Kahu Kū Mauna reviewed and approved the wording of draft policy guidelines. Approval by MKMB occurred in early 2018 after additional consultation by Kahu Kū Mauna.
Develop and adopt guidelines for the visitation Completed Develop and adopt guidelines for the visitation Completed and use of ancient shrines. Completed Kahu Kū Mauna shall take the lead in determining the appropriateness of constructing new Hawaiian Completed UH Mgt. Areas on the scattering of cremated human remains. Completed A management policy for the UH Mgt. Areas on the scattering of cremated human remains. Completed A management policy for the culturally appropriateness of building ahu or "stacking of nocks" will need to be developed by Kahu Kū Mauna who may consider similar policies adopted by Hawaii' Volcanoes National Park. Completed	CR-5	Develop and adopt guidelines for the culturally appropriate placement and removal of offerings.	Completed	Administrative rules for UH's managed lands, effective beginning January 2020, incorporate policies approved by the University President while ensuring protections afforded to Native Hawaiian traditional and customary practices.
Develop and adopt guidelines for the visitation and use of ancient shrines. Completed Kahu Kū Mauna shall take the lead in determining the appropriateness of constructing new Hawaiian cultural features. Completed Numan readopt a management policy for the UH Mgt. Areas on the scattering of cremated human remains. Completed A management policy for the culturally appropriateness of building ahu or "stacking of rocks" will need to be developed by Kahu Kū Mauna who may consider similar policies adopted by Hawaii Volcanoes National Park.				Note: CR-5 overlaps with CR-7 (constructing new Hawaiian cultural features) being that offerings are usually associated with the construction of new features.
Kahu Kū Mauna shall take the lead in determining the appropriateness of constructing new Hawaiian cultural features. Develop and adopt a management policy for the UH Mgt. Areas on the scattering of cremated human remains. A management policy for the culturally appropriateness of building ahu or "stacking of nocks" will need to be developed by Kahu Kū Mauna who may consider similar policies adopted by Hawai'i Volcanoes National Park.	CR-6	Develop and adopt guidelines for the visitation and use of ancient shrines.	Completed	In 2016 Kahu Kū Mauna drafted and the MKMB approved the policy. Administrative rules for UH's managed lands, effective beginning January 2020, incorporate policies approved by the University President while ensuring protections afforded to Native Hawaiian traditional and customary practices.
cultural features. Develop and adopt a management policy for the UH Mgt. Areas on the scattering of cremated human remains. A management policy for the culturally appropriateness of building ahu or "stacking of rocks" will need to be developed by Kahu Kū Mauna who may consider similar policies adopted by Hawai'i Volcanoes National Park.	CR-7	Kahu Kū Mauna shall take the lead in determining the appropriateness of constructing new Hawaiian	Completed	In 2012, Kahu Kū Mauna reviewed a draft of a process. In 2016 Kahu Kū Mauna re- evaluated the policy and held a consultation session that included OHA. Approval by MKMB occurred in early 2018 after additional consultation by Kahu Kū Mauna.
Develop and adopt a management policy for the UH Mgt. Areas on the scattering of cremated human remains. A management policy for the culturally appropriateness of building ahu or "stacking of nocks" will need to be developed by Kahu Kū Mauna who may consider similar policies adopted by Hawai'i Volcanoes National Park.		cultural features.		It is noted that the proposed policy acknowledges there are existing statutes and other agency rules governing this type of activity.
human remains. A management policy for the culturally appropriateness of building ahu or "stacking of rocks" will need to be developed by Kahu Kū Mauna who may consider similar policies adopted by Hawai'i Volcanoes National Park.	CR-8	Develop and adopt a management policy for the UH Mgt. Areas on the scattering of cremated	Completed	In 2012 Kahu Kū Mauna developed and approved a draft policy. In 2016 Kahu Kū Mauna re-evaluated the policy and held a consultation session that included OHA. Approval by MKMB occurred in early 2018 after additional consultation by Kahu Kū Mauna.
A management policy for the culturally appropriateness of building ahu or "stacking of rocks" will need to be developed by Kahu Kū Mauna who may consider similar policies adopted by Hawai" Volcanoes National Park.		human remains.		Administrative rules for UH's managed lands, effective beginning January 2020, incorporate policies approved by the University President while ensuring protections afforded to Native Hawaiian traditional and customary practices.
icies adopted	CR-9	A management policy for the culturally appropriateness of building ahu or "stacking of rocks" will need to be developed by Kahu Kū	Completed	In 2012 Kahu Kū Mauna approved a draft policy. In 2016 Kahu Kū Mauna re- evaluated the policy and held a consultation session that included OHA. Approval by MKMB occurred in early 2018 after additional consultation by Kahu Kū Mauna.
		Mauna who may consider similar policies adopted by Hawai'i Volcanoes National Park.		CR-7 was combined with CR-9 under the guidance of Kahu Kū Mauna who pointed out that the "stacking of rocks" may be a cultural features.

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	COMPONENT PLAN: UNI	DERSTANDING AI	COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES
		Implementation	
		Status	Comments
Historic	Historic Properties		
CR-10	Develop and implement a historic property monitoring program to systematically monitor the condition of the historic district and all historic properties, including cultural sites and burials.	Completed	SHPD approved OMKM's long term historic properties monitoring plan; monitoring is ongoing according to the plan's schedule.
CR-11	Complete an archaeological survey of the portions of the Summit Access Road corridor that are under UH management.	Completed	An archaeological survey of the Maunakea Science Reserve and summit access road was completed in 2009.
CR-12	Consult with Kahu Kū Mauna about establishing buffers (preservation zones) around known historic sites in the Astronomy Precinct, to protect them from potential future development.	Completed	In 2012 Kahu Kū Mauna determined that this should be reviewed on a case-by-case basis. They identified criteria for when to consult for routine (minimal impact) project proposals, as well as with future development. In 2016, Kahu Kū Mauna revised their policy. MKMB approved their policy.
CR-13	Develop and implement a burial treatment plan for the UH Management Areas in consultation with Kahu Kū Mauna Council, MKMB's Hawaiian Culture Committee, the Hawaifi Island Burial Council, recognized lineal or cultural descendants, and SHPD.	Completed	SHPD reviewed and approved the Burial Treatment Plan for Mauna Kea in 2014.
CR-14	Immediately report any disturbance of a shrine or burial site to the rangers, DOCARE, Kahu Kū Mauna Council, and SHPD.	Ongoing	Rangers report disturbance to OMKM and OMKM in turn notifies other parties.

Threat Prevention and Control Threat Invoice and Control NR-1 Limit threats to natural resources through management of permitted activities and uses. NR-2 Limit damage caused by invasive species through program.		molementation	
Threat Prevention and Contro NR-1 Limit threats to natural readers NR-2 Limit damage caused by program.		Status	Comments
Threat Prevention and Contro NR-1 Limit threats to natural resimanagement of permitted NR-2 Limit damage caused by program.		NATURAL RESOURCES	ESOURCES
	sources through activities and uses.	Completed/ Ongoing	OMKM consulted with agencies on a draft of administrative rules governing public and commercial activities. Public hearings seeking public comments on a proposed draft were held in 2018. Administrative rules, effective beginning January 2020, for UH's managed lands incorporate policies approved by the University President while ensuring protections afforded to Native Hawaiian traditional and customary practices.
			An Operations, Monitoring and Maintenance Plan (OMMP) relating to the coordination of maintenance plans, activities and schedules was developed and approved by the MKMB, and is being implemented.
			The Maunakea Invasive Species Management Plan is approved and implemented. Additional topics are addressed as situations arise, and procedures are developed based on scientific, management board, and community feedback.
			A volunteer program was established to pull invasive weeds on UH's managed lands with emphasis in the Halepõhaku area.
	Limit damage caused by invasive species through creation of an invasive species prevention and control program.	Completed/ Ongoing	Beginning in 2007 OMKM conducted annual surveys of invasive arthropod species on UH's managed lands. This program was expanded to include monthly monitoring at the facilities at the 9.200 ft mid-level facilities, and quarterly monitoring of the summit facilities. Rapid response strategies were drafted as part of the Invasive Species Management Plan.
			Inspections of heavy equipment, construction material, and other items too large to be carried by an individual occur prior to coming on to UH's lands. Specific requirements are part of the Invasive Species Management Plan. A MS Student evaluated program efficacy as part of his 2018 thesis, with management recommendations incorporated into OMKM policies and procedures. Beginning in 2013 to July 2020, a total 808 large vehicles and loads were inspected. 782 passed initial inspection or following quick remediation and were approved, 17 were rejected and required re-inspection, and 9 were non-compliant, that is, no requests for inspections were made prior to proceeding to the mountain.
NR-3 Maintain native plant and animal populations and biological diversity.	animal populations and	Ongoing	Non-native plants and arthropods are monitored. The Division of Forestry and Wildlife is completing a circum-Maunakea fence and ungulate removal from Palila critical habitat. OMKM staff investigated māmane leaf curl frequency at Halepõhaku (plant disease response) in coordination with UHH scientists. Arthropod food webs and parasites are being investigated.
Minimize barriers to species migration to help NR-4 maintain populations and protect ecosystem processes and development.	es migration to help protect ecosystem ent.	Ongoing	OMKM coordinates with Forest Reserve, Natural Area Reserve, and Department of Land and Natural Resources technical staff to identify issues, craft appropriate responses, and investigate concerns regarding ecosystems and populations.

NR-5	Manage ecosystems to allow for response to climate change.	Ongoing	OMKM coordinates with Forest Reserve and Natural Area Reserve staff to ensure management activities do not inadvertently impede natural ecosystem response. Research into climate change forecast downscaling and climate monitoring helps inform potential future management action. OMKM participated in Pacific Islands Climate Change Cooperative workshops on climate change to help identify mitigation and adaptation strategies. A climate monitoring sea level to summit network plan is in preparation.
NR-6	Reduce threats to natural resources by educating stakeholders and the public about Mauna Kea's unique natural resources.	Ongoing	Rangers help to educate visitors about Maunakea as part of their daily activities. Resource orientation of those who work on the mountain including observatory personnel, VIS and MKSS staff, rangers, commercial tour operators and staff, and construction workers commenced in 2013. An online orientation is also available. A
			brief public / visitor orientation is complete and provided for scheduled group visits. See also CR-3 and EO-2
Ecosys	Ecosystem Protection, Enhancement & Restoration		
NR-7	Delineate areas of high native diversity, unique communities, or unique geological features within the Astronomy Precinct and at Hale Põhaku and consider protection from development.	Ongoing	Botanical survey of UH managed lands is completed. Biodiversity, wēkiu bug, and erosion and surficial geology surveys are ongoing. A study and mapping of wēkiu bug habitat is completed. Surveys for birds and bats are ongoing.
NR-8	Consider fencing areas of high native biodiversity or populations of endangered species to keep out feral ungulates (applies to areas below 12,800 ft elevation).	Ongoing	Assisted DLNR with fencing natural population of Silverswords. Other areas will be fenced when areas are identified and needed.
			Māmane seedlings germinated from seeds found in the Halepōhaku area were planted near the VIS
			Worked with DLNR and planted 200 Silversword seedlings in the Halepōhaku area.
NR-9	Increase native plant density and diversity through an	Ongoing	Collaborated with Kamehameha Schools to build plant propagation benches and start seedlings for eventual habitat restoration and enhancement at Halepõhaku.
			Germination of māmane seedlings continues.
			The construction of a small greenhouse at Halepõhaku for growing native plants was approved by BLNR as part of a project to improve the ingress/egress and parking at the VIS. Planning for construction is ongoing. Over 200 native plants were planted under the ingress/egress improvements permit.
NR-10	Incorporate mitigation plans into project planning and conduct mitigation following new development.	Ongoing	Mitigation and best management practices plans are required for projects as appropriate.
NR-11	Conduct habitat rehabilitation projects following unplanned disturbances.	Ongoing	Damage assessments and rehabilitation following unplanned disturbances are conducted on a case-by-case basis as needed. Generally, unplanned disturbances, such as vehicle oil leaks, occur on previously disturbed areas such as roadways, where humans frequent.
NR-12	Create restoration plans and conduct habitat restoration activities, as needed.	Ongoing	A study of wēkiu bug habitat restoration was initiated in 2015. A study and mapping of wēkiu bug habitat has been completed. Restoration plans and greenhouse for long-term program use are part of a project to improve the ingress/egress and parking at the VIS.

	COMPONENT PLAN: UNI	ERSTANDING A	COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES
		Implementation	
Progran	Program Management	Oldius	CONTINENTS
NR-13	Increase communication, networking, and collaborative opportunities to support management and protection of natural resources.	Ongoing	OMKM has established and continues to establish working relationships with the community and DLNR through working groups such as the Maunakea Environment Committee and Big Island Invasive Species Committee, Maunakea Watershed Alliance, Hawaii Ant Lab, and OHA.
NR-14	Use the principles of adaptive management when developing programs and methodologies. Review programs annually and revise any component plan every five years, based on the results of the program review.	Ongoing	Potential CMP revisions are identified in annual program documentation. Program plans, such as the Maunakea Invasive Species Management Plan, are updated and communicated at MKMB meetings as issues are identified. Completion of Envision Maunakea project.
Invento	Inventory, Monitoring and Research		
	Conduct baseline inventories of high-priority		Baseline surveys of wēkiu bugs, other arthropods, including invasive species have been completed or are continuing. A botanical survey was completed in the Summer of 2011 and published in 2013.
NR-15	resources, as outlined in an inventory, monitoring, and research plan.	Ongoing	OMKM is funding a multi-year study on permafrost and working on designing a climate monitoring network. OMKM is also studying erosion to better understand surficial geology, cinder cone erosion, and characterize arthropod habitat. A bird and bat inventory commenced in 2017.
NR-16	Conduct regular long-term monitoring, as outlined in an inventory, monitoring, and research plan.	Ongoing	OMKM conducts annual wekiu bug, alien and invasive species surveys. Botanical and arthropod surveys are conducted as part of the annual archaeological monitoring. Other monitoring plans to be developed following baseline surveys.
NR-17	Conduct research to fill knowledge gaps that cannot be addressed through inventory and monitoring.	Ongoing	OMKM funded a study to develop a long term model relating to climate change and potential impact to the summit ecosystem; a study of native arthropod habitats and vegetation association, arthropod food webs; analysis of historical weather climate conditions on the summit and meteorological and geological influences on insect and snowfall drops on the summit terrain to help inform wēkiu bug research; study to assess the presence and persistence of permafrost; surficial geology and erosion.; and several studies related to the wēkiu bug including life history, genetics, habitat restoration, and habitat mapping.
			OMKM funded an international symposium on Tropical Alpine Ecosystems. Invited speakers are experts in research and management of alpine ecosystems. OMKM hopes to develop a network with other researchers and managers to gain knowledge to better manage Maunakea.
NR-18	Develop geo-spatial database of all known natural resources and their locations in the UH Management Areas that can serve as baseline documentation against change and provide information essential for decision-making.	Ongoing	Wēkiu bug and botanical data, infrastructure and signs have been mapped. A GIS database of resources surveyed utilizing ArcGIS and distributed as GoogleEarth layers has been developed; new data as available is added to this database.

	COMPONENT PLAN: UNE	DERSTANDING A	COMPONENT PLAN: UNDERSTANDING AND PROTECTING MAUNA KEA'S RESOURCES
		Implementation Status	ion Comments
		EDUCATION	EDUCATION AND OUTREACH
Program	Program Development		
			Volunteer, Orientation, Brochures (Safety, Culture, Resources, What is OMKM) are available. In-school visits (Hilo Inter, Hawaii Academy of Arts and Sciences PCS, Ke Ana La'ahana, Waiakea High, Kealakehe Elementary) occur regularly. Community organizations and members help support OMKM's volunteer program. Work with Kealakehe Elementary School to support their annual Science Showcase at the school.
E0-1	Develop and implement education and outreach program	Ongoing	Outreach activities by researchers are conducted at various schools; OMKM research affiliate also helps advise young scientists with their science fair projects. Updates on OMKM activities are given to various community organizations. OMKM also participates in community events.
			The MKMB approved an Education and Outreach plan in July 2020. This plan addresses EO-1, 3, 5, 6, 7, and 8.
Education	u		
	Require orientation of users, with periodic updates		Resource orientation of those who work on the mountain including observatory personnel, VIS and MKSS staff, rangers, commercial tour operators and staff, and construction
E0-2	and a certificate of completion, including but not limited to visitors, employees, observatory staff, contractors and commercial and recreational users	Ongoing	workers commenced in 2013. Orientation is available to all interested parties in-person or online.
			Proposed administrative rules include a provision for an orientation of visitors.
EO-3	Continue to develop, update, and distribute materials explaining important aspects of Mauna Kea.	Ongoing	Materials on the cultural and natural resources, visiting safely and responsibly and Mauna Kea hazards are distributed at the VIS.
			A sign plan was approved by the MKMB in 2016 and implemented in 2017.
E0-4	Develop and implement a signage plan to improve signage throughout the UH Management Areas (interpretive safety rules and regulations)	Completed/ Ongoing	An inventory of sign locations on UH's managed lands has been completed.
			Cultural and safety related signs have been installed.
EO-5	Develop interpretive features such as self-guided cultural walks and volunteer-maintained native plant gardens.	In Progress	Included as part of ongoing CIP funded project. The MKMB approved an Education and Outreach plan in July 2020. This plan addresses EO-1, 3, 5, 6, 7, and 8.
	Engage in outreach and partnerships with schools, by		See EO-1
EO-6	university researchers, and by working with the 'Imiloa Astronomy Center of Hawai'i.	Ongoing	

Outreach Continue and inc members to provires ources manage ensure systemati management, an natural resources other ethnograph associated. EO-8 Provide opportun participate in stev AR-1 Operate the UH h	Continue and increase opportunities for community members to provide input to cultural and natural resources management activities on Mauna Kea, to ensure systematic input regarding planning, management, and operational decisions that affect natural resources, sacred materials or places, or	Status	
	rease opportunities for community vide input to cultural and natural gement activities on Mauna Kea, to ic input regarding planning, ad operational decisions that affect s, sacred materials or places, or		
	gement activities on magna rea, to ic input regarding planning, ad operational decisions that affect s, sacced materials or places, or		OMKM through the MKMB, Kahu Kū Mauna, and Environment Committee provide opportunity for members of the community and other organizations to participate in the management activities of the mountain.
	s, sadred materials of places, of	Ongoing	Bi-monthly volunteer activities provide an opportunity for the community to participate and share knowledge.
	ourier eurilographic resources with which they are associated.		Meetings with community groups and open houses were conducted to give the public an opportunity to provide input and feedback on administrative rules being developed by OMKM. Public hearings seeking public comments on a proposed draft were held in 2018.
			OMKM through the MKMB, Kahu Kū Mauna, and Environment provide opportunity for members of the community to participate in the management activities of the mountain.
	Provide opportunities for community members to participate in stewardship activities.	Ongoing	Bi-monthly volunteer activities provide an opportunity for the community to participate and share knowledge.
			Student projects and mentoring provides opportunities (science fair, legacy, etc.) for one- on-one interaction and more in-depth efforts.
		ASTRONOMIC	ASTRONOMICAL RESOURCES
resources.	Operate the UH Management Areas to prohibit activities resulting in negative impacts to astronomical resources.	Ongoing	Administrative rules, effective beginning January 2020, for UH's managed lands incorporate policies approved by the University President while ensuring protections afforded to Native Hawaiian traditional and customary practices.
			Project proposals requesting the use of radio signals are reviewed by the Institute for Astronomy for potential interference with astronomical research activities.
	Prevent light pollution, radio frequency interference		At the State level, the Starlight Reserve Advisory Committee was active from 2010 to 2015. Efforts by UH and DBEDT .to make the committee permanent were unsuccessful at the 2015 and 2016 Legislature were unsuccessful. They will try again in 2107.
AR-2 (RFI) and dust.		0 10 0	UH has been working closely with Hawaii County officials on outdoor lighting issues. This has resulted in the adoption of public-health, wildlife, and astronomy-friendly LED lights to replace the previous low-pressure sodium lights. UH and the County are now requesting the State to use similar lights at Hawaii Island airports and harbors. UH continues to provide advice on amendments to the Hawaii County lighting ordinance

	COMPONEI	IENT PLAN: MAN	NT PLAN: MANAGING ACCESS AND USES
		Implementation Status	Comments
		ACTIVITIE	ACTIVITIES AND USES
General N	General Management		
ACT-1	Continue and update managed access policy of 1995 Management Plan.	Completed Ongoing	The BLNR approved the Public Access Plan for UH Management Areas on Mauna Kea. This plan contains principals and policies regarding public access. Administrative rules will help define UH's public access policy. Public hearings seeking public comments on a proposed draft were held in 2018 and the rules implemented in January 2020. UH is in the process of updating the Master Plan and CMP that will address access policy
			Capital improvement funds are being used to implement an Ingress/egress, and parking plan to address concerns of traffic flow and pedestrian safety. A CDUP was issued to implement the ingress/egress project commenced in late 2018.
ACT-2	Develop parking and visitor traffic plan.	Ongoing	OMKM Rangers assist staff at the VIS with the implementation of their interim parking plan to maintain order, accommodate as many vehicles as possible and to ensure the safety of visitors to the VIS.
			An automated vehicle counter counts the number of vehicles (differentiating: public, commercial, tour, observatory, etc.) that drive above Halepõhaku.
ACT-3	Maintain a presence of interpretive and enforcement personnel on the mountain at all times to educate users, deter violations, and encourage adherence to restrictions.	Completed Ongoing	Mauna Kea Rangers are present year round from 7:15 am to 10:15 pm daily; DOCARE officers and Hawaii County Police are called for assistance on an as needed basis.
	Double and and and a consist of the test of the second		OMKM prohibits the use of off-road vehicles on UH's managed lands. Vehicle access to the top of Pu'upoli'ahu has been blocked since 2001 at the request of Kahu Kū Mauna.
ACT-4	prohibitions on off-road vehicle use in the UH Management Areas and that strengthens measures	Ongoing	Commercial operators and film crews are required to stay on the road or within the footprint of existing facilities, unless granted permission by OMKM.
	roads and designated parking areas.		Administrative rules, effective beginning January 2020, for UH's managed lands incorporate policies approved by the University President while ensuring protections afforded to Native Hawaiian traditional and customary practices.
Recreational	nal		
ACT-5	Implement policies to reduce impacts of recreational hiking	Completed Ongoing	Administrative rules, effective beginning January 2020, for UH's managed lands incorporate policies approved by the University President while ensuring protections afforded to Native Hawaiian traditional and customary practices.
ACT-6	Define and maintain areas where snow-related activities can occur and confine activities to slopes that have a protective layer of snow.	Completed Ongoing	Generally, this is a self-regulated activity. People usually do not venture to areas where there is no snow. A map of areas where snow play generally occurs has been developed, but areas change depending on the weather and snow deposition. Administrative rules, effective beginning January 2020, for UH's managed lands incorporate policies approved by the University President while ensuring protections afforded to Native Hawaiian traditional and customary practices.
ACT-7	Confine University or other sponsored tours and stargazing activities to previously disturbed ground surfaces and established parking areas.	Completed Ongoing	Star gazing activities on UH's lands are limited to parking lots, or in areas in close proximity to the VIS

ACT-8	Coordinate with DLNR in the development of a policy regarding hunting in the UH Management Areas.	Completed Ongoing	DLNR's hunting rules apply to UH's managed lands. UH administrative rules confirms application of DLNR's hunting rules to UH managed lands. Administrative rules, effective beginning January 2020, for UH's managed lands incorporate policies approved by the University President while ensuring protections afforded to Native Hawaiian traditional and customary practices.
Commercial	ial		
ACT-9	Maintain commercial tour permitting process; evaluate and issue permits annually.	Ongoing	UH oversees commercial tour permits, a responsibility transferred to UH from BLNR. Administrative rules, effective beginning January 2020, for UH's managed lands incorporate policies approved by the University President while ensuring protections afforded to Native Hawaiian traditional and customary practices.
ACT-10	Ensure OMKM input on permits for filming activities	Completed Ongoing	Film permits are issued by the Hawaii Film Office of Department of Business Economic Development of Tourism. All film permits require OMKM's approval before they are issued. Administrative rules, effective beginning January 2020, for UH's managed lands incorporate policies approved by the University President while ensuring protections afforded to Native Hawaiian traditional and customary practices.
ACT-11	Seek statutory authority for the University to regulate commercial activities in the UH Management Areas.	Completed Ongoing	The function of commercial tour permitting was transferred by BLNR to UH. OMKM oversees commercial tour operations and film activities. Statutory authority to promulgate administrative rules was granted by the Legislature in 2009. Administrative rules, effective beginning January 2020, for UH's managed lands incorporate policies approved by the University President while ensuring protections
Scientific	Scientific Research		
ACT-12	Ensure input by OMKM, MKMB, and Kahu Kū Mauna on all scientific research permits and establish system of reporting results of research to OMKM.	Ongoing	All research proposals must be approved by OMKM. Proposals requiring ground disturbing activities or potential impact to the cultural and/or natural landscape are reviewed by Kahu Kū Mauna and MKMB. Permit by DLNR as appropriate.
		PERMITTING ANI	ERMITTING AND ENFORCEMENT
Laws and	and Regulations		
P-1	Comply with all applicable federal, state, and local laws, regulations, and permit conditions related to activities in the UH Management Areas.	Ongoing	This is a condition of UH's leases with DLNR. Rangers monitor activities. Regular communication with DLNR's Division of Conservation and Resources Enforcement, County of Hawaii police, and Sheriff's department continues as demonstrated during TMT protests. Since 2006, OMKM rangers have been conducting biannual inspections of all facilities
			Relevant CMP management actions were incorporated into the CDUA for the Thirty
P-2	Strengthen CMP implementation by recommending to the BLNR that the CMP conditions be included in any Conservation District Use Permit or other permit.	Ongoing	meter retescope project. The MKMB requires proposals for projects for Maunakea include a review and comments on how the proposer will comply with CMP action items relevant to the project.

Р-3	Obtain statutory rule-making authority from the legislature, authorizing the University of Hawai'i to adopt administrative rules pursuant to Chapter 91 to implement and enforce the management actions.	Completed	The Legislature granted UH authority to promulgate administrative rules in 2009. Act 132.
P-4	Educate management staff and users of the mountain about all applicable rules and permit requirements.	Ongoing	Included as part of the orientation and with new project start-up meetings. Administrative rules, effective beginning January 2020, for UH's managed lands incorporate policies approved by the University President while ensuring protections afforded to Native Hawaiian traditional and customary practices.
	COMPONEN	ENT PLAN: MAN	T PLAN: MANAGING ACCESS AND USES
		Implementation Status	Comments
Enforcement	ent		
P-5	Continue coordinating with other agencies on enforcement needs.	Ongoing	OMKM coordinates with DOCARE on enforcement activities. Ranger observations are sent to DLNR, NAR, DOFAW, and US Fish & Wildlife Service.
P-6	Obtain legal authority for establishing, and then establish, a law enforcement presence on the mountain that can enforce rules for the UH Management Areas on Mauna Kea.	Completed	
P-7	Develop and implement protocol for oversight and compliance with Conservation District Use Permits.	Ongoing	Since 2006, OMKM rangers have been conducting biannual inspections of all facilities on UH's managed lands for compliance with their CDUPs
P-8	Enforce conditions contained in commercial and Special Use permits.	Ongoing	Rangers' responsibilities includes oversight of commercial tour activities and special use permits issued by OMKM.

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	COMPONENT		PLAN: MANAGING THE BUILT ENVIRONMENT
		impiementa Status	Implementation Status Comments
Intrastructure	ture		
IM-8	Assess feasibility of paving the Summit Access Road.	Completed/ Ongoing	An engineering study related to the paving of the access road from Halepōhaku to the summit was completed in 1984. This study was the basis for paving the road from the summit to about the boundary of the Science Reserve. Another study was prepared in 2017 of the damage caused by large storms over the past 10 years. The report assessed repairs needed and potential cost.
6-MI	Evaluate need for additional parking lots and vehicle pullouts and install if necessary.	Ongoing	As part of the CIP ingress/egress project at the VIS, additional parking was assessed and parking added. With TMT a recreational parking plan for Batch Plant (Park 3) was submitted to DLNR and approved. A visitor study initiated in 2019 by UH Mānoa will further inform any future efforts.
IM-10	Evaluate need for additional public restroom facilities in the summit region and at Hale Põhaku, and install close-contained zero waste systems if necessary.	Ongoing	Initial consideration of converting the presentation room building into a rest and eating stop for commercial tours as a means of reducing congestion at the VIS and providing greater access by the independent travelers, has been put on hold until completion of the ingress/egress project is completed, or if another solution presents itself. MKSS is considering options for handling overcrowding at the VIS.
			Additional portable toilets are available at the summit to address restroom facilities needs at the summit. Waterless urinals were installed in the VIS men's restroom.
Sustainat	Sustainable Technologies		
IM-11	Encourage existing facilities and new development to incorporate sustainable technologies, energy efficient technologies, and LEED standards, whenever possible, into facility design and	Ongoing	The proposed Thirty Meter Telescope is incorporating energy efficiency in its design. Maunakea Observatory Support Services installed a photovoltaic system at Halepõhaku; Gemini observatory installed, and Keck observatory is planning to install photovoltaic
IM-12	Conduct energy audits to identify energy use and system inefficiencies, and develop solutions to reduce energy usage.	Ongoing	Energy audits are part of the photovoltaic system design process, completed or in progress at Gemini, Keck, and Halepõhaku.
IM-13	Conduct feasibility assessment, in consultation with Hawaii Electric Light Company, on developing locally-based alternative energy sources.	Ongoing	MKSS installed a photovoltaic system at Halepõhaku. Additional energy conservation and sustainable generation possibilities are discussed by UHH, MKSS, and Observatories as opportunities arise.
IM-14	Encourage observatories to investigate options to reduce the use of hazardous materials in telescope operations.	Ongoing	With the development of new technology, observatories are beginning to reduce their need to use hazardous materials. An example, is the TMT observatory, which will not be using mercury.

	COMPONENT	T PLAN: MANAGI	
		Status	Comments
		CONSTRUCTI	CONSTRUCTION GUIDLINES
General Re	General Requirements		
С- -	Require an independent construction monitor who has oversight and authority to insure that all aspects of ground based work comply with protocols and permit requirements.	Ongoing	Included as part of the proposed TMT Management Plan in its CDUA.
Best Mana	Best Management Practices		
C-2	Require use of Best Management Practices Plan for Construction Practices.	Ongoing	Included as part of the proposed TMT Management Plan in its CDUA. A template for adaptation and use by others is also available.
C-3	Develop, prior to construction, a rock movement plan.	Ongoing	Included as part of the proposed TMT Management Plan in its CDUA.
C-4	Require contractors to provide information from construction activities to OMKM for input into OMKM information databases.	Ongoing	Included as part of the proposed TMT Management Plan in its CDUA.
C-5	Require on-site monitors (e.g., archaeologist, cultural resources specialist, entomologist) during construction, as determined by the appropriate agency.	Ongoing	Included as part of the proposed TMT Management Plan in its CDUA.
C-6	Conduct required archaeological monitoring during construction projects per SHPD approved plan	Ongoing	Included as part of the proposed TMT Management Plan in its CDUA.
C-7	Education regarding historical and cultural significance	Ongoing	Included as part of the proposed TMT Management Plan in its CDUA.
C-8	Education regarding environment, ecology and natural resources	Ongoing	Included as part of the proposed TMT Management Plan in its CDUA.
6-0	Inspection of construction materials	Ongoing	Included as part of the proposed TMT Management Plan in its CDUA.
	SITE RECYCLING,	DECOMMISSIONIN	SITE RECYCLING, DECOMMISSIONING, DEMOLITION AND RESTORATION
SR-1	Require observatories to develop plans to recycle or demolish facilities once their useful life has ended, in accordance with their sublease requirements, identifying all proposed actions.	Ongoing	This will be part of the TMT decommissioning plan, with the TMT decommissioning funding plan approved by the MKMB in 2014.
SR-2	Require observatories to develop a restoration plan in association with decommissioning, to include an environmental cost-benefit analysis and a cultural assessment.	Ongoing	Included as part of the proposed TMT Management Plan in its CDUA.
SR-3	Require any future observatories to consider site restoration during project planning and include provisions in subleases for funding of full restoration.	Ongoing	Included as part of the proposed TMT Management Plan in its CDUA.

	COMPONE	VT PLAN: MANAG Implementation	COMPONENT PLAN: MANAGING THE BUILT ENVIRONMENT Implementation
		Status	Comments
		CONSIDERING F	CONSIDERING FUTURE LAND USE
Facility Pla	Facility Planning Guidelines		
FLU-1	Follow design guidelines presented in the 2000 Master Plan.	Ongoing	The Design Review Process, which incorporated the 2000 Master Plan's design guidelines, were used in the review of the Thirty Meter Telescope project
	Develop a map with land-use zones in the Astronomy Precinct based on updated inventories		Areas previously mapped as off-limits for future land use through plans such as the Master Plan or CMP are used to limit any proposed activity. UH President Lassner
	of cultural and natural resources, to delineate		confirmed that TMT was the last telescope to be built on undisturbed land. Resource data
FI 11-2	areas where future land use will not be allowed	Ondoind	must be part of any proposal for major land use requests. HAR 13-5 allows for different
	and areas where future land use will be allowed	Runo Runo	types of land uses with each having its own requirements for preparing a land use
	but will require compliance with prerequisite		application. Thus a single pre-prepared map cannot possibly address all potential
	studies or analysis prior to approval of Conservation District Use Permit		scenarios.
	Docuring anti-location of initial cito conditions for		TMT arrest and the state documentation of its cites
FLU-3	use when conducting site restoration.	Ongoing	וואוד טוטפטר טטווטופופט מ טווטנט מטטמווופווומוטון טו ווא אופ.
	Require project specific visual rendering of both		TMT project completed a photo documentation.
FLU-4	pre- and post-project settings to facilitate analysis	Ongoing	
	or potential impacts to view planes.		
	Require an airflow analysis on the design of		Incorporated into the TMT project.
FLU-5	proposed structures to assess potential impacts to	Ongoing	
	aeolian ecosystems.		
9-UJ	Incorporate habitat mitigation plans into project planning process.	Ongoing	Incorporated into the TMT project
	Require use of close-contained zero-discharge		Incorporated into the TMT project
EI 11-7	waste systems for any future development in the	Ondoind	
-	summit region, from portable toilets to observatory restrooms, if feasible.	5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	

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	COMP	DNENT PLAN: MA	COMPONENT PLAN: MANAGING OPERATIONS
		Implementation Status	Comments
	10	PERATION AND II	PERATION AND IMPLEMENTATION
	Maintain OMKM, MKMB, and Kahu Kū Mauna in		The MKMB meets regularly, holding numerous public meetings; which includes consultation with Kahu Kū Mauna Council. OMKM continues to submit CMP management actions (such as the OMMP) to MKMB. MKSS continues to maintain the road and public services, financially supported by the Maunakea Observatories.
0-1	current roles, with Ownwhip Providing local management of the UH Management Areas, and MKSS providing operational and maintenance services.	Completed	Part of the role and responsibilities of OMKM, Kahu Kū Mauna Council and MKMB is the review of projects proposed for UH's managed lands, in particular for compliance with DLNR conservation district rules and since 2009, the CMP. To date over 300 projects have been reviewed by OMKM/Kahu Kū Mauna Council/MKMB.
			See Appendix H: Board & Committee Composition.
0I-2	Develop training plan for staff and volunteers.	Completed	OMKM requires all staff and volunteers to attend the Maunakea orientation. A training plan was submitted and approved by the MKMB; bi-monthly trainings of all staff is being conducted.
01-3	Maintain and expand regular interaction and dialogue with stakeholders, community members, surrounding landowners, and overseeing agencies to provide a coordinated approach to resource management.	Ongoing	OMKM has frequent contact in particularly with its neighbor, DLNR on resource management issues. OMKM rangers report unusual or suspicious behavior observed on DLNR lands to DLNR including DOCARE.
OI-4	Establish grievance procedures for OMKM, to address issues as they arise.	Completed Ongoing	The public has the opportunity to address grievances at the MKMB publicly held meetings. Administrative rules, effective beginning January 2020, for UH's managed lands incorporate policies approved by the University President while ensuring protections afforded to Native Hawaiian traditional and customary practices.
OI-5	Update and implement emergency response plan.	Ongoing	Emergency response plan is reviewed annually.
	MON	IITORING, EVLUA	MONITORING, EVLUATION AND UPDATES
MEU-1	Establish a reporting system to ensure that the MKMB, DLNR, and the public are informed of results of management activities in a timely manner.	Ongoing	Reports are provided at the publicly held MKMB Meetings.
MEU-2	Conduct regular updates of the CMP that reflect outcomes of the evaluation process, and that incorporate new information about the resources.	Ongoing	Five-year CMP revision interval was initiated in 2014. EnVision Maunakea and administrative rules will play a role in the updating the CMP.
	Revise and update planning documents, including the master plan, leases, and subleases, so that they will		UH is preparing an EIS for a new land authorization for UH's lands on Maunakea. A Prep Notice was prepared and published in February 2018. UH is reviewing comments and is considering them in the development of the draft.
MEU-3	clearly assign roles and responsibilities for managing Mauna Kea and reflect stewardship matters resolved	Ongoing	The 2000 Master Plan is being replaced by a new version, with preparation ongoing.
	with DLNR.		The 2009 CMP is being updated, with preparation of progress report and DLNR review ongoing.

Appendix G: Cumulative Progression

Cumulative Annual Progression of CMP Implementation Status.

N	Management	CMP				Annual In	Annual Implementation Status	tion Stati	2				
2		UNI Implementation					Inprovincia	נוסון זומוי	2				·
Action	Action Description	Timeframe	2010	2011	2012*	2013	2014	2015	2016	2017	2018	2019	2020
Native	Native Hawaiian Cultural Resources												
Management	ement									•			
CR-1	Kahu Kū Mauna shall work with families with lineal and historical connections to Maunakea, cultural practitioners, and other Native Hawaiian groups, including the Maunakea Management Board's Hawaiian Culture Committee, toward the development of appropriate procedures and protocols regarding cultural issues.	Immediate		Ongoing	In Progress	0	Ongoing						
CR-2	Support application for designation of the summit region of Maunakea as a Traditional Cultural Property, per the National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470 et seq. in consultation with the larger community.	Short-term							Ongoing				
CR-3	Conduct educational efforts to generate public awareness about the importance of preserving the cultural landscape.	Immediate		Ongoing	ln Progress)	Ongoing						
Cultura	Cultural Practices												
CR-4	Establish a process for ongoing collection of information on traditional, contemporary, and customary cultural practices.	Short-term									Ongoing		
CR-5	Develop and adopt guidelines for the culturally appropriate placement and removal of offerings.	Immediate			In Progress⁺						Completed		
CR-6	Develop and adopt guidelines for the visitation and use of ancient shrines.	Immediate			In Progress				Ongoing		Completed		
CR-7	Kahu Kū Mauna shall take the lead in determining the appropriateness of constructing new Hawaiian cultural features.	Immediate			ln Progress⁺						Completed		
CR-8	Develop and adopt a management policy for the UH Management Areas on the scattering of cremated human remains.	Immediate		Ongoing	ln Progress⁺						Completed		
CR-9	A management policy for the culturally appropriateness of building ahu or "stacking of rocks" will need to be developed by Kahu Kū Mauna who may consider similar policies adopted by Hawai'i Volcanoes National Park.	Immediate		Ongoing	In Progress⁺						Completed		
Historic	Historic Properties												
CR-10	Develop and implement a historic property monitoring program to systematically monitor the condition of the historic district and all historic properties, including cultural sites and burials.	Immediate		Ongoing	ln Progress	ŭ	Completed						
CR-11	Complete an archaeological survey of the portions of the Summit Access Road corridor that are under UH management	Completed											

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Ma	Management	CMP			Annual	Annual Implementation Status	n Status				
Action	Description	Implementation Timeframe 2	2010 2011	2012*	2013	2014 2015	15 2016	2017	2018	2019 2020	20
NR-8	Consider fencing areas of high native biodiversity or populations of endangered species to keep out feral ungulates (applies to areas below 12,800 ft elevation).	Mid-term				Ongoing Ongoing	oing Ongoing	Ongoing			
NR-9	Increase native plant density and diversity through an outplanting program.	Long-term					Ongoing				
NR-10	Incorporate mitigation plans into project planning and conduct mitigation following new development.	As needed				Ongoing					
NR-11	Conduct habitat rehabilitation projects following unplanned disturbances.	As needed				Ongoing					
NR-12	Create restoration plans and conduct habitat restoration activities, as needed.	As needed					In Progress	s Ongoing			
Program	Program Management										
NR-13	Increase communication, networking, and collaborative opportunities, to support management and protection of natural resources.	Immediate	Ongoing	In Progress	Ongoing						
NR-14	Use the principles of adaptive management when developing programs and methodologies. Review programs annually and revise any component plans every five years, based on the results of the prooram review.	Short-term / As needed				In Progress			Ongoing		
Invento	Inventory, Monitoring and Research										
NR-15	Conduct baseline inventories of high-priority resources, as outlined in an inventory, monitoring, and research plan.	Immediate	Ongoing								
NR-16	Conduct regular long-term monitoring, as outlined in an inventory, monitoring, and research plan	Ongoing		In Progress	Ongoing						
NR-17	Conduct research to fill knowledge gaps that cannot be addressed through inventory and monitoring.	Immediate	Ongoing								
NR-18	Develop geo-spatial database of all known natural resources and their locations in the UH Management Areas that can serve as baseline documentation against change and provide information essential for decision-making.	Ongoing		In Progress		Ongoing					
Educatio	Education and Outreach										
Program	Program Development										
E0-1	Develop and implement education and outreach program	Immediate and Short-term			Ongoing					Completed	ted
Education	n										
E0-2	Require orientation of users, with periodic updates and a certificate of completion, including but not limited to visitors, employees, observatory staff, contractors, and commercial and recreational users.	Long-term		In Progress	Ongoing						

Σ	Management	CMP				Annual	Annual Implementation Status	ation Stat	ns				
	2	Implementation											•
Action		Timeframe	2010	2011	2012*	2013	2014	2015	2016	2017	2018	2019	2020
E0-3	Continue to develop, update, and distribute materials explaining important aspects of Maunakea.	Ongoing	Ongoing	Ongoing	ln Progress	Ongoing							
E0-4	Develop and implement a signage plan to improve signage throughout the UH Management Areas (interpretive, safety, rules and regulations).	Immediate							In Progress	Ongoing	Completed / Ongoing	/ Ongoing	
E0-5	Develop interpretive features such as self-guided cultural walks and volunteer-maintained native plant gardens.	Mid-term							In Progress				
EO-6	Engage in outreach and partnerships with schools, by collaborating with local experts, teachers, and university researchers, and by working with the 'fmiloa Astronomy Center of Hawai'f.	Mid-term					Ongoing						
Outreach	ch i i i i i i i i i i i i i i i i i i i												
E0-7	Continue and increase opportunities for community members to provide input to cultural and natural resources management activities on Maunakea, to ensure systematic input regarding planning, management, and operational decisions that affect natural resources, sacred materials or places, or other ethnographic resources with which they are associated.	Ongoing											
EO-8	Provide opportunities for community members to participate in stewardship activities.	Ongoing											
Astronc	Astronomy Resources												
Protect	Protection of Astronomical Resources												
AR-1	Operate the UH Management Areas to prohibit activities resulting in negative impacts to astronomical resources.	Ongoing			ln Progress							On	Ongoing
AR-2	Prevent light pollution, radio frequency interference (RFI) and dust.	Ongoing											
ACTIVITI	Activities and Uses												
ACT-1	Activation of the second secon	Short-term			Completed								
ACT-2	Develop parking and visitor traffic plan.	Immediate		Ongoing	Progress						Ongoing	CDUP const comp 2019	CDUP issued, construction completed in 2019
ACT-3	Maintain a presence of interpretive and enforcement personnel on the mountain at all times to educate users, deter violations, and encourage adherence to restrictions.	Completed Ongoing											
ACT-4	Develop and enforce a policy that maintains current prohibitions on off-road vehicle use in the UH Management Areas and that strengthens measures to prevent or deter vehicles from leaving established roads and designated parking areas.	Ongoing											

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W	Management	CMP			Annual Implementation Status	nentation Sta	itus				
Action	Description	Implementation Timeframe 2	2010 2011	2012*	2013 2014	2015	2016	2017	2018	2019	2020
Recreational	ional										
ACT-5	Implement policies to reduce impacts of recreational hiking	Short-term		In Progress)	Completed Ongoing
ACT-6	Define and maintain areas where snow-related activities can occur and confine activities to slopes that have a protective layer of snow	Ongoing									Completed Ongoing
ACT-7	Confine University or other sponsored tours and star-gazing activities to previously disturbed ground surfaces and established parking areas.	Ongoing) 0	Completed Ongoing
ACT-8	Coordinate with DLNR in the development of a policy regarding hunting in the UH Management Areas.	Immediate	Ongoing	Completed Ongoing							
Commercial	rcial										
ACT-9	Maintain commercial tour permitting process; evaluate and issue permits annually.	Ongoing									
ACT-10	Ensure OMKM input on permits for filming activities	Ongoing							Completed Ongoing	eted ing	
ACT-11	Seek statutory authority for the University to regulate commercial activities in the UH Management Areas.	Completed Ongoing									
Scientifi	Scientific Research										
	Ensure input by OMKM, MKMB, and Kahu Kū										
ACT-12	Mauna on all scientific research permits and establish system of reporting results of research to OMKM.	Ongoing									
Permitti	Permitting and Enforcement										
Laws an	Laws and Regulations										
P-1	Comply with all applicable federal, state, and local laws, regulations, and permit conditions related to activities in the UH Management Areas.	Ongoing									
P-2	Strengthen CMP implementation by recommending to the BLNR that the CMP conditions be included in any Conservation District Use Permit or other permit.	As needed		Ongoing							
P-3	Obtain statutory rule-making authority from the legislature, authorizing the University of Hawai'i to adopt administrative rules pursuant to Chapter 91 to implement and enforce the management actions.	Completed									
P-4	Educate management staff and users of the mountain about all applicable rules and permit requirements.	Immediate	Ongoing								
Enforcement	ment										
P-5	Continue coordinating with other agencies on enforcement needs.	Ongoing									

ž	Management	CMP			Annual	Annual Implementation Status	itus			
Action	Description	Implementation Timeframe 2010	2011	2012*	2013	2014 2015	2016 2017	2018	2019	2020
P-6	Obtain legal authority for establishing, and then establish, a law enforcement presence on the mountain that can enforce rules for the UH Management Areas on Maunakea.	Completed / As needed	Completed							
P-7	Develop and implement protocol for oversight and compliance with Conservation District Use Permits.	Ongoing								
P-8	Enforce conditions contained in commercial and Special Use permits.	Ongoing								
Infrastru	Infrastructure and Maintenance									
Routine	Routine Maintenance									
IM-1	Develop and implement an OMMP.	Ongoing		ln Progress	In Progress	In Progress In Progress	Completed/Ongoing	Ū		
IM-2	Reduce impacts from operations and maintenance activities by educating personnel about Maunakea's unique resources.	Immediate	Ongoing	In Progress	Ongoing					
IM-3	Conduct historic preservation review for maintenance activities that will have an adverse effect on historic properties.	Short-term		In Progress					Or	Ongoing
IM-4	Evaluate need for and feasibility of a vehicle wash station near Halepõhaku, and requiring that vehicles be cleaned.	Short-term				In Progress		Completed/ Ongoing	Ongoing	
IM-5	Develop and implement a Debris Removal, Monitoring and Prevention Plan.	Immediate	Ongoing							
9-MI	Develop and implement an erosion inventory and assessment plan.	Long-term				In Progress			Es Es	Estimated completion in 2020
7-MI	Prepare a plan, in collaboration with the Department of Defense, to remove military wreckage from a remote area of the UH Management Areas, while ensuring protection of natural and cultural resources.	Mid-term					Ongoing			
Infrastructure	ucture									
IM-8	Assess feasibility of paving the Summit Access Road.	Long-term		ln Progress			Completed/Ongoing	Ć		
IM-9	Evaluate need for additional parking lots and vehicle pullouts and install if necessary.	Mid-term					In Progress		Ongoing	
IM-10	Evaluate need for additional public restroom facilities in the summit region and at Halepõhaku, and install close-contained zero waste systems if necessary.	Immediate		ln Progress			Ongoing			
Sustaina	Sustainable Technologies									
IM-11	Encourage existing facilities and new development to incorporate sustainable technologies, energy efficient technologies, and LEED standards, whenever possible, into facility design and operations.	As needed				Ongoing				

Σ	Management	CMP			Annual	Annual Implementation Status	ion Statu	~				
Action	Description	Implementation Timeframe	2010 2011	2012*	2013	2014 2	2015	ر 2016	2017	2018	2019	2020
IM-12		Immediate						Ongoing				
IM-13	Conduct feasibility assessment, in consultation with Hawaii Electric Light Company, on developing locally-based alternative energy sources.	Mid-term					<u>_</u>	In Progress	Ongoing			
IM-14	Encourage observatories to investigate options to reduce the use of hazardous materials in telescope operations.	Short-term						Ongoing				
Constru	Construction Guidelines											
General	General Requirements											
C-1	Require an independent construction monitor who has oversight and authority to insure that all aspects of ground based work comply with protocols and permit requirements.	As needed				Ongoing						
Best Ma	Best Management Practices											
C-2	Require use of Best Management Practices Plan for Construction Practices.	As needed				Ongoing						
C-3	Develop, prior to construction, a rock movement plan.	As needed				Ongoing						
C-4	Require contractors to provide information from construction activities to OMKM for input into OMKM information databases.	As needed				Ongoing						
C-5	Require on-site monitors (e.g., archaeologist, cultural resources specialist, entomologist) during construction, as determined by the appropriate agency.	As needed				Ongoing						
C-6	Conduct required archaeological monitoring during construction projects per SHPD approved plan.	As needed				Ongoing						
C-7	Education regarding historical and cultural significance.	As needed				Ongoing						
C-8	Education regarding environment, ecology and natural resources.	As needed				Ongoing						
C-9	Inspection of construction materials.	As needed				Ongoing						
Site Recyclir Restoration	Site Recycling, Decommissioning, Demolition and Restoration											
SR-1	Require observatories to develop plans to recycle or demolish facilities once their useful life has ended, in accordance with their sublease requirements, identifying all proposed actions.	As needed				Ongoing						
SR-2	Require observatories to develop a restoration plan in association with decommissioning, to include an environmental cost-benefit analysis and a cultural assessment.	As needed				Ongoing						

Σ	Management	CMP		μ	nnual Im	Annual Implementation Status	SI				
Action		Implementation Timeframe	2010 2011	2012* 20	2013	2014 2015	2016	2017	2018	2019	2020
SR-3	Require any future observatories to consider site restoration during project planning and include provisions in subleases for funding of full restoration.	As needed			Ō	Ongoing					
Consid	Considering Future Land Use										
Facility	Facility Planning Guidelines										
FLU-1	Follow design guidelines presented in the 2000 Master Plan	As needed		Ongoing							
	Develop a map with land-use zones in the										
	Astronomy Precinct based on updated inventories of cultural and natural resources. to delineate										
FLU-2	areas where future land use will not be allowed and areas where future land use will be allowed	Short-term					C	Ongoing			
	but will require compliance with prerequisite										
	studies or analysis prior to approval of Conservation District Use Permit										
FLU-3	Require cataloguing of initial site conditions for use when conducting site restoration.	As needed			Ō	Ongoing					
FLU-4	Require project specific visual rendering of both pre- and post-project settings to facilitate analysis	As needed			Ō	Ongoing					
	of potential impacts to view planes.					2					
FLU-5	Require an airflow analysis on the design of proposed structures to assess potential impacts to aeolian ecosystems.	As needed			Ō	Ongoing					
FLU-6	Incorporate habitat mitigation plans into project planning process.	As needed			Ō	Ongoing					
FLU-7	Require use of close-contained zero-discharge waste systems for any future development in the summit region, from portable toilets to	As needed			Ō	Ongoing					
	observatory restrooms, if feasible										
Uperations an Management	Uperations and Implementation Management										
ואומו ומלו	Maintain OMKM MKMB and Kahir Kii Marina in										
01-1	Manufatin Owney, when by any range of a current roles, with OMKM providing local management of the UH Management Areas, and MKSS providing operational and maintenance services.	Ongoing							Completed		
01-2	Develop training plan for staff and volunteers	Ongoing		In Progress		0	Completed				
01-3	Maintain and expand regular interaction and dialogue with stakeholders, community members, surrounding landowners, and overseeing agencies to provide a coordinated approach to resource management.	Ongoing									
0I-4	Establish grievance procedures for OMKM, to address issues as they arise.	Short-term		Ongoing						0	Completed Ongoing
01-5	Update and implement emergency response plan.	Ongoing									
Monito	Monitoring, Evaluation, and Updates										

2	Management	CMP				Annual	Annual Implementation Status	tation Stat	tus				
	:	Implementation											
Action	Action Description	Timeframe	2010	2011	2012*	2013	2014	2015	2016	2017	2018	2019	2020
Manac	Management												
MEU-1	Establish a reporting system to ensure that the MKMB, DLNR, and the public are informed of results of management activities in a timely manner.	Immediate		Ongoing									
MEU-2	Conduct regular updates of the CMP that reflect outcomes of the evaluation process, and that incorporate new information about the resources.	Short-term / As needed					In Progress		In Progress		Ongoing		Designation reflects completion of Envision Maunakea process.
MEU-3	Revise and update planning documents, including the master plan, leases, and subleases, so that 3 they will clearly assign roles and responsibilities for managing Maunakea and reflect stewardship matters resolved with DLNR.	As needed					In Progress						Ongoing

*In 2012 the Ongoing category was divided into two groups, Ongoing and In Progress.

+ A lawsuit was filed in federal court which was dismissed without prejudice; the plaintiff may still seek further judicial relief

Appendix H: Board & Committee Composition

Management board and committee composition, including the Maunakea Management Board, Kahu Kū Mauna Council, and Maunakea Environment Committee.

The following tables show the history of each Board, Council, or Committee by year. "X" indicates that an individual of the entity for at least some portion of the calendar year. "C" indicates that an individual was formally recognized as the Chair of the entity for at least some portion of the calendar year, shown only for the Maunakea Management Board. Kahu Kū Mauna Council members are all considered ex officio after their formal participation concludes.

Name	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	2
	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
Armandroff, Taft														Х	Х						<u> </u>
Bergin, Patricia	_					Х	Х	Х	Х	Х	Х	Х	Х	Х	Х						<u> </u>
Bergin, William																					Х
Chu, Roberta																			Х	С	С
Chun, Gregory														Х	Х	Х	С	С	С	С	Х
Cole, Heather	Х	Х	Х	Х	Х																
Cross, John								Х	Х	Х	Х	Х									
Hadway, Lisa								Х	Х	Х	Х	Х	Х	Х	Х						
Higaki, Wayne																					
Hoke, Arthur	С	С	С	С	С	Х	Х														
Imoto, Roger															Х	Х	Х	Х	Х		1
Kalua, Herring							Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х		1
Kennedy, Jim	Х	Х	Х	Х	Х	Х	Х														1
Leialoha, Julie																			Х	Х	Х
Maly, Kepa																			Х	Х	1
Mooers, Gregory												Х	Х	С	С	С	Х	Х	Х		
Nahale'a, Alapaki																			Х		
Pacheco, Rob	Х	Х	Х	Х	С	С	С	С													1
Robertson, Barbara	Х	Х	Х	Х	Х	Х															
Schinckel, Antony							Х														
Simons, Douglas															Х	Х	Х	Х	Х	Х	Х
Springer, Hannah K														Х	Х	Х	Х	Х			
Taniguchi, Barry	Х	Х	Х	Х	Х	Х	Х	Х	С	С	С	С	С						Х	Х	
Terry, Ron	1		1		Х	Х	Х	Х	Х	Х	Х	Х	Х	1		1			1		<u> </u>
Van De Car, Diana																					Х
Veillet, Christian								Х	Х	Х	Х	Х	Х								<u> </u>
Veincent, Lehua M.	1							···				1			Х	Х	Х	Х	Х		<u>† </u>
Yada, Harry	Х	Х	Х	Х	Х	Х	Х	Х													<u> </u>
			1			1		1				1					1				

Maunakea Management Board Composition

Name	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	2
	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
Chad Kālepa Baybayan							Х	Х	Х	Х	Х	Х	Х	Х	Х			Х	Х	Х	Х
Thomas Chun														Х	Х	Х	Х	Х	Х	Х	
Leningrad Elarionoff																Х	Х	Х	Х	Х	Х
Dale Fergerstrom														Х	Х	Х	Х	Х			
Celeste Hao														Х	Х	Х	Х	Х			
Arthur Hoke Jr.								Х	Х	Х	Х	Х	Х								
Wallace Ishibashi														Х							
Tiffnie Kakalia								Х	Х	Х	Х	Х	Х	Х	Х	Х					
Reynolds Kamakawiwoʻole	Х	Х	Х	Х	Х	Х	Х	Х													
Pualani Kanahele	Х	Х	Х	Х	Х	Х	Х	Х													
Niniau Kanahele	Х	Х	Х	Х	Х	Х	Х														
Larry Kimura	Х	Х	Х	Х	Х	Х	Х	Х	Х												
Kaleo Kuali'i	Х	Х	Х	Х	Х	Х	Х	Х													
Wally Lau																				Х	Х
Kimo Lee																				Х	Х
Antoinette Mallow								Х	Х	Х	Х	Х	Х	Х	Х	Х					
U'ilani Naipo																Х	Х	Х	Х	Х	
Sean Naleimaile							Х	Х	Х	Х	Х	Х	Х	Х							
Shane Palacat-Nelsen													Х	Х	Х	Х	Х	Х	Х	Х	Х
Leilehua Omphroy							Х	Х	Х												
Mikahala Roy	Х	Х	Х	Х	Х	Х	Х														
Ululani Sherlock	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х											
Hannah Kihilani Springer	Х	Х	Х	Х	Х	Х	Х	Х	Х												
Edward Stevens	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х					1						
Keahi Tajon															Х						
*		1																			
		1		1		1		1		1			1	l	1	İ	İ	İ	1		1

Maunakea Environment Committee Composition

The Maunakea Environment Committee primarily consists of current or former (including retired): adjacent land-owners or managers, non-profit cooperative partners for these same lands, management board/committee members, along with University, State and Federal agency scientists. Yet meeting attendance is less formal than either the Maunakea Management Board or Kahu Kū Mauna. While there is a standing list of individuals notified of meetings, those receiving the announcements may bring along or send (as a substitute) co-workers, colleagues, or friends depending upon the topic of interest. As such, only the current (early 2020) distribution list is included below.

Andrea Buskirk, Anya Tagawa, Casper Vanderwoude, Cheyenne Perry, David A. Phillips, Debbie Ward, Donald Thomas, Fritz Klasner, Grant Gerrish, Hannah Kihalani Springer, Ian Cole, Jackson Bauer, Jay Hatayama, Jesse Eiben, Jessica Kirkpatrick, Jim Kauahikaua, Joan Yoshioka, Joseph K Camara, Jordan Lee-Loy, Joy Yoshina, Kalā Asing, Nick Agorastos, Roger Imoto, Ron Terry, Springer Kaye, Stewart Hunter, Susan Cordell.

Appendix B. Summary of Outreach and Consultation

CMS sought and benefitted greatly from the input of many stakeholders in the preparation of preliminary and final draft versions of sections of the Draft Outcome Analysis Report that was published on April 30, 2021. Their participation typically included such things as: (*i*) reviewing and commenting on preliminary draft versions of portions or all the document and/or (*ii*) meeting with UH representatives to discuss elements of the report. Those that were contacted and/or participated are summarized in Table B-1.

UH System	Meeting Occurred and/or Comments Received
Regent Alapaki Nahale-a	
David Lassner, President	
Michael Bruno, Provost	
Vassilis Syrmos, VP	
Hawai'inuiākea School of Hawaiian Knowledge, Dr. Jonathan Osorio	
UH School of Ocean & Earth Science & Technology, Dr. Donald	
Thomas	
UH School of Travel Industry Management, Dr. Daniel Spencer	
UHH Chancellor	
UHH Chancellor's Maunakea Advisory Committee	
Hanakahi Council	
Member of UHH Physics & Astronomy Dept.	
Native Hawaiian Affairs Program Officer	
Pūkoʻa Council	
ʻImiloa	
CMS Team	•
МКМВ	•
ККМ	•
Environment Committee	•
Astronomy Organizations	
IfA	
UHH Hōkū Keʻa	
CFHT	•
Keck	
UKIRT	
IRTF	
Subaru	
Gemini	
VLBA	
JCMT	

Table B-1:	Stakeholder	Outreach for	Draft OAR
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SMA	
TMT	
AURA	
Federal Agencies	
Army PTA	
Hakalau Forest, USFWS	
US Forest Service, Dept. of Agriculture	
State Agencies	
DLNR/BLNR	•
Hawai'i Tourism Authority	
DHHL	
Office of Hawaiian Affairs	
Mauna Kea Forest Restoration Project	
Mauna Kea Watershed Alliance	
Community Members/Organizations	
PUEO	
Kui'walu	
Gerald DeMello	
Commercial Tour Operators	
Super Vacation Hawai'i	
Arnott's Lodge & Hiking Adventures	
Taikobo Hawai'i	
Mauna Kea Summit Adventures	
Hawaii Forest & Trail	
Visitor, Commerce & Economic Development	
Island of Hawaii Visitors Bureau	
Japanese Chamber of Commerce	

Appendix B. Summary of Draft CMP Supplement Outreach, Input, and Related Plan Revisions

This appendix first summarizes the outreach conducted during the preparation of the Draft CMP 2022 Supplement. Subsequent sections of this appendix summarize (i) the outreach conducted by UH between March 1 and March 31, 2022, when the Draft CMP 2022 Supplement was available for public review and comment; (ii) the comments received during the period; and (iii) provides a summary of some of the comments and UH's response to the comment or the revisions UH made to the plan based on the comment.

Pre-Draft Outreach

The first step of the CMP Supplement process was the preparation of the Outcome Analysis Report (OAR), which is provided in Appendix A. CMS sought and benefitted greatly from the input of several participants in the preparation of the Draft Outcome Analysis Report that was published on April 30, 2021. Participation typically included such things as: (*i*) reviewing and commenting on preliminary draft versions of portions or all the document and/or (*ii*) meeting with UH representatives to discuss elements of the report. The individual, groups, and agencies that UH sought input from are listed in Appendix B of the OAR. The complete OAR was submitted to DLNR, posted on the CMS website, and was a topic of discussion during UH's annual report to the BLNR in January 2022.

UH began drafting the CMP Supplement following the completion of the OAR. UH coordinated with several parties as it developed the Draft CMP Supplement. That coordination included multiple discussions with the UH advisory groups: MKMB, KKM, and EC. UH also considered input it received from the community during outreach related to the 2022 Master Plan, which often touched on management items, as it developed the Draft CMP Supplement.

Draft CMP Supplement Public Announcements and Outreach

The efforts UH made to inform the community that the Draft CMP Supplement was available for review and comment included:

- Announcement sent via U.S. mail to 242 individuals, groups, and agencies. The mailing was timed so that the announcement reached recipients on or near March 1, 2022.
- Announcement sent via email to 1,357 individuals, groups, and agencies. The email was sent on March 1, 2022.
- Press releases on March 1, 2022, March 14, 2022, and March 30, 2022, which resulted in information regarding the Draft CMP Supplement and how to comment on it appearing prominently in many publicly available radio spots, TV news stories, and website news stories. They were also posted on the UH social media feeds, and websites.
- Personalized individual emails were sent on March 1, 2022, to those UH understood to be leaders of the Hawai'i Island kia'i. There were 13 intended recipients.

- Information similar to the press releases was included in the CMS e-newsletter sent on March 1, 17, and 30, 2022.
- The review of the supplement was on the agenda of the March 15, 2022, MKMB public meeting. The supplement was also reviewed by KKM and EC during the comment period.

The announcements recipients included federal, state, and local agencies (e.g., OHA, DLNR, and DHHL), organizations, elected representatives, kia'i, and all of those who requested they be included on UH's Maunakea mailing list during the preparation of the 2022 Master Plan and other efforts.

Comments Received

The following summarizes the comments received on the Draft CMP Supplement between March 1 and 31, 2022:

- 47 comments from roughly 10 individual commentors were received via the Konveio website in-document commenting tool.
- 18 unique individuals submitted Konveio website comment forms.
- 6 unique entities submitted comments via either U.S. mail or email.
- 19 calls were answered by the toll-free hotline but only 3 messages were recorded.
- UH also met with their advisory groups (MKMB, KKM, and EC) and DHHL during the review period and received feedback from individuals on these groups.

Summary of Comments, Responses, and Plan Revisions

This section summarizes the key comments that were submitted to UH during the Draft CMP Supplement review period (March 1 through March 31, 2021). It is not an exhaustive list and paraphrases the comments. The comments, followed by UH's responses, and the revisions made to the CMP 2022 Supplement to address them, are summarized below.

Cultural Landscape

- Comment: UH should retain the title "Native Hawaiian Cultural Resources" and not change the title to "Cultural Landscape." The focus needs to be on Native Hawaiian cultural resources, traditions, and practices; anything else should only occur with permission of Native Hawaiians.
 - Response: UH, as an agency of the State of Hawai'i, must consider all cultures. The term "cultural landscape" is purposefully broad but, as defined in the supplement, clearly includes Native Hawaiian customary and traditional practices and Native Hawaiian contemporary practices.
- Comment: UH should continue to attempt to collect information on traditional, customary, and contemporary cultural practices and knowledge, as called for in management action CR-
 - 4. This management action should be expanded to recognize that Native Hawaiian

knowledge should inform adaptation of management throughout the UH Management Areas. 41

- Plan revisions: The following has been added to management action CR-4: Working with its advisory groups (e.g., KKM, EC, and MKMB), UH is and will continue to integrate the accumulated Native Hawaiian knowledge with other scientific findings and use both to inform its approaches to implementing the CMP. This may inform approaches to any of the CMP management actions, not just the CR management actions. For example, programs to implement education management actions (EO-#, Section 5.4.3) and the access management action (ACT-1, Section 7.4.1) will continue to incorporate Hawaiian knowledge and methods.
- Comment: Since the CMP was adopted in 2009, there have been cultural practices identified that are not listed in the footnote in Section 3.3 of the Supplement. The list should be expanded and, perhaps, an appendix added to the Supplement.
 - Response: That footnote reproduces a list from the 2009 CMP and specifically states that the list includes "examples" of cultural practices. UH does not believe it is necessary or appropriate to generate a definitive list of cultural practices in the CMP Supplement. As confirmed throughout the CMP, UH will ensure that cultural practices, whether included in this list or not, are protected and respected.

Natural Resources

- Comment: It is understandable that management action NR-8 has been adapted due to the establishment of an ungulate fence at a lower elevation by DLNR. Nevertheless, UH's decision making regarding when smaller fences within the UH Management Areas are warranted should consider the effectiveness of the DLNR fence.⁴²
 - Response: UH does not believe this level of detail is needed in the supplement. The effectiveness of the DLNR fence and other factors will be considered as UH implements management action NR-8.
- Comment: Related to NR-16, the use of standardized metrics, detailed collection techniques and notes, and standardization of reporting should be considered. Furthermore, detail should be provided regarding the collection and storage of monitoring and research data and reports concerning Maunakea.
 - Response: The establishment of metrics is an important aspect of improving UH's management and communication to the public. This is discussed in management action MEU-1, Section 14.4.1, where UH commits to developing, posting, and regularly updating tracking and assessment metrics. The metrics will be developed and refined based on the ability of the metric to (*i*) meaningfully illustrate stewardship progress or effort, (*ii*) relate to multiple aspects of CMP implementation, (*iii*) be readily measurable or otherwise scalable, (*iv*) address community input and interest, and (*v*) inform adaptations to management actions.

Including detailed collecting, note taking, and reporting standards in the CMP was deemed inappropriate because a one-size-fits-all standard that can be applied to the

⁴¹ This comment was provided by KKM during their meetings during the Draft CMP 2022 Supplement comment period.

⁴² This comment was provided by the EC during the Draft CMP 2022 Supplement comment period.

broad range of monitoring and research conducted on Maunakea does not exist. CMS will work with researchers individually to seek consistency within the numerous disciplines.

Access Management (ACT-1) and Commercial Tours

- Comment: Instead of a shuttle system consider a gondola system.
 - Response: This suggestion has periodically been made to UH over the years. Several factors make it untenable (e.g., demand, distance, weather, cost). Furthermore, vehicular access needs to be maintained to provide for the ongoing needs of the astronomy facilities.
- Comment: Other natural areas in Hawai'i manage access and have entrance fees; Maunakea should too. UH should quickly implement what is described as the interim phase and the per person entrance fee should be at least \$20.
 - Response: UH is pursuing implementation of the interim phase of access management as described in management action ACT-1. The entrance fee, if any, will be established during planning in coordination with the community.
- Comment: Commercial tours and stargazing activities within the UH Management Areas should be restricted to Halepōhaku. The sacredness of the landscape, human health and safety, traffic, impact minimization, and good conditions for stargazing are among the reasons why this restriction should be implemented.
 - Response: The UH Management Areas are public land and many people that do visit want to access the summit region. The intent of the commercial tour permit program, which is mentioned in NR-1, ACT-7, ACT-9, and other management actions, is to facilitate visits to the UH Management Areas, including the summit region, in a manner that promotes human health and safety, limits vehicle traffic, and minimizes impacts to resources. UH's monitoring of the commercial tour operators suggest that this intent is being realized. UH believes that if the commercial tours were restricted as suggested, the number of free and independent travelers (FITs) entering the UH Management Areas would increase, resulting in more traffic and increasing the likelihood of adverse impacts to the resources.
- Comment: Public access to the NAR, which is not within the UH Management Areas but is public land, should be provided for under potential future UH access management phases.
 - Response: UH understands that there will be challenges associated with its (the State's) access management program for Maunakea. As indicated in management action ACT-1, CMS will continue to gather input on its contemplated managed access phases. This will include close coordination with DLNR, which manages the NAR. Each phase will be developed into a proposal that involves infrastructure (e.g., land uses) and guidelines and procedures (e.g., management measures that are consistent with the Administrative Rules) that work together to contribute to the CMP's desired outcomes.

Issues and Concerns Beyond the Scope of this CMP Supplement

Through the extensive community outreach that took place during the preparation of this CMP Supplement, it continued to be clear that the community has strong feelings related to past and future activities within the UH Maunakea Lands that were beyond the scope of this CMP Supplement. The primary topics are listed below.

- The existing lease between UH and DLNR and/or the CDUP for the TMT project (HA-3568) should, or should not, be terminated.
- UH is, or is not, the appropriate entity to manage the cultural landscape and natural resources in the summit region or access to this sensitive area.

COMPREHENSIVE MANAGEMENT PLAN 2022 Supplement: Management Actions Update

VOLUME 2



Approved by the University of Hawai'i Board of Regents on <mark>DATE</mark> Approved by the Board of Land and Natural Resources on <mark>DATE</mark>

> PREPARED FOR: University of Hawai'i

PREPARED BY: Planning Solutions, Inc. Ho'okuleana, LLC

APRIL 11, 2022

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1 LETTER SENT VIA U.S. MAIL ANNOUNCING AVAILABILITY OF THE DRAFT CMP SUPPLEMENT FOR REVIEW

February 26	, 2022
Subject:	Public Draft Comprehensive Management Plan 2022 Supplement
Dear Comm	unity Member:
BLNR in 20 Hawai'i (U	thensive Management Plan, UH Management Areas (2009 CMP) was approved by 009 and is the approved management plan for lands managed by the University o H) on Maunakea. It included 103 management actions that the UH has been 1g since then.
we request Management supplement implemented Master Plan March 31,	pdating the 2009 CMP through a supplement focused on the management actions and your review, input, and comments on the public draft of the <i>Comprehensiv</i> <i>t Plan 2022 Supplement: Management Action Updates</i> (CMP Supplement). This draft was prepared in consideration of input received by UH over the last 10 years as i d the CMP, baseline and monitoring data, and recent community input on the 2022 that was relevant to the CMP. UH is accepting input on this draft supplement through 2022 . You may access and comment on the draft supplement by visiting ewardship.org.
details will	come on any section or topic of the CMP Supplement. Once you access the link above be provided on the website on how to submit your comments via the online tool, U.S. mail, voicemail, or online general comment form.
considered i and Natural CMP Supple	ment will be updated to address the input and comments received and will then be n a "pre-final" form by the Board of Regents (BOR) followed by the Board of Land Resources (BLNR). Once approved by both the BOR and BLNR, Section 1.2 of the ement will replace Section 3.1.1 of the 2009 CMP, and all other parts of the CMI will replace Chapter 7 of the 2009 CMP.
	nge you to access and comment on the draft CMP Supplement by visiting ewardship.org.
Thank you f	or your consideration and participation.
Me ka'oia'i'	o,
Gregory C	- Chun
Gregory Chi Executive D	an, Ph.D. irector, UH Hilo Center for Maunakea Stewardship

(Sent February 25 and 28, 2022 by Planning Solutions, Inc. to list below in Section 2)

Name	Organization	City	State	Zip
Leslie Agorastos		Kamuela	HI	96743
Michael Akau		Honokaa	HI	96727
Bimo Akiona		Kailua Kona	HI	96740
Anthony Ching Ako		Kapaau	HI	96755
Imaikalani		Kamuela	HI	96743
Anakaniami				
Lehua Andrade	Hui Mālama Ola Nā 'Ōiwi	Hilo	HI	96720
Satya Anubhuti		Pahoa	HI	96778
R.M Arnett		Saline	MI	48176
Andea Aseff		Honolulu	HI	96822
Chandell Asuncion		Hilo	HI	96720
Meghan Au		Waimanalo	HI	96795
Bryant Azevedo		Hilo	HI	96720
Bonnie Bator		Anahola	HI	96703
Walter Bell		Keaau	HI	96749
Daniel Bent		Honolulu	HI	96817
Jonah Bento	Kaumana Elementary	Hilo	HI	96720
Daryl Berg		Naalehu	HI	96772
Ed Bernal		Kea'au	HI	96749
Matt Binder		Kealakekua	HI	96750
Larry Black		Hilo	HI	96720
Maydean K. Bowman	Charles Pelenui Mahi Ohana	Kawaihae	HI	96743
Heidi Byron		Hilo	HI	96721
Nancy Cabral		Hilo	HI	96720
Anna Cariagu		Pahala	HI	96777
B. Pualani Case		1 unutu		20111
Lloyd Case		Kamuela	HI	96743
Dawn Chang		Kaneohe	HI	96744
Pradeepta Chowdhury		Hilo	HI	96720
Roberta Chu		Hilo	HI	96720
Kathleen Chung		Hilo	HI	96720
L. Brent Cook		Kilauea	HI	96754
Abraham Cortes-	Hawaiian Kingdom Task Force	Kurtistown	HI	96760
Kaleopaa	Hawanan Kingdom Task Force	Kurtistown	111	70700
Abraham Keola	Independent District of Puna	Pāhoa	HI	96778
Cortes-Kaleopaa	Independent District of Tuna	1 anoa	111	90778
Maggie Costigan		Paia	HI	96779
Gi Crabbe		Summerland	CA	93067
Puanani Crumb		Hilo	HI	96720
James DuPont	Department of Hawaiian Home	Kamuela	HI	96743
	Lands, West Hawai'i District Office			
Jeffrey Eckerd	Department of Health, Indoor and Radiological Health	Aiea	HI	96701
Marge Elwell		Na'alehu	HI	96772
Eloise Engman		Makawao	HI	96768
Bob & Margot Enrst		Mountain View	HI	96771

2 LIST OF U.S. MAIL LETTER RECIPIENTS

Name	Organization	City	State	Zip
Charles Ensey		Papaihou	HI	96781
Mark Felman		Kapolei	HI	96707
Olinda "Nina" Fisher	Department of Hawaiian Home Lands, East Hawai'i District Office	Hilo	HI	96720
Mike Fitzgerald		Honolulu	HI	96813
Dennis Florer		Kailua Kona	HI	96740
Allie and Roy Forbes		Hilo	HI	96720
Duane Fujiyama		Keaau	HI	96749
Fred Fukuchi		Hilo	HI	96720
Keoki Fukumitsu		Kaneohe	HI	96744
Jody Fulford		Hilo	HI	96720
Natalie Gates	U.S. Department of Interior, National Parks Service	Makawao	HI	96768
Maryjane Genco		Campbell	CA	95008
Guido Giacometti		Kamuela	HI	96743
James Gilberston		Kailua-Kona	HI	96740
Mark Goldman		Hilo	HI	96720
David & Anne		Kamuela	HI	96743
Gomes				
Daphne Gray		Kamuela	HI	96743
Joseph Green		Kapa'au	HI	96755
Linda Gregoire		Hilo	HI	96721
Jim Guequierre	Native Hawaiian Chamber of Commerce	Honolulu	HI	96809
Martha Guzman	U.S. Environmental Protection Agency, EPA-Region 9	San Francisco	CA	94105
Masa Hayasui		Hilo	HI	96720
Moses Heauu		Pahala	HI	96771
Walter Heen		Honolulu	HI	96821
Paul Hertz	NASA Science Mission Directorate, Astronomy and Physics Division	Washington	DC	20546
William Hoohuli		Waipahu	HI	96797
Bruce Hopper		Hilo	HI	96720
Matthew Hoshide- Andrade		Hilo	HI	96720
J. Kimo Hugho		Honolulu	HI	96816
L Humphrey's		Pahoa	HI	96778
Sylvia Hussey, Ed.D	Office of Hawaiian Affairs	Honolulu	HI	96817
Lene Ichinotsubo	Department of Health, Solid and Hazardous Waste Branch	Pearl City	HI	96782
Jennifer Ire		Kapaa	HI	96746
Leslie Isemoto		Hilo	HI	96720
Ricky Ishibashi		Kurtistown	HI	96760
Kim Jackson		Pahoa	HI	96778
Laurie Lee Jenkins	U.S. Department of Interior, National Parks Service	Moose	WY	83012
Darryl Johnston		Kamuela	HI	96743
Russell Kackley		Hilo	HI	96720

Name	Organization	City	State	Zip
Herriag Kalua		Hilo	HI	96720
Ciro Kamai		Honolulu	HI	96817
Jeitn Kanu		Hilo	HI	96720
Harold Kaula		Kamuela	HI	96743
Dr. Keith Kawaoka	Department of Health, Environmental Health Administration	Pearl City	HI	96782
Kara Kelai		Honolulu	HI	96819
Leimomi Khan		Honolulu	HI	96814
Jo Kim		Paauilo	HI	96776
Lei Kimura		Kamuela	HI	96743
Samuel P. King, Jr.		Honolulu	HI	96813
Graham Paul Knopp		Honokaa	HI	96727
Rich Koval		Keaau	HI	96749
Lloyd Lane		Kamuela	HI	96743
Ann Lau		Hilo	HI	96720
Brenda Luana	Machado-Akana-Aona-Namakaeha	Hilo	HI	96720
Machado Lee	Ohana	-		
Brenda Luana		Captain Cook	HI	96704
Machado Lee		***		0.6700
Paul Leong		Hilo	HI	96720
Carmen "Hulu" Lindsey	Office of Hawaiian Affairs	Honolulu	HI	96817
Pete Lindsey		Kamuela	HI	96743
Leilani Lindsey-		Hilo	HI	96720
Kaapuni				
Clifford Livermore		Waikoloa	HI	96738
Rhoda Loh	U.S. Department of Interior, National Parks Service	Hawaii National Park	HI	96718
Mark Lossing		Kailua-Kona	HI	96740
Gladys Lucas		Mililani	HI	96789
Kelden Lukzen		Honoka'a	HI	96727
Barney Magrath		Kamuela	HI	96743
Cynthia Massa		Hilo	HI	96720
Kathryn Matayoshi	Hawaii Business Roundtable	Honolulu	HI	96813
J. Mauhili		Hilo	HI	96720
Christi Maumau		Kapolei	HI	96707
Joann McCabe		Hilo	HI	96720
James McCully	McCully Works	Hilo	HI	96720
Ruby McDonald		Kailua Kona	HI	96740
Nancy McGilvray		Keaau	HI	96749
Pablo McLoud		Honokaa	HI	96727
Patrick McNeely		Hilo	HI	96720
Anakura Melemai		Keaau	HI	96749
Jeff Melrose		Hilo	HI	96720
Peter Michael		Hilo	HI	96720
Jan Moon		Hilo	HI	96720
Donn Mukensnable		Kamuela	HI	96743
LaVerne Nahinu		Honolulu	HI	96815

Name	Organization	City	State	Zip
Scott Nakasone	DHS-Benefit, Employment &	Honolulu	HI	96813
	Support Services Division			
Daniel Navratil		Waianae	HI	96792
Katherine Nguyen		Kurtistown	HI	96760
Frank Kamealoha	Temple of Lono	Volcano	HI	96785
Anuumealani Nobriga				
Kani K. Keana'aina		Kurtistown	HI	96760
Ohana				
Cindy Orlando	U.S. Department of Interior, U.S. National Park Service	San Francisco	CA	94104
Thomas Orton		Kailua Kona	HI	96740
Johni Ota		Hilo	HI	96720
Hulali Pai		Kailua-Kona	HI	96740
Sandra Parker		Kaneohe	HI	96744
Tom Peek		Volcano	HI	96785
Lyle G. Phillips		Hilo	HI	96720
Kealoha Pluiotte		Hilo	HI	96720
Steve Pollard		Hilo	HI	96720
Sina Pruder, P.E.	Department of Health, Wastewater Branch	Pearl City	HI	96782
Noelah Pua		Hilo	HI	96720
Nina Puhipau		Waialua	HI	96791
Pauline Pule		Kapaau	HI	96755
Christopher F.	Hawaii Conservation Alliance	Honolulu	HI	96848
Puttock				
Cornelia Radich		Keaau	HI	96749
Kiope Raymond	Kilakila o Haleakalā	Haʻiku	HI	96708
Shel Remington		Keaau	HI	96749
Marian Reyes		Kapaau	HI	96755
Odette Rickert		Hilo	HI	96721
Catherine Robbins		Volcano	HI	96785
John F. Roney		Hilo	HI	96720
Michael Roposh		Hilo	HI	96720
Karen Rosen		Hawi	HI	96719
Susan Rosier		Pahoa	HI	96778
Don and Celeste		Pepeekeo	HI	96783
Rudny		repetites		20105
George Salazar		Pahoa	HI	96778
J. William Sanborn		Kamuela	HI	96743
Glenn A. Santos		Hilo	HI	96720
Nathan Secrest		Hilo	HI	96720
Dayton Seto	Stanford Native American Cultural	Stanford	CA	94305
2 2,000 2000	Center, Hui o Nā Mōkū, Stanford American Indian Organization (SAIO)			
Rear Admiral Matthew W. Sibley	U.S. Department of Homeland Security, Coast Guard	Honolulu	HI	96850
Gail Silva		Aiea	HI	96701

Name	Organization	City	State	Zip
Damien Silva		Hilo	HI	96720
Phoenix T.M.		Hilo	HI	96720
Simeona				
Bri Simonian		Keaau	HI	96749
David Smith	Department of Land and Natural	Honolulu	HI	96813
	Resources, Division of Forestry and			
	Wildlife			
Cha Smith		Honolulu	HI	96816
Kent Sonoda		Hilo	HI	96720
Carter Spencer		Pahoa	HI	96778
Aaron Stene		Kailua Kona	HI	96740
John Steuber		Keaau	HI	96749
Fred Stone		Kurtistown	HI	96760
Stephanie-Malia		Naalehu	HI	96722
Tabbada				
Milford Tabura		Hilo	HI	96720
Paul Nolan Tallett		Hilo	HI	96720
Nimr Tamimi		Hilo	HI	96720
Wayne Taneh		Kealakekhua	HI	96750
Ray Tellis	U.S. Department of Transportation, Federal Transit Administration	San Francisco	CA	94103
Taro Togo		Hilo	HI	96720
Leona Toler		Hilo	HI	96720
Moana Towares		Hilo	HI	96720
John Tremblay		Kailua Kona	HI	96740
Patricia Tummons	Environment Hawaii	Hilo	HI	96720
Stephen Ueda		Hilo	HI	96720
Mary Fern Urena		Hilo	HI	96720
Keomailani VonGogh		Hilo	HI	96720
Leo VonGoyn		Hilo	HI	96720
Thomas Walsh		Hilo	HI	96720
Bill Walter	W.H. Shipman Limited	Keaau	HI	96749
Guy Ward		Hilo	HI	96720
Robert G. Williams	Prudential	Hilo	HI	96720
James K. Willis		Mt View	HI	96771
Dwayne Yoshina		Hilo	HI	96720
Phyllis and Lanny		New Lenox	IL	60451
Younger				
<u> </u>	Association of Hawaiians for Homestead Lands	Honolulu	HI	96814
	Bond Memorial Library	Kapaau	HI	96755
	Center for Biological Diversity	Tucson	AZ	85702
	Department of Health, Environmental	Pearl City	HI	96782
	Management Division Department of Health, Waimea	Kamuela	HI	96743
	District Health Office			
	Department of Health, Hilo District Health Office	Hilo	HI	96720

Name	Organization	City	State	Zip
	Department of Health, Kona District Health Office	Kealakekua	HI	96750
Chair	Department of Land and Natural	Kapolei	HI	96707
	Resources, Hawaii Island Burial Council			
	Edith Kanaka'ole Foundation	Hilo	HI	96720
	Governor, State of Hawai'i, David Ige	Honolulu	HI	96813
	Halau Hula O Ka Ua Kanilehua	Hilo	HI	96720
	Halau Hula O Kahikilaulani	Hilo	HI	96720
	Halau Hula O Kou Lima Nani E	Hilo	HI	96720
	Hawai'i Gas	Kailua-Kona	HI	96740
	Hawaii Leeward Planning	Kamuela	HI	96743
	Conference			
	Hawaii State Library, Hawaiʻi	Honolulu	HI	96813
	Document Center	1101101010		,0010
	Hilo Public Library	Hilo	HI	96720
	Honoka'a Public Library	Honoka'a	HI	96727
	Kailua-Kona Public Library	Kailua Kona	HI	96740
	Kalapana Community Organization	Pāhoa	HI	96778
	Ka'u Preservation	Naalehu	HI	96772
	Ka u reservation Ke Kula 'o Nawahiokalani'opu'u Iki	Keaʻau	HI	96749
	Kea'au Public & School Library	Kea'au	HI	96749
	Kealakekua Public Library	Kealakekua	HI	96750
	Laupāhoehoe Public & School	Laupāhoehoe	HI	96764
	Library Mainland Council Association of	Orem	UT	84057
	Hawaiian Civic Clubs Mauna Kea Recreational Users	Hilo	HI	96720
	Group Mountain View Public & School	Mountain View	HI	96771
	Library	N 1 . 1	TIT	0(772)
	Nā'ālehu Library	Naalehu	HI	96772
	North Kohala Public Library	Kapaau	HI	96755
	Pāhala Library	Pahala D=1	HI	96777
	Pāhoa Public & School Library	Pāhoa	HI	96778
	Polynesian Voyaging Society	Honolulu	HI	96819
	Royal Order of Kamehameha I, Moku O Kona	Kailua-Kona	HI	96745
	Sierra Club, Moku Loa Group	Hilo	HI	96760
	Thelma Parker Library	Kamuela	HI	96743
	U.S. Department of Commerce, NOAA, National Marine Fisheries	Long Beach	CA	90802
	ServiceU.S. Department of Interior, NOAA,National Marine Fisheries Service	Washington	DC	20240
	U.S. Department of Interior, National Parks Service	Honolulu	HI	96850

Name	Organization	City	State	Zip
	U.S. Department of Interior, National	Honolulu	HI	96850
	Parks Service - National Historic			
	Landmarks Program			
	U.S. Representative Ed Case	Honolulu	HI	96813
	U.S. Representative Ed Case	Washington	DC	20515
	U.S. Representative Kaiali`i Kahele	Washington	DC	20515
	U.S. Representative Kaiali`i Kahele	Hilo	HI	96720
	U.S. Senator Brian Schatz	Washington	DC	20510
	U.S. Senator Brian Schatz	Honolulu	HI	96850
	U.S. Senator Mazie Hirono	Honolulu	HI	96850
	U.S. Senator Mazie Hirono	Washington	DC	20510
	UH Hamilton Library	Honolulu	HI	96822
	UH Kaua'i Community College	Līhu'e	HI	96766
	Library			
	UH Maui College Library	Kahalui	HI	96732
	UH West Hawai'i Palamanui Campus	Kailua-Kona	HI	96740
	Library			

3 EMAIL SENT ANNOUNCING AVAILABILITY OF THE DRAFT CMP SUPPLEMENT FOR REVIEW

From: UH Maunakea Updates <<u>mkinfo@hawaii.edu</u>> Date: Tue, Mar 1, 2022 at 9:50 AM Subject: Public Draft Comprehensive Management Plan 2022 Supplement

Dear Community Member:

The Comprehensive Management Plan, UH Management Areas (2009 CMP) was approved by BLNR in 2009 and is the approved management plan for lands managed by the University of Hawai'i (UH) on Maunakea. It included 103 management actions that the UH has been implementing since then.

UH is now updating the 2009 CMP through a supplement focused on the management actions and we request your review, input, and comments on the public draft of the *Comprehensive Management Plan 2022 Supplement: Management Action Updates* (CMP Supplement). This draft supplement was prepared in consideration of input received by UH over the last 10 years as it implemented the CMP, baseline and monitoring data, and recent community input on the 2022 Master Plan that was relevant to the CMP. UH is accepting input on this draft supplement through March 31, 2022. You may access and comment on the draft supplement by visiting MaunakeaStewardship.org.

Input is welcome on any section or topic of the CMP Supplement. Once you access the link above, details will be provided on the website on how to submit your comments via the online commenting tool, U.S. mail, voicemail, or online general comment form.

This supplement will be updated to address the input and comments received and will then be considered in a "pre-final" form by the Board of Regents (BOR) followed by the Board of Land and Natural Resources (BLNR). Once approved by both the BOR and BLNR, Section 1.2 of the CMP Supplement will replace Section 3.1.1 of the 2009 CMP, and all other parts of the CMP Supplement will replace Chapter 7 of the 2009 CMP.

We encourage you to access and comment on the draft CMP Supplement by visiting <u>MaunakeaStewardship.org</u>.

Thank you for your consideration and participation.

Me ka'oia'i'o,

Gregory Chun, PhD Executive Director, UH Hilo Center for Maunakea Stewardship

(Sent March 1, 2022 from mkinfo@hawaii.edu to the list below in Section 4)

4 LIST OF EMAIL RECIPIENTS

Name	Organization	City	State	Zip
Francine M.K. Aarona	Maui/Kekahuna &			
Flanchie M.K. Aarona	Poliahu 'Ohana			
Mona Abadir				
Maya Abarca		'Ewa Beach	HI	
Martin Abel				
Meryl Abrams				
Joshua Paul Acebo		Wahiawā	HI	
Paul Achitoff	Earthjustice	Honolulu	HI	96813
Kayla Acoba		Hilo	HI	
Alida Adamek		Hawi	HI	96719
Douglass Adams	County of Hawai'I, Department of Research and Development	Hilo	HI	96720
Georjean Adams		South Kohala	HI	
Kerstyn Afuso		Kapalama		
Leslie M. Agorastos		Kamuela	HI	96743
Melvin Ah Ching		Honolulu	HI	
Māhealani Ahia		Kaneohe	HI	
Noelani Ahia		Waiehu, Maui	HI	
Puaena Ahn		Honomū	HI	
William Aila, Jr.	Department of Hawaiian Home Lands	Honolulu	HI	96805
Tutui Akana	UH Ka Haka 'Ula Language School and Waimānalo Hawaiian Civic Club	Honolulu	HI	96817
Diana Akao	La'i'Ōpua 2020			
Willette Akima-Akau	Waimea Hawaiian Civic Club	Kamuela	HI	96743
Kylie Akiona		Mililani, Oʻahualua	HI	
Tana Alana		Papakōlea, Oʻahu	HI	
Jim Albertini		Kurtistown	HI	96760
Jim Albertini		Ola\'a (Kurtistown)	HI	
Charles Alcock	Smithsonian Astrophysical Observatory (also SMA)	Cambridge	МА	2138
Daniel Alexander				
KJ Alexander		Bonney Lake	WA	
Lujain Ali		Cairo	Egypt	
Barbara Altemus		Honolulu	HI	
Keoni Kealoha Alvarez	Keoni Kealoha Alvarez			

Name	Organization	City	State	Zip
Annelle Amaral	Association of Hawaiian Civic Clubs	Honolulu	HI	96807
Kupono Ana		Hilo	HI	
Kevin Ancog				
Sarah Anderson		Honokaa	HI	96727
Margaret Anderson		Kailua Kona	HI	96740
Suzanne Elise Anderson				
Andy Andrews		Pahoa	Hawaii	96778
Jada May Areola		Honolulu	Hawaii	96819
Lorelei Armstrong		Princeville	Hawaii	96722
Doug Arnott	Arnott's Lodge &	Hilo	HI	96720
-	Hiking Adventures			70720
Justus Arthur		Waimanalo	HI	
Meleanaonālani Asams		Hāwī	HI	
Lincoln Ashida	Torkildson, Katz, Moore, Hetherington & Harris			
Chauncey Asing	Mauna Kea Forest Restoration Project			
Alaka'i Asing	<u>y</u>	Kailua Kona		
Liko Asing		La\'iopua		
Colin Aspin		Hilo	HI	96720
Warlito Astrande				
Trevor Atkins		Honolulu	HI	
Jane Au		Haleiwa	HI	
Linnea Avallone, Ph.D.	National Science Foundation			
Laurie Avilla		Anahola	Hawaii	96703
Damien Award		Wailuku	HI	
Bronson Azama		Kaneohe	HI	96744
Keoki Baclayon		Ewa Beach	HI	96706
Isabella badia bellinger				
Lisa Bail				
Paul Baillie		Keaau	HI	96749
Ali Bairos		Kealakekua	HI	96750
Rosalyn Baker	State Senator Rosalyn Baker	Honolulu	HI	96813
Donna Ball	U.S. Department of Interior, U.S. Fish and Wildlife Service			
Ada Ball		Siletz	OR	
Ronald G. Ball		Kailua-Kona	HI	96740
Nadine Banglos				
Christoph Baranec		Hilo	HI	
Christoph Baranec				
Christoph Baranec				
Carl Barash				

Name	Organization	City	State	Zip
Paige Barber	Nānākuli Housing Corporation	Honolulu	HI	96817
Paige Kapi'olani Barber	Nanakuli Housing Corporation			
Kaimana Barcarse	'Aha Hui Siwila o Ke Aloha 'Āina	Hilo	HI	96720
Philip Barnes		Hilo	HI	96720
John & Chris Barnett				
N. Uʻilani Barrett-Tau	Hālau Kū Māna Charter School			
Bonnie Bator	`Ohana			
Barnaby Beech				
John Begg		Pahoa	HI	96778
Mary Begier	Mary Begier Realty	Hilo	HI	96720
Bette Belanger		Kīhei	HI	
Chase Benbow				
Susan Bender		Kailua-Kona	HI	96740
Paula Frances Gillingham				
Bender				
Daniel Bent		Honolulu	HI	96817
Tabitha Bergevin-Krumme				
Steve Bergfeld	Department of Land and Natural Resources, U.S. Fish and Wildlife Service	Hilo	HI	96720
Alexandra Bernstein				
Hooipo Bertelmann		Kamuela	HI	
Nicholas Berti				
Cathy Betts	Department of Human Services	Honolulu	HI	96813
Mamo Bezilla				
Matt Binder		Kealakekua	HI	96750
Matt Binder		Kamuela	HI	96743
Ross Birch	Island of Hawaiʻi Visitors Bureau	Kohala Coast	HI	96743
David Bishaw		Hilo	HI	96721
Patricia Blair		Kailua	HI	96734
Kalena Blakemore		Volcano	HI	
John Blakeslee	Gemini Observatory (Northern Operations Center)	Hilo	ні	96720
Caitlin Blanchfield		Ithaca	NY	
Bill Blanton	U.S. Department of Homeland Security, Federal Emergency Management Agency	Oakland	СА	94607
David Boboltz	National Science Foundation	Alexandria	VA	22314

Name	Organization	City	State	Zip
David Bock	Hawaii Island Chamber of Commerce	Hilo	HI	96720
Michelle Bogardus	U.S. Department of Interior, U.S. Fish and Wildlife Service	Honolulu	HI	96850
David Bohn				
Benett J. Bolek				
E.C. Bolton				
Henry Boothe				
Richard & Kanison Bowers		Hāwī	HI	
Noe Bowman				
Dennis Boyd		Kailua Kona		
Ahanu Boyle				
Kat Brady		Honolulu	HI	96817
Fred Braun		Hilo	HI	96720
Rosie Braun		Hilo	HI	96720
May, Jon Zenaida, Anna				
Breimon				
Paul Brewbaker		Kailua	HI	96734
Julie Brighton				
Walter Brisken	Long Baseline Observatory, NRAO Headquarters & North American ALMA Science Center	Socorro	NM	87801
Dr. John Britton				
Thomas Browder	Univ. of Hawaii	Honolulu	HI	96826
Sheldon Brown		Wailuku	HI	96792
Samson Brown	Au Puni O Hawai'i	Hilo	HI	96720
Puanani Brown				
Michael Bruno	University of Hawai'i at Mānoa	Honolulu	HI	96822
Leon Buchner				
Kaui Burgess	Kamehameha Schools - Community Relations and Communications Group, Government Relations	Honolulu	НІ	96813
Cheryl Burghardt				
Erica Burt		Haleiwa	HI	96712
Steven Businger		Honolulu	HI	96816
Jade Butay	Department of Transportation	Honolulu	HI	96813
Heidi Byron		Hilo	HI	96721
Loui Cabebe		Hanapepe	HI	96716
Mana Caceres		Kapolei	HI	
Fred Cachola		Hawi	HI	96719
Patricia B. Cadiz				

Name	Organization	City	State	Zip
Jade Cain		Forest Grove	OR	97116
lindsey caldwell		Waikoloa	HI	
Charles Caldwell		Mountain View	HI	96771
Mason Calimlim		Kahuku	HI	
Anthony Calimlim		Kahuku, Oʻahu	HI	
Ramsey Calimlim		Kahuku	HI	
Joseph Camara		Tununu	111	
Chantell Cambia				
Meline Cardona		Henderson	NV	
Jerry Carr		Hilo	HI	96720
•	County of Hawai'i,			
Brenda Carreira	Mass Transit Agency	Hilo	HI	96720
Richard Carreira III	Halau ku mana			
Elise Carrell		Oakland	CA	
	Pacific Biosciences	- minute		
Tina Carvalho	Research Center, UHM			
Joe Carvauo		Kapaau	HI	96755
Suzanne D. Case	Department of Land and Natural Resources	Honolulu	HI	96813
B. Case	Flores-Case Ohana	Kamuela	HI	96743
Lloyd Case		Kamuela	HI	96743
Emalani Case		Kamuela	HI	96743
Paul Richard Paumalu Cassiday		Kalliucia	111	90743
Kanoe Cazimero		Honolulu	HI	96817
Brittany Chambrella		Kapolei	HI	90817
Muncel Chang		Hilo	HI	96720
Austin Chang		Hilo	HI	90720
Williamson Chang			111	
Elizabeth Char, M.D.	Department of Health	Honolulu	HI	96813
	Na Kuauhauo		111	
H. Cheek	Kahiwakaneikopolei	Kaneohe	HI	96744
Maggie Chen			HI	
Guy Chenoweth		Anchorage	AK	
Clarence Ching		Kamuela	HI	96743
Donna L. Ching			HI	
Saw Ching		Honolulu	HI	96826
Donna Ching-Foster		Honolulu	HI	
Terrilani Chong				
Newton Chu	Torkildson, Katz, Moore, Hetherington & Harris			
Newton Chu		Hilo	HI	96720
Pat Chu		Hilo	HI	96720
Kippen Chu	Friends of Iolani Palace	Honolulu	HI	96804
Roberta Chu	Maunakea Management Board	Hilo	HI	96720
Greg Chun	CMS	Hilo	HI	96720
Mark Chun	UH 2.2			

Name	Organization	City	State	Zip
Thomas Chun		Keaau	HI	96749
Cynthia Chun		'Ewa Beach	HI	
Lucille Chung	Hawaiian Civic Club of Laupahoehoe	Hilo	HI	96720
Sharlene Chun-Lum	Papa Ola Lokahi	Honolulu	HI	96813
Ed Clapp				
Gideon Clark				
Stan Clingan				
William Coke				
Belinda Cole-Schwartz				
Nicholas Comerford	University of Hawai'i at Mānoa, Institute for Astronomy	Honolulu	ні	96822
Carla Compagnoni		Mississauga	Canada	
Emma Condet		Grand Rapids	MI	
Kenneth Conklin				
Clare Connors	Department of the Attorney General	Honolulu	HI	96813
Vaughn Cook	Torkildson Katz Hetherington Harris Knorek	Hilo	HI	96720
Patti Cook		Kamuela	HI	96743
Bobby Cooper				
Andrew Cooper				
Nlohea Cordela		Pahoa	HI	96778
Susan Cordell	U.S. Department of Agriculture, US Forest Service	Hilo	ні	96720
Tara Cornelisse		San Rafael	CA	94903
Seth J. Corpuz-Lahne				
Gabriel Sebastian Correa		Pāhoa		
LIANA CORTEZ-KEKAWA		Waiʻanae	HI	
Cathy Costa		Kurtistown	HI	
Maggie Costigan		Paia	HI	96779
Brian Costner	U.S. Department of Energy, NEPA Policy and Compliance	Washington	DC	20585
James Cotter		Kailua Kona	HI	96745
Carroll Cox	EnviroWatch	Mililani	HI	96789
Andrew Coyle		Honolulu	HI	96818
Tara Coyote		Kapaʻa	HI	
Hōʻolu Cravalho		Pacific Palisades	HI	
Lt. Col. Kevin Cronin	U.S. Army, PTA			
John Cross		Pahala	HI	96777
Jackie Crowther				
Mary J. Culvyhouse				
Roslynn Cummings		Kalāheo	Hawaiʻi Nei	

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Name	Organization	City	State	Zip
Jonah Cummings		Aiea, Oʻahu	HI	
Thayne Currie				
Thayne Currie				
Henry Curtis	Life of the Land	Honolulu	HI	96837
Nicholas Cushnie				
Donna Cussac		Cleveland	TN	37311
Mahealani Cypher	Koʻolau Foundation	Kaneohe	HI	96744
Mahealani Cypher	George K. Cypher 'Ohana			
Sylvia Dahlby		Hilo	HI	96721
Sheri-Ann Daniels, Ed.D.	Papa Ola Lokahi			
Robin Danner	Sovereign Councils of the Hawaiian Homelands Assembly	Kapolei	HI	96707
Robin Puanani Danner	Sovereign Council of Hawaiian Homestead Associations			
Karima Daoudi		Oʻahu	HI	
Peter Daspit		Kailua	HI	96734
Keith Davenport				
Carol Davies			HI	96743
Kevin Davies				
Clive B. Davies, PhD				
Don Davis				
Gardner De Aguiar				
John De Fries	Hawaiʻi Tourism Authority (HTA)			
Konaneakamahina de la Nux		Wai'ehu	HI	
Laurel De Mello		Hilo	HI	96720
Gerald De Mello	Gerald De Mello			
Lucienne de Naie	Maui Tomorrow Foundation, Inc.	Wailuku	HI	96793
Lynn DeCoite	State Senator Lynn DeCoite	Honolulu	HI	96813
Palikapu Dedman	Pele Defense Fund	Hilo	HI	96720
Ken Deehr		Kea'au	HI	
Donovan Dela Cruz	State Senator Donovan Dela Cruz	Honolulu	HI	96813
Jessica DelaCruz		Kahuku	HI	96731
Richard DeLeon		Kihei	HI	96753
Bernadette DeLeon		Papakolea, Oʻahu	HI	
David DeLuz, Jr.	Kanoelehua Industrial Area Association	Hilo	HI	96720
Daylan DeMello		Honolulu	HI	96816
Alika Desha				
Graham DeVey				
Kanani DeVincent-Rodriguez		Wahiawā	HI	

Name	Organization	City	State	Zip
Michael DeWeert		Kaneohe	HI	96744
Amisha DeYoung-Dominguez				
Mary Dias		Aiea	HI	96701
Kimmy Diaz		Honolulu	HI	
Jan Dill	Partners in Development Foundation	Honolulu	HI	96817
Day Dinner		Hanalei	HI	96714
Ben Discoe		Honokaa	HI	96727
Shannon Dodge		Centennial	CO	80122
Vince Dodge		Wai'anae	HI	96792
Tiana Dole		Honolulu	HI	
Cheyenne Domingo	Halau Ku Mana PCS			
Bob Douglas		Hilo	HI	96720
Raquel Dow		Volcano	HI	96785
David Dow				
Alan Downer, Ph.D.	Department of Land and Natural Resources, State Historic Preservation Division	Kapolei	НІ	96707
Nick Dreher		honolulu	HI	96825
Claire Dresser		santa cruz, berkeley, sfc,	CA	
Paula Duke			HI	
Malialani Dullanty		Laupahoehoe	HI	
Lloyd Dunn	Lloyd's	Kailua Kona	HI	96740
Laura Dvorak		Hilo	HI	
Frederika Ebel		Flemington	NJ	08822
Sadie Eckart		Kailua		
Britany Edwards		Wai'anae	HI	96792
Peter Ehrhorn				
Jesse Eiben		Hilo	HI	96720
Barbara Ells				
Rose elovitz		Honolulu	HI	96822
P Else		Pahoa	HI	
Dennis Elwell		Naalehu	HI	96772
Carl Emerson		Hilo	HI	96720
Greg Engh				
Cheryl English			1	1
Ron Englund			1	1
Eloise Engman		makawao	HI	96768
Guy Enriques		Pahala	HI	96777
Bob & Margot Enrst		Mountain View	HI	96771
Steven Epstein				20111
Cheryl Ernst				
Chavella Espinosa		Kahuku	HI	
S. Estores		North Las Vegas	NV	89085

Name	Organization	City	State	Zip
	DBEDT, Office of			
Mary Evans	Planning & Sustainable	Honolulu	HI	96804
	Development			
Cindy Evans		Waikoloa	HI	96738
Vivian-Malia Faagata		Away for School		
Hailama Farden	Association of			
Hanania Faideli	Hawaiian Civic Clubs			
Elena Farden	Native Hawaiian			
	Education Council			
Garid Faria		Honolulu	HI	96826
Kiersten Faulkner	Historic Hawai'i	Honolulu	HI	96817
	Foundation			
Vicki Fay, EdM.		Kaneohe	HI	96744
	Association of			
Blossom Feiteira	Hawaiians for	Kapolei	HI	96707
	Homestead Lands			
Gabriel Feliciano		Kamuela	HI	
Mark Felman		Kapolei	HI	96707
Harry Fergerstrom		Kurtistown	HI	96760
Kali Fermantez		Pahoa	HI	96778
Alzira Fernandes	University of Hawaii at Manoa	Honolulu	HI	96848
Cara Fernandez		Kailua	HI	
Paul Ferreira	County of Hawai'i,	Hilo	HI	96720
Paul Fellella	Police Department	ппо	пі	90720
Jerry Ferro		Hilo	HI	96720
Marian Fieldson				
Kyle Finley		Ewa Beach	HI	96706
Ramsey Fiorello	Halau Ku Mānā			
Stephen Fischer		kailua kona	HI	96740
Lilly Fisher		Honolulu	HI	96822
Mike Fitzgerald		Honolulu	HI	96813
Tyler Fitzsimmons		Honolulu	HI	
Nicolas Flagey	IfA / RCUH			
Gordon Fleig				
E. Flores	Flores-Case Ohana	Kamuela	HI	96743
Kapulei Flores				
Tiana Mahina Grace Flores		Moʻiliʻili, Honolulu, Oʻahu	HI	
E. Kalani Flores		,		
E. Kalani Flores		l .		
E. Kalani Flores		l .		
Fred Fogel				
Katy Fogg		Boston Harbor	WA	98501
Roger Fontes		Kailua-Kona	HI	96740
Jason Forester				-
Sofia Franco		Lisbon	Portugal	
Cynthia Franklin			0	1

Name	Organization	City	State	Zip
Rick Frazier	0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		
Patti Freeman	Canada-France-Hawai'i Telescope			
Alberta Freidus-Flagg	*	Honolulu	HI	96826
Cindy Freitas		Kailua Kona	HI	96745
William Freitas		Kailua Kona	HI	96745
Christopher Kanehilua Freitas		Wai'anae	HI	
Stacie Friel		Kaneohe		
Linda Frutoz-Gill				
Candace Fujikane		Honolulu	HI	
Ronald Fujiyoshi		Hilo	HI	96720
wayne Fukunaga		Kailua Kona	HI	96740
Peter Fuleky				
Peter Fuleky				
Mike Gabbard	Healthy Hawaii Coalition	Kapolei	HI	96707
Tehani Gabriel-Ka'olelopono	Halau Ku Mana Public Charter School			
Ashley Galacgac				
Len Gambla				
Diana Garcia		Sacramento	CA	
Joshua Garfein		Centennial	CO	80122
Christina Gauen		Kailua	HI	96734
Joyce Gay		Keaau	HI	96749
Tom Geballe		Hilo	HI	96720
Tom Geballe				
Jean Geer				
Alberto Genovia		Līhu'e	HI	
Levi Gerlitzky				
Thomas Giambelluca	Universty of Hawaiʻi at Mānoa, Water Resources Research Center & Environmental Center	Honolulu	HI	96822
Thomas Giguere		Kapolei	HI	96707
Jeff Gilbreath	Hawaiian Community Assets, Inc.	Honolulu	HI	96817
Samuel Gillie		Honolulu	HI	96825
Tehani Gionson		Waikaloa	HI	
Scott Glenn	DBEDT, Hawai'i State Energy Office	Honolulu	HI	96804
Lawrence Goff		Kailua-Kona	HI	96745
Dawn Gohara		Honolulu	HI	96816
Mark Goldman		Hilo	HI	96720
William Golisch				
Sunil Golwala	CSO			
Tyler Gomes	Department of Hawaiian Home Lands	Honolulu	HI	96805

Name	Organization	City	State	Zip
David & Anne Gomes		Kamuela	HI	96743
Makanalani Gomes		Waipahu	HI	96797
Michael L. Gonsalves		Pearl City	HI	96782
Sharron Gonzalez		Hilo	HI	
Donald Goo		Honolulu	HI	96825
Debbie Goodwin		Kailua Kona	HI	96740
Hershini Gopal				
Leah Gourker		Pahoa	HI	96778
Kuapapakai Graff		Villas	NJ	08251
Lindsay Gragasin		Honolulu	HI	
Lisa Grandinetti		Honolulu	HI	
Daphne Gray		Kamuela	HI	96743
Joseph Green		Kapa'au	HI	96755
Bette Green		1		
Patricia 'Aunty Momi' Greene		Kailua-Kona	HI	
Walter Greenwood				
Samuel Wilder Gridley				
Dezeray Griffin				
Ray Grogan		Honolulu	HI	96816- 3404
Gene Grounds				5404
Victoria Gruen		Hunstville	AL	
Kale Gumapae			AL	
Matthew Gurewitsch		Kīhei	HI	96753
Markus H		KIICI	111	90755
Rachel H	Uprooted and Rising			
Richard Ha				
Ron Hagg		Papai\'kou	HI	
	Waiākea High School	I apai\ Kou	111	
Eric Hagiwara, Med	Robotics			
Howard & Patricia Hall		Waimea	HI	
Howard L. Hall				
Terry Hamada				
John Hamilton	UH Hilo, Physics and Astronomy	Pepeekea	HI	96783
Robert E. Hammond				
Joseph Han		Honolulu	HI	
Nalani Hance				
Karen Buenavista Hanna, PhD				
Val Hanohano				
Maj. Gen. Kenneth Hara	Department of Defense	Honolulu	HI	96816- 4495
Susan Ching Harbin		Mililani	HI	
Cory Harden		Honolulu	HI	96813
Isaac Harp		Kamuela	HI	96743
Isaac Harp	Makani Hou o Kaloko- Honokohau			
Piper Harron		Toronto	Canada	
			Canada	

Name	Organization	City	State	Zip
Janice Harvey	<u> </u>	Hilo	HI	96720
Jay Hatayama	Department of Land and Natural Resources, Division of Forestry and Wildlife	Hilo	HI	96720
Ronald Hay		Waikoloa	Hawaii	96738
Keith Hayashi	Department of Education	Honolulu	HI	96804
Toby Hazel		Pahoa	HI	96778
Melody Hazel		Honolulu	HI	
Kevin Hedlund		Hilo	HI	96720
Barbara Heintz		Hilo	HI	96720
Paula Helfrich				
David Henkin	Earthjustice	Honolulu	HI	96813
Raine Henry		Denver	CO	
Jo-Anna Herkes	SSFM International			
David Hernandez			HI	
Cesar Hernandez		Portland	OR	
Sandy Hess				
Haunani Hess		Pearl City		
Tiare HewLen		Kealakekua	HI	
Stephanie Hewlen				
Inge Heyer		Hilo	HI	96720
Len Higashi	DBEDT, Hawaiʻi Technology Development Corporation	Honolulu	HI	96813
Thomas Higashida		Hilo	HI	96720
Kaliko High	Small House Growers		HI	96749
Gwendolyn Hill		Hilo	HI	96720
Ligaya Hill	Design Review Committee			
Piilani Hirahara				
Craig Hirai	Department of Budget and Finance	Honolulu	HI	96810
Michaelle Hiraishi	Hui Malama Ola Na Oiwi	Hilo	HI	96720
Steve Hirakami		Pahoa	HI	96778
Paula Hirst		Hilo	HI	
Paul Ho	(JCMT) East Asian Observatory	Hilo	HI	96720
Rosalie Hobbs		Wai'anae	HI	96792
Lon Hocker		Hilo	HI	96721
Klaus Hodapp	UKIRT			<i>70,2</i> 1
Michael Hodson	Waimea Hawaiian Homesteaders' Association, Inc.			
Michael Hoenig		Honolulu	HI	

Name	Organization	City	State	Zip
John Hoffman	U.S. Department of Interior, USGS, Pacific Islands Water Science Center	Honolulu	НІ	96818
Roy Hoffman		Bedford	TX	
Charlene holani		Hilo	HI	96720
Sharon Holck-Lono		Indianapolis	IN	
Mary Holley				
Lorna Holmes				
Vicky Holt-Takamine	KAHEA: The Hawaiian Environmental Alliance	Honolulu	HI	96837
Renee Hoomanawanui		Pāhoa	HI	
Isella Hoopai		Concord		
Jacqui Hoover	Hawaii Island Economic Development Board	Hilo	HI	96720- 2811
Jacqui L. Hoover	Hawaii Island Economic Development Board and Hawaii Leeward Planning Conference			
Jenna Puanani Horner		Phoenix	AZ	
Scott R. Horvath	U.S. Department of Interior, USGS, Office of Communications and Publishing	Reston	VA	20192
Aubrey Hounshell		Kau	HI	
Annelise Houston		Hilo	HI	
Robert S.J. Hu				
Makaniolu Huaka			HI	
Clyde Hugh		Honolulu	HI	96817
Tiffany Edwards Hunt		Kurtistown	HI	96760
Stewart Hunter	MKSS	Hilo	HI	96720
Linda Hunter	none	Honoka'a	HI	96727
Haydn Huntley				
Sylvia M. Hussey, Ed.D.	Office of Hawaiian Affairs			
James Hustace	Waimea Community Association			
Leinaala Hutchinson				
Calvin Hutton	Hutton, Calvin L	Aiea	HI	96701
Kainalu Iaea	University of Hawai'i at Hilo			
Michealene Iaukea-Lum		Hilo	HI	96720
Aina Iglesias		Honolulu	HI	96815
Patricia Ikeda				
Michael Ikeda		Captain Cook	Hi	96704

Name	Organization	City	State	Zip
Sam Ikehara		Honolulu	HI	
Amber Imai-Hong	Ohana Kilo Hoku	Keaau	HI	96749
J. Ing	Watanabe Ing LLP			
Tiffany Ing				
Vickie Innis		Honolulu	HI	96825
Ka'imipono Inofinada				
Susan Irvine		Hilo	HI	
Bonnie Irwin	University of Hawai'i at Hilo	Hilo	HI	96720
Mike Irwin		Reno	NV	89519
Charles Lehuakona Isaacs, Jr.	'Ahahui Mālama I Ka Lōkahi	Kailua	HI	96734
Bianca Isaki	KAHEA: The Hawaiian Environmental Alliance			
Leslie Isemoto		Hilo	HI	96720
Wally Ishibashi	CMS			
Rocky Ishibashi		KEAAU	HI	96749
Wallace Ishibashi	Community	Papaikou	HI	96781
James Jack		*	Singapore	
Kimberly Jackson	Law Offices of Kimberly A. Jackson, LLLC	Kailua-Kona	НІ	96740
'Ānela Jackson	'Aha Mālama, Corp.			
James Jacobi, Ph.D.	U.S. Department of Interior, USGS, Pacific Island Ecosystems Research Center	Hawaii National Park	ні	96718
Maringi James		Rotorua	New Zealand	
William N Jardine	Retired individual	Kamuela	HI	96743
Natalie Jardine		Honolulu	HI	
Tye Jazo		Palmer	AK	
Tyrie Jenkins				
Ian Jenss				
Cindy Jepsen		Lā'ie	HI	
Kevin Jim				
Eric Johnsen	Creative Solutions	Honokaa	HI	96727
Delton Johnson		Kapaa	HI	96746
Marilyn Johnson		•		
Carol N. Johnson	Kauwahi 'Anaina Hawai'i Hawaiian Civic Club			
Rick Johnston				
Buck Joiner		Kīhei	HI	
Fithian Jones		Kapaa	HI	96746
Richard Jones		Kamuela	HI	96743
Luana Jones		Pahoa	HI	96778

Name	Organization	City	State	Zip
Fehren Jones		Honolulu	HI	96817
Lloyd Jones				
Michael Jones				
Anela Joseph		Waipahu	HI	
Jana Julian		Honolulu	HI	
Jim Juvik		Hilo	HI	96720
Sonia Juvik		Hilo	HI	96720
Shannon Kaaa		Aiea	HI	96701
Julie Kaai-Kanekoa		Honolulu	Hi	96819
BobbieJoy Kaakau				
Kalani Kaʻanāʻanā	Hawaiʻi Tourism Authority (HTA)			
Michele Kaeo		Waimanalo	HI	
S. Kaleikoa Ka'eo	Kākoʻo Haleakalā	Kula	HI	96789
Trina Kahalewai		Las Vegas	NV	70707
Natasha Kahana		Hilo	HI	
Patrick L. Kahawaiolaa	Keaukaha Community Association			
Joshua Kahele		Kahului	HI	
Craig Kahui	Lai Opua 2020	Kailua-Kona	HI	96740
Carlotta Kailiawa		Mammoth Lakes	CA	
Kaleokalani Kailiwai		Kailua Kona	HI	
Kyle Kajihiro	American Friends Service Committee	Honolulu	HI	96822
Tiffnie Kakalia		Hilo	HI	96720
Alyson Kakugawa-Leong	University of Hawaiʻi at Hilo	Hilo	HI	96720
Arthur Kalā		1720 ala Moana Blvd		
Giavonna Kalaiwaa		Waimanalo	HI	96795
Lei Kalamau		Hilo	HI	96720
Sunaina Keonaona Kale				
Mike Kaleikini	Puna Geothermal Venture-ORMAT			
kaupena kalima		Wailuku	HI	
Alisha Kaluhiokalani		Kailua	HI	
Dwynn Kamai		Honolulu	HI	96825
Nahokualakaikawaikapuokalani kamakawiwoole		Honokaa	HI	96727
Naʻunanikinau Kamaliʻi	Kawaileo Law A Limited Liability Law Company			
Paula Kamiya		Waikoloa,	HI	96738
Joni Kamiya		Kaneohe	HI	
Kalikolehua Kanaele		Hilo	HI	96720
Dr. Pualani Kanahele				
Pua Kanahele				
Harley Kane		Waiʻanae	HI	

Name	Organization	City	State	Zip
Kailey Kane		Aiea	HI	^
Velora Kane				
C.M. Kanuha		Kailua Kona	HI	96740
Chase Kahookahi Kanuha				
Chase Kahookahi Kanuha				
Annette Kaohelaulii		Kaneohe	HI	96744
Kapi'olani Kaowili-Mclain		Surprise	AZ	
Ana Kapihe	Laughing Buddha	Honoka'a	HI	96727
Lucia Kaplan				
Drew Kapp		Volcano	HI	96785
Kanoe Kapu		Hilo	HI	96721
Gary Kato				
Christine Kauahikaua		Waimanalo	HI	96795
Pualani Kauila		Honolulu	HI	96816
Rosemary Kauina		Kailua	Hi	96734
Fabian Kaulukukui-Heloca		Waiʻanae	HI	
	University of Hawai'i at			
Keiki Kawai`ae`a	Hilo, College of	Hilo	HI	96720
	Hawaiian Language			
Luana Kawelu		Hilo	HI	96720
Kahealani Keahi		Honolulu	HI	
Moses Kealamakia, Jr.				
Brannon Kealoha				
Donna Kealohanui		Waimanalo	HI	
Raymond Keaulana				
Dana Keawe		Pahoa	HI	96778
Avalon Keene		Benicia	CA	
Paula Kekahuna	Makuu Farmers Association	Pahoa	HI	96778
Curtis Kekahuna				
Kimberly Kekina				
Kapua Keliikoa-Kamai		Waianai	HI	96792
Kamalani Keliikuli				
Josephine Keliipio		Kailua Kona	HI	96740
Damien Kenison	Kauhakō Ohana Association			
Jim Kennedy	CoH Workforce Investment Board			
Denise Kenoi		Hilo	HI	96720
Emma Emalia Keohokalole	'Ohana Keohokālole			20.20
W. D. Keomailani-Case		Kamuela	HI	96743
Don & Kerrill Kephart				
Tom Kerley		Kameula	HI	
Zendo Kern	County of Hawai'i, Planning Department	Hilo	HI	96720
Mike Kido		Honolulu	HI	96813
Mehana Kihoi		Honaunau	HI	96726
Lei Kihoi		Kailua Kona	HI	96745
Lei NIII0I		Kallua Kolla	пі	90743

Name	Organization	City	State	Zip
Keith Kikuchi				1
Glen Kila		Waiʻanae	HI	96792
Dennis Kim		Mililani	HI	96789
Michael w Kimball		Kamuela		96743
Naomi Kim-Davis		Mililani	HI	
	Imiloa / HI Chamber of			
Kaiu Kimura	Commerce			
Art and Rene Kimura		Hilo	HI	96720
Ka'iu Kimura	ʻImiloa	Hilo	HI	96720
Rene Kimura	UH retired			
Shaylyn Kimura		Kīlauea	HI	
Paahana Kincaid		Honolulu	HI	96822
Adrienne King				
Chris King	Microsoft			
Carl King				
Samuel Wilder King II				
Hammiora Kingston				
Pohau & Larry Kirkland		Waikoloa	HI	96738
Jessica Kirkpatrick				
Dave Kisor		Kaneohe	HI	96744
Michelle Kitashima		Haiku	HI	,,,,,
Judy Kline		Tunku		
Jim Klyman				
Wiley Knight		Kamuela	HI	96743
Leslie Ko		Berkeley	CA	20713
Gloria Kobayashi		Hilo	HI	96720
Paul Koehla		Kailua Kona	HI	96740
Caitie Kohl		Island Heights	NJ	20740
Josie Kojima		Kailua Kona	HI	96740
Mary Kok		Kea'au	HI	20740
Kawena Komeiji	Nālimakui Native Hawaiian Council, UH West Oʻahu			
Amber Kon		Pāhoa	HI	
Jerry Konanui		Pahoa	HI	96778
Klement Kondratovich		Honolulu	HI	96826
Florence Kong		Kaunakakai	HI	
Michael J. Konowicz				
Helen Koo	Super Vacation Hawai'i			
Kelly Kraemer				
Barbara & Stan Krasniewski		Kailua	HI	96734
Edward Rambo Odquina Kū				
Trina Kudlacek		Honolulu	HI	96813
Lori Kulhavy		Ulupalakua	HI	
Susan Kunz	County of Hawai'i, Office of Housing and Community Development	Hilo	ні	96720

Name	Organization	City	State	Zip
James I. Kurioiwa, Jr.		Kaneohe	HI	96744
Neil "Dutch" Kuyper	Parker Ranch			
Jessica Kuzmier		Kailua Kona	HI	96740
Kelly Kwak		Honolulu	HI	
Brenda Kwon		Honolulu	ID	96817
Lani Kwon		Honolulu	HI	
Carmen L		Madrid	OT	
Terry Ladwig				
Gerald Lai				
Leslie Ann Laing		Kapa'a Kauai'i	HI	96746
Kaiulani Lambert		Kaneohe	HI	
Jay R. Lambert				
Kerstin Lampert				
Carlton Lane		Kamuela	HI	96743
Kalena Lanuza				,
Wendy Laros	Kona-Kohala Chamber of Commerce	Kailua-Kona	HI	96740
Wendy J. Laros	Kona-Kohala Chamber of Commerce	Kailua-Kona	HI	96740
Wendy Laros, M.Ed.	Kona-Kohala Chamber of Commerce	Kailua-Kona	HI	96740
David Lassner	University of Hawai'i	Honolulu	HI	96822
Betty Lau	ž	Kamuela	HI	96743
Lyann Lau		Honolulu	HI	96817
Ryan Lau	ISAS/JAXA			
Suzanne & Geoffrey Lauer				
Richard Lawyer		Waikoloa	HI	96738
Mary Beth Laychak				
Paula Le Blanc				
Susan Lebo, Ph.D.	Department of Land and Natural Resources, State Historic Preservation Division	Kapolei	ні	96707
Nelson Lee	University of Hawai'I there is Office of Project Delivery	Honolulu	HI	96822
Maelani Lee				
Kimo Lee		Keaau	HI	96749
Laura Lee		Larkspur	CA	94939
Victor Lee				
Jim Lee		Keaau	Hi	96749
Derek Lee		Rowland Heights	CA	
Beth Leeds		Kahuku	HI	96731
Marc Lefebvre				
james lehner	lehner	keaau HPP	HI	96749
Kristie Leiato		Kaneohe	HI	
Brian Lemaux	Gemini-North	Hilo	HI	96720

Name	Organization	City	State	Zip
	Department of Land			
Sam Lemmo	and Natural Resources,	Honolulu	HI	96813
Sam Lemmo	Office of Conservation	Honorulu	п	90813
	and Coastal Lands			
Anthony Lenchanko	POHAKEA KAI LLC	WAIANAE	HI	96792
Noelani Leonard				
Lori Leong				
Terryl Leong				
Gene Leslie				
William (Bill) Lester		Kailua-Kona	HI	96740
Nikos Leverenz		Honolulu	HI	
Corey Ann Lewin		west Hollywood	CA	90069
Hilton Lewis	W. M. Keck Observatory	Kamuela	HI	96743
Gemma Ley				
Danny Li		Keaau	HI	96749
Mia Liang		Seatlle	WA	
Lila Liebmann				
Charelle Lima-Po				
Pat Lind		Shasta Lake City		
Jon Lindborg				
Denise Lindsey				
Ekin Lindsey		Honolulu	HI	
	University of Hawai'i at			
Kaiwipuni Lipe	Mānoa, Native			
	Hawaiian Affairs			
Ayesha Liquorish		Haleiwa		
Chad Listman		Hanalei, Kauaʻi	HI	
Noel Livingston		Honolulu	HI	
Nanea Lo		Honolulu	HI	
John Lockwood		Hilo	HI	96720
Skye Loe		Kihe'i	HI	96753
Euclid LoGiudice		Pahoa	HI	96778
Euclid A. LoGiudice				
Euclid A. LoGiudice		Pāhoa	HI	96778
Valerie Loh		honolulu	HI	96816
Ginette Lolagne		Hilo	HI	
Melanie Long		Honolulu	HI	96825
Carol Long		Wahiawa	HI	96786
Ilima Long				
Joy Loo				
Steve Loo				
Sheena Lopes				
Kealii Lopez	Imua Hawaiʻi	Honolulu	HI	96805
Thomas Loudat		Kaneohe	HI	96744
Elizabeth Lovejoy-Yundt		Pāhoa	HI	
Paul Lowe				

Name	Organization	City	State	Zip
Thomas Lowe	University of Hawaii, Institute for Astronomy	Kula	н	96790
Jordan "Kama" Lee Loy	Piihonua Hawaiian Homestead Community Association			
Leinani Lozi				
Lanell Haunani Lua				
RJ Lucchesi				
Christy Luce				
Auli'i Ludington		Honolulu	HI	96814
Charlene Lui	Mainland Council Association of Hawaiian Civic Clubs	Orem	UT	84057
Charlene Lui	Mainland Council Association of Hawaiian Civic Clubs			
Eric Luke		Makawao	HI	
Leanne Lukela		Kailua	HI	
Ann Lum				
Nancy Lundblad		Hilo	HI	96720
Cheryl Lupenui	Kohala Center	Kamuela	HI	96743
Jim LuPiba				
Susan Lussier				
Jim Lyke		Kamuela	HI	96743
Ronald Lynch				
William Lyon		Haleiwa	HI	96712
Denise Lytle		Fords	NJ	08863
Ikaika M		Honolulu	Hi	96816
Susan Maddo	EnVision Maunakea Initiative	Kamuela	HI	96743
Talmadge Magno	County of Hawai'i, Civil Defense	Hilo	НІ	96720
Kim Magnuson		Papaikou	HI	96781
Lois Magnussen				
Hulale'a Kalā Mahi'ai	Halau Ku Mana public charter school			
Scott Mahoney		Kamuela	HI	96743
Ben Mai				
Tehani Maielua				
Dr. Jean-Pierre Maillard	Institut d'Astrophysique de Paris			
Dr. Jean-Pierre Maillard				
Nicholas Makinano		Kapolei	HI	
Antoinette Mallow	Hawaiian Civic Club of Hilo	Hilo	HI	96721
Kepa Maly				
Kelsey Ann Mamizuka		Kahuku	HI	
Joshua Lanakila Mangauil				

Name	Organization	City	State	Zip
Joshua Lanakila Mangauil				
Shaeralee Manosa		Mana'e Moloka'i	HI	
	County of Hawai'i,			
Ramzi Mansour	Department of	Hilo	HI	96720
Kallizi Malisoul	Environmental	11110	111	90720
	Management			
Nana-Honua Manuel		Volcano	HI	
Alec Marentic		Mountain View	HI	
Malia Marquez		Maunalua, Oʻahu	HI	
Richard Marshall		Pearl City	HI	96782
Andolie Marten				
Rene Martin	Hōkū Ke'a			
Kapi'olani Martin		Kona	HI	
Mahealani Martin		Honolulu	HI	
Mark Martin		Hilo	HI	
E. Kalikoaloha Martin Jr				
Al Martinez		Mt. View	HI	96771
Marty Martins		Kīhei	HI	
Sarah Marusek				
Stephen Massey		Paauilo	HI	96776
Roy Massey		Hilo	HI	
Bob Masuda		Kamuela	HI	96743
Peter Matlock	Self	Keauhou	HI	96739
Christine Matsuda				
Rich Matsuda	W.M. Keck Observatory			
Bryan Matsumoto		Temple City	CA	91780
H. Doug Matsuoka	Hawaii Guerrilla Video Hui	Honolulu	HI	96823
Kayla Matsushima		Kīlauea	HI	
Lahela Mattos		Pearl City	HI	
Kainoa Mattson				
Theo & Mose Mauga		Hilo	HI	96720
Peter Maurer				
Gerald Mayfield MD				
Robert Maynard		Kailua	HI	96734
Olivia Maynard		Marquette	MI	
Joann McCabe		Hilo	HI	96720
	Department of Business, Economic		, m	0.0004
Mike McCartney	Development and Tourism	Honolulu	HI	96804
Greg McCartney	Stars Above Hawai'i	Ko Olina	HI	96707
B.A McClintock		Honolulu	HI	96825
Ruby McDonald		Kailua Kona	HI	96740
Art McDonald	Queen's University, Department of Physics,		Canada	K7L 3N6

Name	Organization	City	State	Zip
	Engineering Physics			
	and Astronomy			
John MaDonnall M D	UH JABSOM, Dept of	Kailua	HI	96734
John McDonnell, M.D.	Medicine	Nallua	пі	90754
Lindsay McDougall		Toronto	ON	M4X1R3
Anuhea McDougall	Hālau Kū Mānā			
Kimberly McDowell		Kailua	HI	
Ivy McIntosh				
Kawika McKegan		Honolulu	HI	96823
pahnelopi mckenzie	non			
Nedi Miki'oi McKnight		Pa`auilo		
Pablo McLoud		Honokaa	HI	96727
Dan Taulapapa McMullin		Laguna Niguel	Ca	92677
Patrick McNeely		Hilo	HI	96720
Kaimalialani McTavish		Nā'ālehu	HI	
James C. McWhinnie		Kailua	HI	96734
Kapua Medeiros		Waimanalo	HI	
Duane Medeiros		Kailua Kona	HI	
Alfred Keaka Hiona Medeiros				
Jim Medeiros Sr.	Protect Keopuka Ohana	Honaunau	HI	96743
Karen Meech	IfA			
Alan Mefford				
Orlinna Meheula		Kapole	HI	
Kailani Meheula		Kaneohe	HI	
Loyal Mehrhoff	Center for Biological Diversity	Tucson	AZ	85702
Dan Meisenzahl	UH Communications			
Gunther Mench	Harbor Gallery	Kamuela	HI	96743
Maurice Messina	County of Hawai'i, Department of Parks and Recreation	Hilo	HI	96720
Paul Meyer				
Patti Mickelsen		Kohala Coast	HI	96743
Jeff Mila				
Libby Miller		Hilo	HI	96720
Elizabeth Miller		Volcano	HI	96785
Sam Miller				
Elizabeth Miller		Volcano	HI	96785
Marvin Min				
Kealohilani Minami		Denver	CO	
GinnyJo Minamishin		Kailua-Kona	HI	96745
Lucia Miramontes		Salt Lake City	UT	
Victoria Missien				
Jennifer Mitchell		Kailua Kona	HI	
Mikayla Mitchell		Waimea	HI	
Janet Mitchell				
Myles Miyasato				
Esther Moi		Springfield	MO	

Name	Organization	City	State	Zip
Stacey Moniz		Makawao	HI	
James Monk		Captain cook	HI	96704
Mirella Monoscalco				
Malinda Montalbo				
Sandra Moore		Washington	DC	20001
Philip Morales		Wai'anae	Kingdom of Hawaiʻi	
Richard Morris			Thuman T	
Izak Morton		Wailuku	HI	
Darryl Moses		Hilo	HI	96720
Paul Moss		White Bear Lake	MN	55110
Lee Motteler		Pahoa	HI	96778
Becky Moylan		Honolulu	HI	96815
Kaimi Mullaney		Honolulu	HI	70015
Katherine Mullett	U.S. Department of Interior, U.S. Fish and Wildlife Service	Honolulu	HI	96850
Shelley Muneoka		Honolulu	HI	96744
Gloria Ann Muraki		Kailua-Kona	HI	96740
Douglas Murata		Honolulu	HI	96825
Margaret Murchie		Honolulu	HI	96816
Tom Murdic		Franklin	TN	37064
Shannon Murphy		Honolulu	HI	96822
Matthew D. Murphy				
Mike Muszynski				
Brian Naauao		Kahului	HI	96732
MoaniKeala Nabarro	UH Communications			
Dasia Nahoopii		Hauula	HI	
Lisa Nakamura		Honolulu	Hawaii	96819
Sean Naleimaile	Department of Land and Natural Resources, State Historic Preservation Division	Hilo	НІ	96720
Janelle Naone				
Tasha Napaepae		Honolulu	HI	
Cynthia Nazara	Kona Hawaiian Civic Club	Kailua-Kona	HI	96745
Ron Needham		Hilo	HI	96720
Amber Needham		Kailua-Kona	HI	96740
I. Robert Nehmad				
Brian Neilson	Department of Land and Natural Resources, Division of Aquatic Resources	Honolulu	НІ	96813
John Nel		Pahala	HI	96777
Shane Nelsen	Kuakini Hawaiian Civic Club of Kona	Kealakekua	HI	96750

Name	Organization	City	State	Zip
Geoff Nelson		Hakalau	HI	96710
Geoff Nelson	Suisun Creek Vineyards			
Summer Nemeth		Mililani	HI	96789
Paul Neves		Hilo	HI	96720
Anthony Newman		Petaluma	CA	20120
Christopher Neyman				
Chieu Nguyen		MOUNTAIN VIEW	HI	96771
Nani Niheu		Waiʻanae	HI	
Noel Noel		Honolulu	HI	96813
Marcia Nora			111	90013
		Honolulu	HI	96817
George R. Norcross	Ohana Kaamaamahi	Holiolulu	пі	90817
Carolyn Keala Norman	'Ohana Keaweamahi			
Timmy Kakaolelo Nui		x x 1		0.6720
Don Nunes		Hilo	Hi	96720
Cinzia O		Honolulu	HI	
Seán Ó Connor		Haiku	HI	
Ken Obenski				
Eugene O'Connell	The Makua Group	Wai'anae	HI	96792
Curen Ohama		Makawao	HI	96768
Veronica Ohara		Honolulu	HI	HI
Rebekah Ohara	Akaka Foundation (For Tropical Forests)			
Brian O'Hara				
Suzanna Ohoiner		Honolulu	HI	96826
Ryan Okahara	U.S. Department of Housing and Urban Development	Honolulu	HI	96813
Keith Okamoto	County of Hawai'i, Department of Water Supply	Hilo	HI	96720
Dave Okamura	HELCO			
Emmy Okawa	Taikobo Hawaiʻi			
Carrie Okinaga	University of Hawai', General Counsel	Honolulu	HI	96822
Velda Okubo	Kohala Hawaiian Civic Club	Kapaau	HI	96755
Katrin O'Leary		Honolulu	HI	96825
Frank Oliveira		Hana	HI	
Catherine Oliver, MD		1		
Greg Olsen				
John Omerod		Honolulu	HI	
MaryAnn Omerod		Honolulu	HI	
	SSFM International		111	
Hugh Ono Marissa Ornellas		Kapa'a	HI	
manssa Omenas	Howeis Fleetrie Light	napa a		
Stanward Oshiro	Hawai'i Electric Light Company	Hilo	HI	96720

Name	Organization	City	State	Zip
	Hawai'inuiakea School			
Dr. Jonathan Osorio	of Hawaiian			
	Knowledge			
Tressie Ostermiller		Kailua	HI	96734
	Department of			
Curt Otaguro	Accounting and	Honolulu	HI	96813
	General Services			
Caitlin P				
Christian Pa				
Lori Kehaulani Pa		Edgewood	VA	
Rob Pacheco	Hawai'i Forest & Trail			
Gary Padovani				
Sharlynn Paet		Honolulu	HI	96816
Steven Pagano				
Enoch Page		S Deerfield	MA	01373
Martin Pahinui		Waialua	HI	
Aleka Pahinui		Waialua	HI	
Hulali Pai		Kailua-Kona	HI	96740
Linda Paik	Aha Wahine	Aiea	HI	96701
Wainani Paikai	State Farm Insurance	Brooklyn	NY	11205
Larry Painton		Kamuela	Hi	96743
Shawn Paiva		HILO	HI	96720
Leilani Pao		Kailua	HI	
Dana Paresa		Portland	OR	
Kaydee Park		Waimanalo	HI	
Sandra Parker		Kaneohe	HI	96744
Susan Parker		Hilo	HI	96720
Hiilei Patoc		-		
	Hawaii Audubon			
Linda Paul	Society	Honolulu	HI	96813
	Kaha I Ka Panoa			
Sharon K. Paulo	Kaleponi Hawaiian			
	Civic Club			
Mya Paw'u		Keaau	HI	96749
Bryan Pearson				
Lisa Kaahakea Peleiholani				
William and Maria Pendered		Keaau	HI	96749
Ida Perez		Hilo	HI	, , , ,
Andre Perez				
	County of Hawai'i, Fire			
Robert Perreira	Department	Hilo	HI	96720
	Department of Labor			
Anne Perreira-Eustaquio	and Industrial Relations	Honolulu	HI	96813
Douglas Perrine				1
	Maunakea Watershed			
Cheyenne Perry	Alliance			
U'ilani Perry		Waiʻanae	HI	1
Kekailoa Perry				1

Name	Organization	City	State	Zip
Norma Pershing			~~~~~	-7
Kaena Peterson	South Kohala Hawaiian Civic Club	Kamuela	HI	96743
Christian Peterson	Institute for Astronomy, Advanced Technology Research Center	Honolulu	HI	96822
Regina Peterson		Watanabe	HI	
Erik Petigura				
Doug Phillips		Kamuela	HI	96743
Carena Phillips		Waikoloa	HI	
Kahealani Phillips		Kamuela	HI	
Felicidy Phimmasone				
John Pierce		Waikoloa	HI	96738
Ted Pierson				
Thomas Pinkert		Waikoloa	HI	96738
Kealoha Pisciotta	Mauna Kea Anaina Hou/Kai Palaoa	Hilo	ні	96720
Shane Placat-Nelsen	Kahu Kū Mauna	Hilo	HI	96720
Kealoha Pluiotte		Hilo	HI	96720
Herbert Poepoe				
Joanna Pokipala		Honolulu	HI	96813
Sue Pollock				
Keali'imakamana'onalani		Hilo	HI	
Poʻoloa		HIIO	н	
Lindy Pounds		Honaunau	HI	96726
john powers	Imagtek LLC	Pahoa	HI	96778
Gerald Pozen				
Kaui Pratt-Aquino		Oʻahu	HI	
Jackie Prell		Pahoa	HI	96778
Holly Price		Pittsburg	CA	
Charlene Prickett		Papaikou	HI	96781
Margaret Primacio		Kahuku	HI	96731
Nina Puhipau		Waialua	HI	96791
Pamela Punihaole		Kailua-Kona	HI	96740
Kathleen Puou		Kealakekua	HI	96750
Claudia Claire Kapiolani			HI	
Quintanilla				
Dea Rackley		Pāhoa	HI	0.07
Dennis Ragsdale	Kingdom of Hawaiʻi	Honolulu	HI	96815
Dennis Ragsdale	Order of Kamehameha I	Honolulu	HI	96815
Paul Rambaut				-
Laura Ramirez		Kapa'a, Kaua'i	HI	
Amber Suzanne Ramsey				
Raquel Raquel				
Juanita Ray				
Morgan Ray				
John Rayner	IRTF			
Saralyn Ready				

Name	Organization	City	State	Zip
David Reed	<u>_</u>	Hilo	HI	96720
Peggy Regentine				
Cecilia Reilly		Wailuku	HI	
Ron Reilly				
Kathy A. Reinhart				
Jamie Reno		Paauilo	HI	96776
Andrew Repp				
Lynn Richardson	Ola'a Banana Co.	Hilo	HI	96720
Carol Riley				
Walter Ritte	'Āina Momona			
Walter Ritte	'Āina Momona			
Ralph Rizzo	U.S. Department of Transportation, Federal Highway Administration	Honolulu	ні	96850
Kaiali'i Roberts		Kea'au	HI	
Wayne Roberts				
Dick & Sue Roberts		Kailua Kona		
Aliya Robin				
George Robinson		Kealakekua	HI	96750
Ranette Puna Robinson		Hilo	HI	
Robert Robinson				
Ruth E. Robison, Ph D		Hilo	HI	96720
Nancy Rocheleau				
Brooke Rodenhurst		Honolulu	HI	
Steven Rodenhurst, P.E.	County of Hawai'i, Department of Public Works	Hilo	HI	96720
Robert Rodman				
Drena Rodrigues				
ALICE ROGERS		MILILANI	HI	96789
David Lee Rogers		Arlington, Tarrant	TX	
Celeste Rogers		Kapolei	HI	96707
Mark Rognstad		Kailua		
Tara Rojas				
Kayley Rolph				
Rodrigo Romo		Hilo	HI	
Denise Ropa		Lāna'i City	HI	
Regina Rose				
Katherine Loke Roseguo		1		
Katherine Roseguo				
David Rubin	UH Mānoa	1		96825
Pamela Rubin		Halifax, Nova Scotia	Canada	
Don and Celeste Rudny		Pepeekeo	HI	96783
Shannon Rudolph		Hōlualoa	HI	20100
Alexa Russell		110100100		

Name	Organization	City	State	Zip
Tei Ryu		Honolulu	HI	1
Sara Maaria Saastamoinen	Graduate Student Organization, UH at Mānoa			
Jeff Sacher		Kamuela	HI	96743
L. Saganuma	Royal Hawaiian Academy of Traditional Arts	Honolulu	HI	96821
Laakea Saganuma	The Mary Kawena Pukui Cultural Preservation Society	Honolulu	ні	96821
Nancy Sakamoto				
Nancy Sakamoto		Kailua-Kona	HI	96740
Eric Salazar		New York	NY	
Momi Sales		'Ewa Beach	HI	
Chaunnel Pake Salmon		Makaha	HI	96792
Rita Salvanera GORDON Sam	Pearl HawaiiFederal Credit Union - Waipahu, HI	Honolulu	HI	96825
Cerina Sanchez		Honolulu	HI	
Göran Sandell		Hilo	HI	96720
Dr. Michelle Sandell				
Peter Sanderson		Santa Rosa	CA	95401
Kathleen Sanner		Keeau	HI	
Kirie Santos		Pāhoa	HI	
Suzy Sanxter		Hilo	HI	96720
Barbara Schaefer		Kamuela	HI	96743
Calista Schloessmann		Kalispell	MT	
Jacob Schneider				
Kia'gina Schubert		Hilo	HI	96720
Maggie Schultz		Kīhei	HI	
Robert Scott				
Stephen Scribner		Elmira	NY	14904
Marilyn Seely				
Natali Segovia	Water Protector Legal Collective	Albuquerque	NM	87176
Alika Seki		Kahului	HI	
Dayton Seto	Stanford Native American Cultural Center, Hui o Nā Mōkū, Stanford American Indian Organization (SAIO)	Stanford	CA	94305
John Sevick				
David Seyfarth		i de la companya de la		1

Name	Organization	City	State	Zip
Scott Seymour	Pulama Ia Kona Heritage Preservation Council	Holualoa	ні	96725
David Shaw				
Jacob Shearer		Honolulu, Kona, Oʻahu	HI	
Andrew Sheinis	Canada-France-Hawai'i Telescope	Kamuela	HI	96743
Kaylene Sheldon		Kaaawa	HI	
Jennifer Shimabukuro	SMS Research	Honolulu	HI	96813
Phyllis Shimabukuro-Geiser	Department of Agriculture	Honolulu	HI	96814
Ross Shinyama	Watanabe Ing LLP			
Carrie Ann Shirota		Honolulu	HI	
Forest Shower		Port Townsend	WA	98368
Karelle Siellez	Institute of Astrophysics in Paris	Paris		75020
Damien Silva		Hilo	HI	96720
Adrian Silva	Hui Huliau Inc.	Waiʻanae	HI	96792
Maria & Carolina Silva		Sacramento	CA	94203
Naomi Silva				
Cynthia Simms		Laguna Beach	CA	92677
Philip Simon		San Rafael	CA	94912
Doug Simons	University of Hawai'i at Mānoa, Institue for Astronomy	Honolulu	НІ	96822
Lanny Sinkin	Temple of Lono	Hilo	HI	96721
Rene Siracusa	Malama O Puna	Pahoa	HI	96778
Yvonne Siu-Runyan		Boulder	СО	80304
James Skibby		Kailua Kona	HI	96745
Jennifer Sleightholm		Waikoloa	HI	96738
Edward Smart				
Cha Smith		Honolulu	HI	96816
Norma Jane Smith				
Matt Smith				
Daniel Smith, PhD				
James Smithson				
Robert Soares				
Jon Sobstad		Kaunakakai	HI	96748
Teague Soderman				
Healani Sonoda-Pale				
Melvin Soong	The I Mua Group	Kailua	HI	96734
Jesse Souki	University of Hawaiʻi at Hilo			
Shanna Kahealani Souza				
Lisa Spain	ʻImiloa			

Name	Organization	City	State	Zip
Linda Speerstra	U.S. Army Corps of Engineers, Regulatory Branch, CEPOH-EC-R	Fort Shafter	НІ	96858
Mele Spencer		Hilo	HI	96720
Dr. Daniel Spencer	University of Hawai'i at Mānoa, Tourism Management @ UH School of Travel Industry Mmgt			56726
Kainoa Spencer		Kona	HI	
Keolakawai Spencer		Nagoya	Japan	
Ki'ilani Spencer		Honokaa	HI	
Harold Spindel				
Pavel Stankov				
Summer Starr		Makawao	HI	
William Steiner	Pacific Agricultural Land Management System	Hilo	HI	96720
Justin Stevick				
Sunny Stewart		Kea'au	HI	96749
Johannes Stoessl	University of Hawaii	Honolulu	HI	96814
Paul Stomski		Kamuela	HI	96743
Fred Stone		Kurtistown	HI	96760
Kaleiheana Stormcrow		Kapu'euhi	HI	
Glee Stormont		1100		
Kimo Stowell		Honolulu	HI	96792
Zach Street		Coupeville	WA	20172
Ann Strong		Coupevine		
Kaiqing Su				
Barton Susan		O'okala	HI	96774
Ilao Santos Susuico		Olkala		20114
Carol Sutherland				
Sherry Sutherland-Choy				
Vassilis Syrmos	University of Hawaiʻi at Mānoa, Center for Hawaiian Studies	Honolulu	НІ	96822
Kei Szeto				
Gyongyi Szirom		Keaau	HI	96749
Gerald Taber		Wailuku	HI	96793
Michael Tada				
Audrey Takamine	Japanese Chamber of Commerce & Industry of Hawai'i	Hilo	НІ	96720
Marianne Takamiya	UH Hilo, Physics and Astronomy			
Gerald Takase				
Eric Takasugi				
Amy Takeuchi				

Name	Organization	City	State	Zip
Miwa Tamanaha		Honolulu	HI	96837
Cheryl Tanguay		Kailua-Kona	HI	96740
Arthur Taniguchi	Bank of Hawai'i	Hilo	HI	96720
Toby Taniguchi	KTA Stores			
David Tarnas	MCS International			
Xerxes Tata		Honolulu	HI	96825
Walter Tavares		Hauula	HI	
Kaleinani Taylor		Honolulu, HI	HI	
Nancy Taylor		, , , , , , , , , , , , , , , , , , ,		
David Taylor				
Mark Temkin		Oxnard	CA	93035
Chariya Terlep-Cabatbat			HI	96771
Ron Terry, Ph.D., Principal	Geometrician Associates	Hilo	HI	96720
Karen Thatcher		Kapahulu	HI	
Chris Thomas		Philadelphia	PA	19104
Donald Thomas	University of Hawai'i, School of Ocean and Earth Science and Technology			1)10+
Steven Thomas		Mililani	HI	
Travis Thomason	U.S. Department of Agriculture, USDA Natural Resources Conservation Service	Honolulu	ні	96850
Nainoa Thompson	Nainoa Thompson			
Morgan Timeche				
Christopher Tipton				
Thomas Tizard		Kailua	HI	96734
Alvin Toda				
Alan Tokunaga				
Lili'u Tomasello		Waimanalo	HI	
Momi Tong		Ola`a	HI	
Jasmine Torres				
Michael Tosatto	U.S. Department of Commerce, NOAA, National Marine Fisheries Service, Pacific Islands Regional Office	Honolulu	HI	96818
Jean Toyama		Honolulu	HI	96813
Jean Toyama				
Kaui Trainer		Hilo	HI	96720
Mililani Trask	Na Koa Ikaika Ka Lahui Hawaiʻi	Hilo	HI	96720
Natalie Trevino		Fraser	MI	
Mary Katherine & Paul Trevithick		Kailua-Kona		

Name	Organization	City	State	Zip
Mary True		Pepe'ekeo	HI	-
Russell Tsuji	Department of Land and Natural Resources, Land Division	Honolulu	HI	96813
Ash Tsuji				
Damon Tucker				
L V Tucker		Kapa'au	HI	96755
Marcy Ulep		Makawao	HI	96768
Carl Ullerich		Hilo	HI	96720
Mary Urena		Hilo	HI	96720
Isis Usborne		Aiea	HI	
Georgina Valles		Oxnard	CA	
Rob Van Green				
Bettie Van Overbeke		Hakalau	HI	96710
Jen Vasquez		Tigard	OR	97224
Tiffany Vasquez		Oakland	CA	
Christian Veillet		Kamuela	HI	96743
Glen Venezio		San Juan	PR	911
Hamana Ventura	County of Hawai'i, Department of Finance - Property Management Division	Hilo	НІ	96720
Dwight Vicente		Hilo	HI	96720
Hanalei Vierra		San Diego	cA	
Melissa Virtue				
Carla Von				
Theone Vredenburg				
Ann Malluwa Wadu		Arlington	VA	
Rick Wagner		Honolulu	HI	96821
Jessica Waia'u		Hiki	HI	
Lorraine Waianuhea	University of Hawaii at Mānoa			
Tim Waite	Simpson Strong-Tie Company	Kapolei	HI	96707
Glenn Wakai	State Senator Glenn Wakai	Honolulu	HI	96813
margaret Walker	Coldwell Banker	Honolulu	HI	96825
Kahiau Wallace		Kahana, Oʻahu		
Christine Walters		Honolulu	HI	96822
Kelden Waltjen	County of Hawai'i, Office of the Prosecuting Attorney	Hilo	HI	96720
Diane Wane		Volcano	HI	96785
Deborah Ward		Kurtistown	HI	96760
Laurence Ward		Honolulu	HI	96816
Bob Ware		TOTOTULU	111	70010

Name	Organization	City	State	Zip
	Perpetuating Unique			
Keahi Warfield	Educational			
	Opportunities, Inc.			
Taylor Warner		Salt Lake City	UT	
Rick Warshauer		Volcano	HI	96785
Joseph Wat		Honolulu	HI	
Miranda Watson		Keauhou	HI	96739
Hema K. Watson	Halau Ku Mana Charter School			
Dharma (Darlene) Wease		Princeville	HI	96722
Dr. Charles W. Weems				
Valerie Weiss		Kapa'a		
Elizabeth Weitz		Honolulu	HI	
Sigouin Wendie Wendie		Honolulu	HI	96821
Leimomi Wheeler		Keaau	HI	96749
Melissa Wheeler		Naalehu	HI	96772
John White		KAMUELA	HI	96810
Marge White		Kamuela	HI	96743
Robert Whiteley	Asgard Research	Denver	СО	80238
Amy Wiecking		Kae'ohe	HI	96744
Mel Wildman			HI	
Makena Willette		Hollister	CA	
		Kuiaha, Ha'iku,		
Kaneali'ikeikioka'aina Williams		Hamakualoa,	HI	
		Maui		
Jonathan Williams				
Robert Willing		Hauula	HI	
Teal Willingham		Kailua	HI	
Ross Wilson	Current Events			
Pete Wilson		Pāhoa	HI	96778
Cam Wipper		Pepeekeo	HI	96783
Taffi Wise	Kanu o ka Aina	Kamuela	HI	96743
	Learning Ohana	Kainuela	пі	90745
Larry Wiss				
David Wissmar		waikoloa	HI	96738
Kanon Withington		Hawi	HI	96719
Joseph Wolf				
Joyce Wond		Honolulu	HI	
	U.S. Department of			
	Transportation, Federal			
	Aviation			
Gordon Wong	Administration,	Honolulu	HI	96850
	Western-Pacific			
	Region, Airports			
		1	1	1
	Division			
Dana Wong	Division Hawaii's Thousand Friends	Kailua	HI	96734

Name	Organization	City	State	Zip
Sabrina Wong	<u>y</u>	Honolulu	HI	
Maile Wong		Honolulu	HI	
Troy Wong		Kapa\'a	HI	
Gail Wong				
Noe Noe Wong Wilson				
Alec Wong, P.E.	Department of Health, Clean Water Branch	Pearl City	HI	96782
Noe Noe Wong-Wilson	Hawaiian Civic Club of Hilo	Hilo	HI	96721
Napali Woode	Ncouncil for Native Hawaiian Advancement	Kapolei	HI	96707
Napali Woode	Native Hawaiian Economic Alliance	Kapolei	HI	96707
Fairin Woods		Lawai	HI	96765
Ulalia Woodside	Nature Conservancy of Hawaii	Honolulu	HI	96817
Matt Wordeman	Friends of Haleakala National Park	Makawao	HI	96768
Pat Wright	Paradise Safaris, Inc. dba Mauna Kea Summit Adventures			
Jesse Wu		Hilo	HI	96720
Richard Wurdeman				
Alison Yahna		Naalehu	HI	96772
Nadav Yair			Israel, Samaria	
Bert Yamamoto				
Nicolas Yamasaki				
Jarmaine Yamashiro		Kailua	HI	
Annie Yamashiro		'Ewa	HI	
Doris Yang		Honolulu	HI	
Weston Yap	Kupunakalo			
Paul Yee				
Aileen yeh		Hilo	HI	96720
Ruth Yender		Kailua	HI	96734
Berkeley Yoshida	Hawaiian Civic Club of Ka'ū	Ocean View	HI	96737
Michitoshi Yoshida	Subaru (National Astronomical Observatory of Japan)			
Miles Yoshioka	Hawaiʻi Island Chamber of Commerce	Hilo	HI	96720
Peter Young				
Jennifer Kau'i Young		Kealakekua	HI	96750
Koa Young		Kōloa	HI	
Frank Young				
Phyllis and Lanny Younger		New Lenox	IL	60451
Nathan Yuen		Honolulu	HI	

Name	Organization	City	State	Zip
Joy Yukumoto		Kaneohe	HI	96744
Ty Yun				
Pablo Yurkievich		Honolulu	HI	96814
Douglas Zang				
Martin Zebzda		Kihei	HI	96753
Boyang Zhang		Honolulu	HI	96848
	Conservation Council			
Marjorie Ziegler	for Hawaii	Honolulu	HI	96802
Alice Zumbé		Düsseldorf	Germany	
	U.S. Department of Homeland Security, Federal Emergency Management Agency	Fort Shafter	HI	96858
	Honolulu Advertiser	Honolulu	HI	96813
	Hawaii Tribune Herald	Hilo	HI	96720
	West Hawaii Today	Kailua-Kona	HI	96740
	Pacific Business News	Honolulu	HI	96813
	Honolulu Civil Beat	Honolulu	HI	96816
	Hawaiian Telcom			
	U.S. Senator Brian Schatz			
	U.S. Senator Mazie Hirono			
	State Senator Laura Acasio	Honolulu	HI	96813
	State Senator Joy A. San Buenaventura	Honolulu	HI	96813
	State Senator Dru Mamo Kanuha	Honolulu	HI	96813
	State Senator Lorraine Inouye	Honolulu	HI	96813
	State Representative Mark M. Nakashima - repeat	Honolulu	ні	96813
	State Representative Chris Todd	Honolulu	HI	96813
	State Representative Richard Onishi	Honolulu	HI	96813
	State Representative Greggor Ilagan	Honolulu	HI	96813
	State Representative Jeanne Kapela - repeat	Honolulu	HI	96813
	State Representative Nicole Lowen	Honolulu	HI	96813
	State Representative David A. Tarnas	Honolulu	HI	96813
	Mayor, County of Hawai'i, Mitch Roth	Hilo	HI	96720

Name	Organization	City	State	Zip
	Hawaiʻi County Council, Chairman	Kailua-Kona	HI	96740
	Maile David			
	Hawai'i County			
	Council, Vice Chair	Hilo	HI	96720
	Aaron Chung			
	Hawai'i County	ILL	TTT	06720
	Councilmember Heather L. Kimball	Hilo	HI	96720
	Hawai'i County			
	Councilperson Susan	Hilo	HI	96720
	"Sue" L.K. Lee Loy	1110		20720
	Hawai'i County			
	Councilperson Ashley	Hilo	HI	96720
	Lehualani Kierkiewicz			
	Hawai'i County			
	Councilperson Matt	Hilo	HI	96720
	Kaneali'i-Kleinfelder			
	Hawai'i County			
	Councilperson Rebecca	Kailua-Kona	HI	96740
	Villegas			
	Hawai'i County	Kailua-Kona	HI	96740
	Councilperson Holeka Goro Inaba	Kallua-Kolla	пі	90740
	Hawai'i County			
	Councilperson Herbert	Waimea	HI	
	M. Richards III, DVM	() united		
	State Senator Mike	TT 11	111	0(012
	Gabbard	Honolulu	HI	96813
	State Senator Clarence	Honolulu	HI	96813
	K. Nishihara	Honorata	111	90015
	State Senator Michelle	Honolulu	HI	96813
	N. Kidani	1101101010		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
	State Senator Donna	Honolulu	HI	96813
	Mercado Kim			
	State Senator Maile S.L. Shimabukuro	Honolulu	HI	96813
	State Senator Jarrett			
	Keohokalole	Honolulu	HI	96813
	State Representative			
	Justin H. Woodson	Honolulu	HI	96813
	State Representative	TT 1 1		0.6912
	Nicole E. Lowen	Honolulu	HI	96813
	State Representative	Honolulu	HI	96813
	Lisa Marten	TOTOTUTU	111	70013
	State Representative	Honolulu	HI	96813
	Gregg Takayama	Infontutu		70015
	State Representative	Honolulu	HI	96813
	Linda Clark			/ 0010

Name	Organization	City	State	Zip
	State Representative Lynn DeCoite	Honolulu	HI	96813
	State Representative	Honolulu	HI	96813
	Scot Z. Matayoshi	Honolulu		70015
	State Representative	Honolulu	HI	96813
	Patrick Pihana Branco			
	State Representative			
	Jackson D. Sayama			
	State Representative Henry J.C. Aquino			
	Hawaiian Ecosystems			
	at Risk	Puunene	HI	96784
	Mauna Kea			
	Recreational Users	Hilo	HI	96720
	Group	inio		20120
	Bishop Museum	Honolulu	HI	96817
	Hawaiian Historical			
	Society	Honolulu	HI	96813
	Na Maka o ka 'Āina	Nā'ālehu	HI	96772
	Hawaii Ecotourism	TT 1 1		
	Association	Honolulu	HI	96839
	University of Hawai'i at			
	Hilo, College of			
	Agriculture, Forestry,	Hilo	HI	96720
	and Natural Resource			
	Management			
	University of Hawai'i at			
	Mānoa, College of	Honolulu	HI	96822
	Tropical Agriculture	Tionolulu	111	90822
	and Human Resources			
Inge Heyer		Hilo	HI	96720
	Chancellor's Maunakea			
	Advisory Committee			
	Pūkoʻa Council			
	Kualii Council			
	Hanakahi Council			
	Hoʻolulu Council			
	Hawaiian Haoles, Inc.			
	dba Hawaiian Eyes			
	Tours			
	TMT International			
	Observatory			
President	Keaukaha Homestead			
Lisa				
Myka				
Liliana				
Kapana	Halaukumana			
Joycelyn				

Name	Organization	City	State	Zip
	MKO Directors			
	MK Communicators			
Anonymous				
Anonymous				
Anonymous				

5 PRESS RELEASES AND MEDIA PICKUPS

Date	Medium	Name	Link
Press Relea	ase #1, on 3/1.	2022 Regarding Availably of Draft	CMP Supplement for Public Review and
Comment			
3/1/2022	TV	KITV-ABC; KITV Island News at 6:00 PM	
3/1/2022	TV	KIKU-IND; KITV Island News at 6:00 PM	
3/1/2022	Online	Big Island Gazette	https://bigislandgazette.com/public-asked-to- participate-in-update-to-maunakea-management- plan/
3/2/2022	Online	Big Island Now	https://bigislandnow.com/2022/03/01/public- input-sought-on-update-maunakea-management- plan/
3/2/2022	TV	KITV-ABC; Good Morning Hawaiʻi at 5:30 AM	
3/2/2022	TV	KIKU-IND; Good Morning Hawaiʻi at 5:30 AM	
3/2/2022	Radio	KAPA-FM; KAPA-FM Big Island 6:00 AM	
3/2/2022	Radio	KAPA-FM; KAPA-FM Big Island 6:00 AM	
3/2/2022	TV	KITV-ABC; Good Morning Hawaiʻi at 6:30 AM	
3/2/2022	TV	KIKU-IND; Good Morning Hawaiʻi at 6:30 AM	
3/2/2022	TV	KIKU-IND; Good Morning Hawaiʻi at 7:00 AM	
3/2/2022	Radio	KAPA-FM; KAPA-FM Big Island 7:00 AM	
3/2/2022	Radio	KAPA-FM; KAPA-FM Big Island 7:00 AM	
3/2/2022	Radio	KAPA-FM; KAPA-FM Big Island 8:00 AM	
3/3/2022	Social Media	Instagram: malamamaunakea	
3/9/2022	Social Mecia	Facebook: Center for Maunakea Stewardship	
Press Relea	ase #2, on 3/1	4/2022, Regarding Draft CMP Supp	lement for Public Review and Comment
3/14/2022	Online	Big Island Video News	https://www.bigislandvideonews.com/2022/03/1 4/uh-seeks-public-feeback-on-maunakea- management-plan/
3/14/2022	TV	KHNL-NBC; Hawaii News Now on KHNL at 4:30 PM	
3/15/2022	TV	KGMB-CBS; Sunrise on KGMB at 4:30 AM	
3/15/2022	TV	KHNL-NBC; Sunrise on KHNL at 6:00 AM	
3/15/2022	TV	KGMB-CBS; Sunrise on KGMB at 6:00 AM	
3/15/2022	TV	KGMB-CBS; Sunrise on KGMB at 7:30 AM	

Date	Medium	Name	Link
3/15/2022	TV	KFVE-MNT; Sunrise on K-5 at	
		7:30 AM	
3/15/2022	Online	The Hawaii Free Press	http://www.hawaiifreepress.com/Articles-
			Main/ID/30236/Public-feedback-needed-for-
			update-to-Maunakea-management-plan
3/15/2022	Blog	All Hawaii News	https://www.allhawaiinews.com/2022/03/homele
2/1 5/2022			ss-program-could-be-extended-raw.html
3/15/2022	Social	Facebook: Center for Maunakea	
3/16/2022	Media	Stewardship Dia alilaa	https://www.hlaslikes.com/hlass/2022.02
3/10/2022	Blog	Bloglikes	https://www.bloglikes.com/blogs/2022-03- 15/homeless-program-could-be-extended-raw-
			milk-sales-could-be-legalized-home-prices-top-
			1-1m-median-more-news-from-all-the-hawaiian-
			islands
Press Relea	ase #3 on 3/3	0/2022, Regarding end of Public Co	
3/30/2022	TV	KHNL-NBC; Hawai'i News Now	
515012022	1 4	on KHNL at 5:00 PM	
3/30/2022	TV	KGMB-CBS; Hawai'i News Now	
		on KGMB at 5:00 PM	
3/30/2022	TV	KHNL-NBC; Hawai'i News Now	
		on KHNL at 5:30 PM	
3/30/2022	TV	KITV-ABC; KITV Island News	
		at 6:30 PM	
3/30/2022	TV	KIKU-IND; KITV Island News at	
		6:30 PM	
3/30/2022	TV	KFVE-MNT; Hawai'i News Now	
2/20/2022		on K-5 at 9:00 PM	
3/30/2022	TV	KHNL-NBC; Hawai'i News Now	
3/30/2022	TV	on KHNL at 10:00 PM KGMB-CBS; Hawaiʻi News Now	
5/30/2022	1 v	on KGMB at 10:00 PM	
3/30/2022	TV	KFVE-MNT; Hawai'i News Now	
5/ 50/ 2022	1 4	at 11:00 PM	
3/31/2022	TV	KHNL-NBC; Sunrise on KHNL	
		at 5:00 AM	
3/31/2022	TV	KGMB-CBS; Sunrise on KGMB	
		at 5:00 AM	
3/31/2022	TV	KITV-ABC; Good Morning	
		Hawai'i at 6:00 AM	
3/31/2022	TV	KIKU-IND; Good Morning	
		Hawai'i at 6:00 AM	
3/31/2022	TV	KHNL-NBC; Sunrise on KHNL	
2/21/2022	TV	at 6:00 AM	
3/31/2022	TV	KGMB-CBS; Sunrise on KGMB	
3/31/2022	TV	at 6:00 AM KGMB-CBS; Sunrise on KGMB	
5/51/2022	I V	at 7:00 AM	
3/31/2022	TV	KFVE-MNT; Sunrise on K-5 at	
5,51,2022		7:00 AM	
3/31/2022	TV	KIKU-IND; Good Morning	
		Hawai'i at 7:30 AM	
3/31/2022	TV	KFVE-MNT; Sunrise on K-5 at	
		8:00 AM	

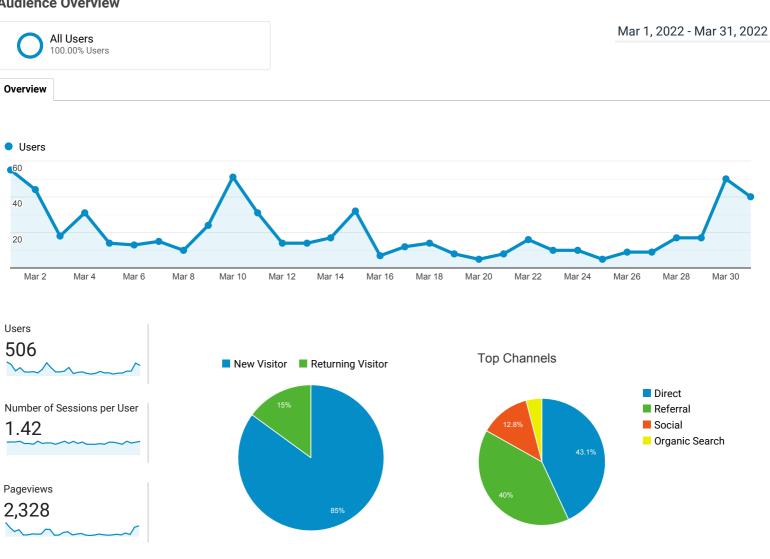
6 KONVEIO WEBSITE GOOGLE ANALYTICS REPORT

The following pages provides a summary of the traffic to the <u>https://maunakea.konveio.com/</u> website during the Draft CMP Supplement comment period. The report indicates that the outreach efforts summarized above resulted in 506 users visiting the website during the comment period.

Analytics Public Draft CMP 2022 Supplement All Web Site Data

Audience Overview

...



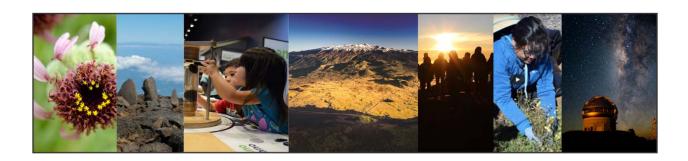
C	Country	Users	% Users
1.	United States	479	94.29%
2.	China	10	1.97%
3.	Japan	6	1.18%
4.	Sweden	3	0.59%
5.	Ireland	2	0.39%

	City	Users	% Users
1.	Honolulu	128	24.52%
2.	Hilo	70	13.41%
3.	Los Angeles	23	4.41%
4.	Kailua-Kona	20	3.83%
5.	Ashburn	18	3.45%
6.	(not set)	12	2.30%
7.	Waimea	12	2.30%
8.	Kalaoa	12	2.30%
9.	Kaneohe	10	1.92%
10	. Denver	7	1.34%

7 INPUT RECEIVED VIA KONVEIO WEBSITE COMMENTING TOOL

DRAFT COMPREHENSIVE MANAGEMENT PLAN 2022 Supplement: MANAGEMENT ACTION UPDATES

COMPREHENSIVE MANAGEMENT ACTION MEU-2



AVAILABLE FOR PUBLIC REVIEW FROM MARCH 1 THROUGH MARCH 31, 2022

PREPARED FOR: University of Hawai'i

PREPARED BY: Planning Solutions, Inc. Ho'okuleana, LLC

MARCH 1, 2022

Posted by STEPHEN FISCHER on 03/01/2022 at 3:50pm [Comment ID: 559]

Type: Suggestion

Agree: 0, Disagree: 0

I feel the proposed management document is a poorly disguised attempt to remove all science work from the maunas. The fact that the ancient Hawaiians used Mauna Kea for astronomy to assist in their daily lives is disregarded. Also, the committee membership seems to be based on racial considerations, a patently unconstitutional requirement.

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Posted by Helaakaiminaauao on 03/17/2022 at 8:29pm [Comment ID: 569]

Type: Suggestion

Agree: 0, Disagree: 0

This is a comprehensive and extensive plan which attempts to include all stakeholders. It is in-depth and detailed. I applaud and support this plan to move forward.

FOREWORD

In 2009 the Board of Land and Natural Resources (BLNR) approved the Maunakea Comprehensive Management Plan (2009 CMP) prepared by the University of Hawai'i (UH). Consistent with Hawai'i Administrative Rules (HAR) § 13-5-2, the 2009 CMP is UH's



"comprehensive plan to manage multiple uses and activities in order to protect and conserve natural and cultural resources." achieve comprehensive To management of the UH Management Areas, the 2009 CMP laid out 12 subjects, each with a desired outcome, and management actions (103 in total) designed to achieve the desired outcome. As specified in the 2009 CMP, status reports and periodic updates/supplements are to be

conducted to ensure the management actions remain relevant and sufficient to achieve the desired outcomes based on experience, data, and learning. While annual reports on the status of UH's implementation of the CMP have been submitted to BLNR this is the first review and update that will benefit from an Outcome Analysis Report of the CMP management actions.

Ecosystem management is a complex process, so the 2009 CMP was developed and based on the principle of adaptive management. Adaptive management is defined in the 2009 CMP as:

[A] systematic process for continually improving management policies and practices for resource protection by learning from the outcomes of past and current management activities. Adaptive management recognizes that there is a level of uncertainty about the "best" policy or practice for a particular management issue, and therefore requires that each management decision be revisited in the future to determine if it is providing the desired outcome.

As discussed in the Introduction (Chapter 1) of this supplement, some management actions are substantively changed based on what we have learned since 2009 while others are not. Where changes are made, the reasons for the changes are provided; at their core, all changes are made to improve management and UH's ability to achieve the desired outcome associated with the subject. What remains unwavering is UH's sustained commitment and responsibility to manage multiple uses and activities to protect and conserve natural and cultural resources.

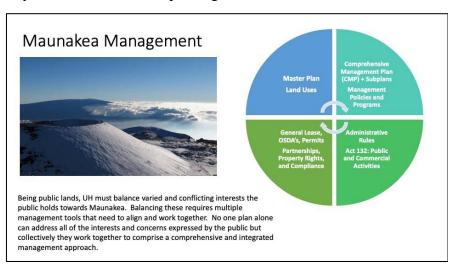
Maunakea is linked to the culture and cosmology of Native Hawaiian people, and for many the mauna is sacred. Its resources serve as the source for a diverse range of spiritual, research, educational, recreational, and subsistence experiences that all contribute to the significance of Maunakea. Its extraordinary blend of topographic and atmospheric qualities makes Maunakea the most desirable location for ground-based astronomy in the Northern Hemisphere, and the exceptional combination of alpine and subalpine ecosystems in a tropical environment make it

ecologically unique as well. Managing for the protection of this range of valued resources, and the activities and uses that may impact them, requires the kind of holistic and integrated approach articulated in the 2009 CMP.

As UH was in the process of evaluating and updating the 2009 CMP, the 2022 State House of Representatives created the Mauna Kea Working Group (MKWG) to engage in a separate process to explore governance options for managing Maunakea. The MKWG prepared a report ("HE LĀ HOU KĒIA MA MAUNA A WĀKEA: A NEW DAY ON MAUNA A WĀKEA") to the legislature, which included a discussion of the Kānāwai principles. We acknowledge and appreciate the holistic and integrated approach of the Kānāwai principles described in the MKWG Report. While our learning and integration of culturally- and data-based ecosystem management is an ongoing process these principles are consistent with existing UH plans for Maunakea. The symbiotic connections between the elements of nature, and of nature with humans, emphasizes the importance of sustaining balance between these forms. These principles are valuable guidelines for land use planning and decision making.

We understand that astronomy on Maunakea is a privilege that comes with the kuleana of

stewardship which itself requires a comprehensive and cohesive management program given the unique nature of the resources we are responsible to protect. UH embraces its responsibilities to Maunakea, which are reflected in the integrated and balanced nature of our 2022 Master Plan, our 2009 CMP and this supplement, and HAR Chapter 20-26, entitled



"Public and Commercial Activities on Mauna Kea Lands" (Maunakea Administrative Rules) that collectively and specifically outline our commitments and responsibilities to Maunakea, the state, and the communities we serve.

Posted by john powers on 03/22/2022 at 3:02pm [Comment ID: 571]

Type: Suggestion

Agree: 0, Disagree: 0

The proposed supplement is overtly unconstitutional in its pandering to traditional, and newly-invented 'woke' quasi-religious Hawaiian ideology. The USA is a Constitutional Republic and Hawaii is a part of the USA. The supplement is Constitutionally null and void as presented.

The people of Hawaii, especially anti-Astronomy activists posing as 'Cultural Practitioners', need to understand a basic fact. If Hawaii descends to the level of being nothing more than an island of eaters who militantly reject contributing anything of value to the USA, why should the food barges and welfare checks keep coming here? This is a serious question. And nobody cares that Hawaii was not an independent country for the Japanese to annihilate in the early 20th Century.

Astronomy and HI-TEK is the future of Hawaii, or Hawaii becomes the Marshall Islands.

LIST OF ACRONYMS

ACT	Activities and Uses
AMP	Archaeological Monitoring Plan
AR	Astronomical Resources
ACT	Activities, and Uses
BLNR	Board of Land and Natural Resources
BMP	Best Management Practices
BOR	UH Board of Regents
BTP	Burial Treatment Plan
C	Construction Guidelines
CDUA	Conservation District Use Application
CDUR	Conservation District Use Permits
CIP	Capital Improvement Program
CMP	Comprehensive Management Plan
CMS	Comprehensive Management Flan Center for Maunakea Stewardship
CMS	Cultural Resources
CRMP	Cultural Resources Management Plan
CSO	Caltech Submillimeter Observatory
DBEDT	Department of Business, Economic Development & Tourism
DHHL	Department of Hawaiian Home Lands
DLNR	Department of Land and Natural Resources
DOFAW	Division of Forestry and Wildlife (DLNR)
DOCARE	Division of Conservation and Resources Enforcement (DLNR)
DOCARE	U.S. Department of Defense
EA	Environmental Assessment
EC	Environment Committee
EIS	Environmental Impact Statement
EISPN	EIS Preparation Notice
EO	Education and Outreach
FLU	Considering Future Land Use
HAR	Hawai'i Administrative Rules
HP	Halepōhaku
HRS	Hawai'i Revised Statutes
ICM	Independent Construction Monitor
IM	Infrastructure and Maintenance
IRM	Interpretive Resource Manual
KKM	Kahu Kū Mauna
LEED	Leadership in Energy and Environmental Design
MEU	Monitoring, Evaluation and Updates
MEOP	Maunakea Education and Outreach Plan
MKMB	Maunakea Management Board
MKO	Maunakea Observatories
	mumaked Observatories

MKSR	Mauna Kea Science Reserve
MKSS	Mauna Kea Observatory Support Services
NAR	Natural Area Reserve
NARS	Natural Area Reserve System (DLNR)
NOI	Notice of Intent
NR	Natural Resources
NRMP	Natural Resources Management Plan
OAR	Outcome Analysis Report
OCCL	Office of Conservation and Coastal Lands (DLNR)
OI	Operations and Implementation
O&M	Operations and Maintenance
OMKM	Office of Mauna Kea Management
OMMP	Operations, Monitoring and Maintenance Plan
Р	Permitting and Enforcement
RFI	Radio Frequency Interference
SHPD	State Historic Preservation Division (DLNR)
SOP	Standard Operating Procedures
SR	Site Recycling, Decommissioning, Demolition, and Restoration
TCP	Traditional Cultural Property
TMT	Thirty Meter Telescope
UH	University of Hawai'i
UH Hilo	University of Hawai'i at Hilo
USFWS	U.S. Fish and Wildlife Service
VIS	Visitor Information Station

1 INTRODUCTION

1.1 PURPOSE OF THIS SUPPLEMENT

The purpose of this document is to supplement the *Mauna Kea Comprehensive Management Plan* (2009 CMP) (Ho'akea, LLC dba Ku'iwalu, April 2009). The 2009 CMP can be downloaded from <u>https://hilo.hawaii.edu/maunakea/stewardship/management-plans-and-updates</u>. Section 1.2 of this document replaces Section 3.1.1 of the 2009 CMP and all other parts of this document replace Chapter 7 of the 2009 CMP. This CMP 2022 Supplement does not propose new activities or land uses.

This supplement, together with the Outcome Analysis Report (Center for Maunakea Stewardship, August 2021) (2021 OAR) (Appendix A) and other annual reports submitted by UH to DLNR, is part of a "systematic process for continually improving management policies and practices for resource protection by learning from the outcomes of past and current management activities," what the 2009 CMP refers to as "adaptive management."¹ This process allows resource managers and stewards to decide whether to continue a management action or to change course and refine them, based on lessons learned, input from resource experts, Native Hawaiian cultural practitioners, agencies, and others familiar with particular resources.²

This supplement also provides clear and transparent measurements of accountability and progress for implementers, primarily through the University of Hawai'i at Hilo (UH Hilo) Center for Maunakea Stewardship (CMS), and those overseeing and advising UH's implementation (the Department and Board of Land and Natural Resources (BLNR/DLNR), the Environment Committee (EC), the Kahu Kū Mauna Council (KKM), and Maunakea Management Board (MKMB)), and the interested public.

1.2 UPDATE TO LOCATION AND DESCRIPTION OF UH MANAGEMENT AREAS

In April 2009, the Board of Land and Natural Resources (BLNR) approved, subject to conditions, the CMP, an exhaustive and overarching plan guiding UH's administration of the "UH Management Areas."

This section replaces Section 3.1.1 of the 2009 CMP and updates the definition of "UH Management Areas." The term "UH Management Areas" will be synonymous with "Mauna Kea lands," which are defined under Hawai'i Revised Statutes (HRS) § 304A-1901 as:

... the lands that the University of Hawaii is leasing from the board of land and natural resources, including the Mauna Kea Science Reserve, Hale Pohaku, the connecting roadway corridor between Hale Pohaku and the Mauna Kea Science Reserve, and any other lands on Mauna Kea that the University of Hawaii leases or over which the University of Hawaii acquires control or jurisdiction.

¹ Adaptive management is defined as a systematic process for continually improving management policies and practices for resource protection by learning from the outcomes of past and current management activities. Adaptive management recognizes that there is a level of uncertainty about the "best" policy or practice for a particular management issue, and therefore requires that each management decision be revisited in the future to determine if it is providing the desired outcome.

² Resources is defined as the natural environment or human practices, values, and traditions and their physical manifestations.

The UH Maunakea Lands or UH Management Areas presently consist of two parcels that UH leases and the portion of a third parcel over which UH holds a non-exclusive easement (Figure 1.1):

- Parcel TMK 4-4-015:009 via General Lease S-4191, which expires December 31, 2033. This 11,287.854-acre parcel is called the Mauna Kea Science Reserve (MKSR).
- Parcel TMK 4-4-015:012 via General Lease S-5529, which expires in 2041. This 19.261-acre parcel is known as Halepōhaku.
- Portion of parcel TMK 4-4-015:012 under a non-exclusive roadway easement. This easement, which encompasses 70.798 acres, contains the roadway between the two leased parcels.

Over the life of the UH's tenancy on Maunakea the specific area that falls within UH Maunakea Lands, and thus the UH Management Areas, may change. This CMP is only binding on the UH Maunakea Lands.³ If UH Maunakea Lands are modified as the extent of land that UH has control or jurisdiction changes, this CMP will govern only those lands still authorized for use by UH, without the need to amend the CMP.

This CMP supplement does not propose expanding or contracting the UH Maunakea Lands.

³ The CMP does not apply to areas not defined as UH Management Areas, although UH has actively sought coordination and consultation with neighboring landowners such as BLNR, DHHL, and others, since species and cultural resources, for example, know no boundaries.

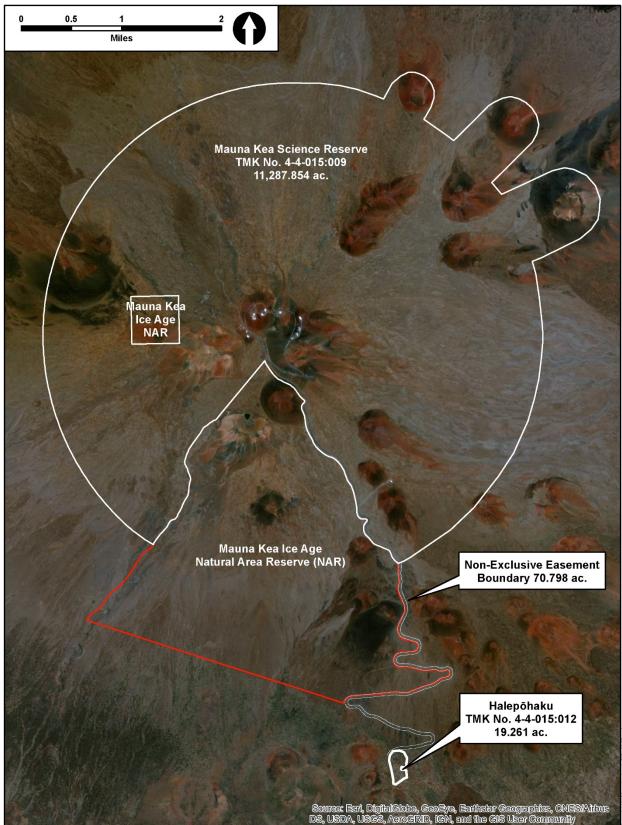
Posted by wildernesswalker on 03/31/2022 at 9:35pm [Comment ID: 600]

Type: Correction

Agree: 0, Disagree: 0

The use of the description "UH Maunakea lands" does not make clear that the lands are kingdom and government lands held in trust for the Native Hawaiian beneficiaries, and the lands are currently being leased by UH for a Mauna Kea Science Reserve, until the lease expires in 2033.





Source: Planning Solutions, Inc. (PSI)

1.3 OVERVIEW OF COMPREHENSIVE MANAGEMENT PLAN COMPONENTS

This section describes the structure of the remainder of this document, which is divided into 12 subjects with management actions associated with each of them; the 12 subjects are:

- 1. Cultural resources (CR)
- 2. Natural resources (NR)
- 3. Education and outreach activities (EO)
- 4. Astronomical resources, activities, and uses (AR)
- 5. Activities and uses (ACT)
- 6. Permitting and enforcement (P)
- 7. Infrastructure and maintenance (IM)
- 8. Construction guidelines (C)
- 9. Site recycling, decommissioning, demolition, and restoration (SR)
- 10. Considering future land use (FLU)
- 11. Operations and implementation (OI)
- 12. Monitoring, evaluation, and updates (MEU)

Each of the 12 subjects has its own chapter in this document (Chapters 3 through 14) with the following subsections:

- <u>Introduction</u>, which provides a brief background and identifies the section of the 2021 OAR (Appendix A) where information concerning the current status of the topic can be found.
- <u>Desired Outcome</u>, which summarizes the goal(s) associated with the subject. The desired outcomes have not substantially changed; UH's remains committed to achieving the desired outcomes approved in 2009.
- <u>Need</u>, which provides a brief high-level discussion of why the subject and its management actions are needed to advance proper management of the UH Management Areas.
- <u>Management Actions</u>, which provides details regarding each of the subject's ongoing management actions. This document updates the CMP management actions, where warranted, per management action MEU-2 to better realize the desired outcomes using adaptive management techniques that considered lessons learned, information collected, and input received since the CMP was adopted.⁴ In some cases the management actions in this supplement remain nearly identical to their original 2009 version. In other cases, they have been substantially adapted. At a minimum, the management actions have been adapted to be consistent with HAR Chapter 20-26, titled *Public and Commercial Activities on Mauna Kea Lands* (Maunakea Administrative Rules) and that did not exist in 2009; the *Master Plan for the University of Hawai'i Maunakea Lands*, *E O I Ka Leo (Listen to the Voice)* (Planning).

⁴ As discussed in Chapter 2, fourteen (14) of the 103 management actions in the original 2009 CMP have been completed and are therefore not discussed outside of Chapter 2 in this document. That is why some management action numbers are missing. For example, management action CR-5 through CR-9 are complete; therefore, the reader will find management actions CR-1 through CR-4 and then CR-10 in this document.

Solutions, Inc., January 2022) (2022 Master Plan), which is substantially different than the 2000 Master Plan; and UH's Maunakea governance structure as of 2021. In all cases, this document provides the complete management action; there is no need to refer to the 2009 CMP or its four "subplans."⁵

1.4 BACKGROUND AND CONTEXT

1.4.1 UH PLANS, LAND AUTHORIZATIONS, AND RULES APPLICABLE TO UH MANAGEMENT

The CMP is an integrated planning tool intended to enable wise resource management. It provides the framework for managing multiple existing and future activities, such as recreational and commercial activities, scientific research (e.g., astronomy), and cultural and religious activities, and for protecting Maunakea's unique cultural and natural resources. Together, UH's land authorizations, the CMP, and the Maunakea Administrative Rules provide both the guidance and the authority that UH needs to manage the UH Management Areas.

The only active plans relevant to UH decision-making regarding the UH Maunakea Lands are: (*i*) the CMP, which is periodically updated/supplemented and approved by the BOR and the BLNR; and (*ii*) the 2022 Master Plan, which was approved and adopted by UH. The CMP and the 2022 Master Plan are consistent and complement one another and are intended to be implemented together. The CMP addresses management of activities and resources. The 2022 Master Plan addresses the planning, siting, and design of new facilities and significant material changes to existing facilities.

<u>1.4.2</u> MAUNAKEA ADMINISTRATIVE RULES

The Maunakea Administrative Rules⁶ were adopted by the Board of Regents on November 6, 2019, and approved by the Governor on January 13, 2020, after the 2009 CMP and 2000 Master Plan. The adoption and approval of the Maunakea Administrative Rules completed CMP management action ACT-11 and addressed significant elements of many other management actions; the rules are an essential tool for managing and protecting resources.

The purpose of the Maunakea Administrative Rules under HAR § 20-26-1, is as follows:

"to provide for the proper use, management, and protection of cultural, natural, and scientific resources of the UH management areas; to promote public safety and welfare by regulating public and commercial activity within the UH management areas; to ensure safe and appropriate access to the UH management areas for the public; and to foster co-management with the department of land and natural resources in UH management areas."

Rangers are authorized to issue citations to enforce the Maunakea Administrative Rules under HAR § 20-26-74 (ACT-3, Section 7.4.3). To protect Maunakea's resources, civil violations under the Maunakea Administrative Rules include littering; parking in undesignated areas; and

⁵ The 2009 CMP (Ho'akea, LLC dba Ku'iwalu, April 2009), the four "subplans" (Pacific Consulting Services, Inc., October 2009), (Sustainable Resources Group International, Inc., September 2009), (Sustainable Resources Group International, Inc., January 2010a), and (Sustainable Resources Group International, Inc., January 2010b), the OAR (Center for Maunakea Stewardship, August 2021), and other annual reports submitted by UH to BLNR and/or DLNR provide historical and background information.

⁶ <u>https://www.hawaii.edu/offices/bor/adminrules/chapter26.pdf</u>.

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removing, injuring, or disturbing resources. The Maunakea Administrative Rules address public and commercial activities only within the UH Management Areas.

Under the Maunakea Administrative Rules, four types of permits are issued or reviewed by CMS: research, special use, commercial tour activity, and commercial film and recordings. Special use permits may allow activities otherwise prohibited under the rules. The permitting process allows for the consideration of a proposed activity's:

- Compatibility with the functions and purpose of the UH Management Areas, consistency with approved management plans;
- Potential effect on the surrounding resources, existing facilities, and the public's activities within the UH Management Areas;
- Compatibility with existing approved uses; and
- Compatibility with scheduled or ongoing construction, repairs, or maintenance activities.

The rules do not regulate Native Hawaiian traditional and customary rights. The Maunakea Administrative Rules explicitly acknowledge that "Native Hawaiian traditional and customary rights as recognized and protected under article XII, section 7, of the Hawai'i State Constitution shall not be abridged." Article XII, section 7, of the Hawai'i State Constitution provides that "The State reaffirms and shall protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by ahupua`a tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778, subject to the right of the State to regulate such rights."

<u>1.4.3</u> The CMP Management Action Update/Supplement Process

The authors of the 2009 CMP used the best information available at the time that it was adopted. At the same time, they recognized that the resource information would improve over time, new management structures might be introduced, and public opinions would continue to evolve as the community engagement effort that is part of the CMP (see management actions EO-7, EO-8, and others) was implemented. With these considerations in mind, the CMP noted that community cooperation in the long-term management of Maunakea's resources is essential if all its desired outcomes are to be achieved and the trust between the community and UH is to be rebuilt.

In accordance with the provisions of the CMP, CMS, which has replaced the Office of Mauna Kea Management (OMKM) as the entity responsible for overseeing the UH Maunakea Lands, prepared a *Draft Outcome Analysis Report* (Center for Maunakea Stewardship, April 2021) describing the progress that UH had made in implementing the management actions contained in the CMP and outlining the adaptations, adjustments, and changes that it believed should be made to those measures in the coming years. It circulated the draft OAR to agencies and advisors participating in the review process at the end of April 2021, and followed up over the following weeks with video-conference meetings with those agencies and advisors. It then used the written and oral feedback that it received to revise and finalize the OAR. The 2021 OAR (Center for Maunakea Stewardship, August 2021) (Appendix A), which reflects the feedback that was received from agencies and advisors participating in the review process, forms the basis of the updates and adaptations of the management actions in this document.

<u>1.4.4</u> UH MAUNAKEA GOVERNANCE STRUCTURE AND ROLES IN CMP IMPLEMENTATION

The CMP management actions will be implemented through the governance structure approved via a motion by the BOR. The BOR delegated responsibility for the governance and management of UH Maunakea Lands to UH Hilo, which is advised by the advisory groups listed below. UH Hilo has, in turn, created the Center for Maunakea Stewardship (CMS) to administer the lands. This governance structure is established through BOR motions and is outside the scope of the CMP management actions. The governance structure at the time this plan supplement was adopted is illustrated in Figure 1.2. The structure may be modified from time to time without requiring the CMP to be amended.

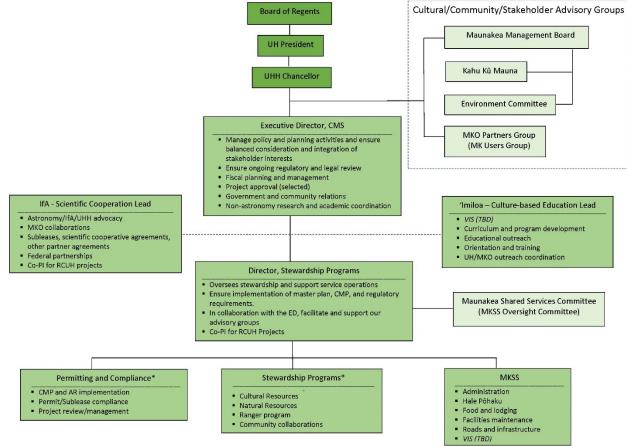


Figure 1.2: CMS Governance Structure, Established in 2020

 Notes:
 * Shown here for descriptive purposes. Organization of these functions to be finalized by Director of Stewardship Programs. The structure may be modified from time to time without triggering a need to amend this plan.

 Source:
 CMS

The "Cultural/Community/Stakeholder Advisory Groups" are important aspects of UH's governance and they fill important advisory roles on a regular basis as UH implements the CMP. These groups are:

• Maunakea Management Board (MKMB) provides the community with a sustained direct voice for the management of Maunakea. The Board is composed of seven members from the community nominated by the University of Hawai'i Hilo (UH Hilo) Chancellor and approved by the UH Board of Regents. The volunteer members represent a cross-section of the community and serve as the community's voice, providing input on operations and

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activities, developing policies, and reviewing and providing recommendations for land uses planned for Maunakea.

- Kahu Kū Mauna (Guardians of the Mountain) Council (KKM) is a community-based volunteer council whose members are from the Native Hawaiian community. KKM advises the CMS, MKMB, and the UH Hilo Chancellor on Hawaiian cultural matters affecting the UH Management Areas. They review proposed projects and give their input to MKMB, and a KKM member participates in MKMB discussions during its public meetings.
- Environmental Committee (EC) advises MKMB, CMS, and the UH Hilo Chancellor on environmental issues, protection and enhancement of the natural environment, and resource management practices to advance the stewardship of Maunakea's natural resources. The EC members serve as subject matter experts on environmental matters to support evidence-based, holistically evaluated planning, project management, and policy development by UH.
- Maunakea Observatories (MKO) advises CMS, Institute for Astronomy, 'Imiloa and the UH Hilo Chancellor on plans, policies, programs and operational issues of mutual interest.

1.4.5 ISSUES AND CONCERNS BEYOND THE SCOPE OF THE CMP

Through the extensive community outreach that took place during the review of the draft 2022 Master Plan and other efforts, it remains clear that the community has several concerns related to past and future activities on Maunakea and specifically within the UH Management Areas that went beyond the scope of the 2022 Master Plan and also go beyond the scope of the CMP 2022 Supplement. Some of these issues and concerns are listed below. Policy makers are urged to consider them in their broader decision making related to Maunakea.

- The existing general lease between UH and DLNR and/or the CDUP for the TMT projectoo6 (HA-3568) should, or should not, be terminated.
- A new land authorization that would allow for astronomy to continue on Maunakea beyond 2033 should, or should not, be awarded in the future.
- UH is, or is not, the appropriate entity to manage the cultural landscape and natural rescores in the summit region or access to this sensitive area.
- The UH Maunakea Lands were "stolen" from the Hawaiian Kingdon
- Whether or not the annexation of Hawai'i by the Union States was legal.
- The desire by some for Hawaiian soverei
- Whether or not the state's activities, uses, and management of Maunake cord with the United Nations Declaration on the Rights of Indigenous Peoples.

Posted by wildernesswalker on 03/31/2022 at 9:36pm [Comment ID: 601]

Type: Suggestion

Agree: 0, Disagree: 0

The Environment Committee does not currently have a member from the scientific community that reports to the MKMB, CMS, or UH Chancellor. At one time there was a specific member from the EC on the MKMB, but that practice seems to have been abandoned. A specific representative from DLNR was also a member of the MKMB at one time. Designation of these members to the MKMB could improve communication. MKMB should include one member from the EC and another from DLNR.

#006

Posted by Veronica Ohara on 03/26/2022 at 11:39am [Comment ID: 572]

Type: Suggestion

Agree: 0, Disagree: 0

As a Kanaka Maoli and UHM alumni I would like to see TMT built in the Maunakea Science Reserve, I would like to see astronomy continue in Hawaii. Astronomy contributes over \$13 million to Hawaii's economy, it's a clean industry and contributes to the stewardship of Maunakea.

#007

Posted by Veronica Ohara on 03/26/2022 at 11:42am [Comment ID: 573]

Type: Suggestion

Agree: 0, Disagree: 0

New land authorization for astronomy should be allowed in the future provided it meets with the standards of stewardship. Decommissioning of some observatories has been agreed to and this should continue.

#008

Posted by Veronica Ohara on 03/26/2022 at 11:46am [Comment ID: 574]

Type: Suggestion

Agree: 0, Disagree: 0

The UH is the appropriate entity to manage these lands, it has developed a system since the last tsunami destroyed Hilo. A careful approach to care of flora and fauna has been developed. Historic properties are looked after, this is critical because these relics remain 'in situ'. It's quite an effort on their part because most visitors, local and tourists don't understand the importance of keeping up the area.

#009

Posted by **Veronica Ohara** on **03/26/2022** at **12:05pm** [Comment ID: 578] *Type: Correction*

Agree: 0, Disagree: 0

There are Kanaka working at the telescopes on Maunakea. Kanaka are on scholarships from the same telescopes, scholarships for higher education. Kanaka and marginalized people of Hawaii benefit from the various scholarships and programs supported by all the observatories. Also the UH BOR Malama Maunakea Resolution has addressed issues of education for us, returning unused land and more. It's unfortunate that the TMT protesters refuse to recognize this. I cannot understand why Hawaii's own law makes are unaware of this important step, we must have the most informed politicians on the planet. Maunakea is used for our benefit and what is available goes beyond the UN Declaration of Rights of Indigenous Peoples.

#010

Posted by Veronica Ohara on 03/26/2022 at 11:49am [Comment ID: 575]

Type: Suggestion

Agree: 0, Disagree: 0

The UH Maunakea Lands were not "stolen" from the Hawaiian people, these lands remain intact and are managed by UH.

#011

Posted by Veronica Ohara on 03/26/2022 at 11:52am [Comment ID: 576]

Type: Suggestion

Agree: 0, Disagree: 0

This is another effort by the anti TMT protesters to remove every vestige of astronomy from Hawaii. Astronomy has been a cornerstone of education at our university and a critical part of education of Hawaii. I hope to see astronomy continue.

#012

Posted by Veronica Ohara on 03/26/2022 at 11:59am [Comment ID: 577]

Type: Suggestion

Agree: 0, Disagree: 0

Hawaiian sovereignty means different things to different people. It's been used to divide our communities and the spirit of aloha. I don't support segregating the people according to race, and the terms "settlor" is most offensive. Many families have lived in Hawaii for more than 4 generations, their blood and bones are in the land. Besides most Kanaka are mixed and very few are even 50%, hence the issues with DHHL. Astronomy and UH cannot be held responsible for issues of housing, land and infrastructure on DHHL. This problem is in the hands of the Federal Government/ Department of the Interior and DHHL. Not even OHA could manage to build homes for Kanaka in Kakaako, and that's a Hawaiian governing organization.

2 COMPLETED MANAGEMENT ACTIONS

As documented in the 2021 OAR, UH has completed 14 of the management actions identified in the 2009 CMP.⁸ Those actions are listed in Table 2.1 below. To learn how UH completed these management actions please see the section in the 2021 OAR (Appendix A) stated in the right column of the table.

Table 2.1	Completed Management Actions
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Mgmt. Action	Description	For Completion Details See OAR Section		
CR-5	Develop and adopt guidelines for the culturally appropriate placement and removal of offerings.			
CR-6	Develop and adopt guidelines for the visitation and use of ancient shrines.			
CR-7	Kahu Kū Mauna (KKM) shall take the lead in determining the appropriateness of constructing new Hawaiian cultural features.	2.1.3.7		
CR-8	Develop and adopt a management guideline for the UH Management Area the scattering of cremated human remains.	2.1.3.8		
CR-9	A management guideline for the culturally appropriateness of building ahu or "stacking of rocks" will need to be developed by KKM who means a policies adopted by Hawai'i Volcanoes National Park.	2.1.3.9		
CR-11	Complete an archaeological survey of the portions of the pummit Access Road corridor that are under UH management.	2.1.3.11		
CR-12	Consult with KKM about establishing buffers (preservation zones) around known historic sites near facilities, to protect them from potential future development.	2.1.3.12		
NR-15	Conduct baseline inventories of high-priority resources, as outline inventory, monitoring, and research plan.	2.2		
ACT-11	Seek statutory authority for the University to regulate comro23 ial activities in the UH Management Areas.	3.4.2.11		
P-3	Obtain statutory rule-making authority from the legislature, authorizing the University of Hawai'i to adopt Administrative Rul	3.5.2.3		
P-6	Obtain legal authority for establishing, and then establish, a law of forcement presence on the mountain that can enforce rules for the UH Ma ⁰²¹ ment Areas.	2.5.2.6		
FLU-2	Develop a map with land use zones in the Astronomy Precinct based on updated inventories of cultural and natural resources, to delineate areas wood future land use will not be allowed and areas where future land use will be allowed but will require compliance with prerequisite studies or analysis prior to approval of Conservation District Use Permit.	3.9.2.2		
OI-1	Maintain OMKM, MKMB, and KKM in extremt roles, with OMKM providing local management of the UH Manageme ⁰²⁷ reas, and MKSS providing operational and maintenance services.	3.10.2.1		
OI-2	Develop training plan for staff and volunteers. 026	3.10.2.2		
Source: Tables 4.1 through 4.25 in 2021 OAR.				

Since these 14 management actions (Table 2.1) are completed, they are not discussed further in this document and will not be discussed in future annual reports or future updates. This accounts for the management action numbering gaps, since this CMP 2022 Supplement retains the 2009

⁸ The 2021 OAR indicated that 15 management actions were complete. UH decided during the preparation of this document that management action CR-13 was not complete because the Burial Treatment Plan is still being implemented and therefore ongoing. Thus, there are now 14 management actions considered complete.

Posted by wildernesswalker on 03/31/2022 at 9:37pm [Comment ID: 602]

Type: Correction Agree: 0, Disagree: 0 Since OMKM no longer provides local management, and it has been merged with CMS, this management action should be clarified and reworded

#014

Posted by **Veronica Ohara** on **03/26/2022** at **12:07pm** [Comment ID: 579] *Type: Suggestion Agree: 0, Disagree: 0* I support buffers around historic sites.

#015

Posted by **Veronica Ohara** on **03/26/2022** at **12:10pm** [Comment ID: 580] *Type: Suggestion Agree: 0, Disagree: 0* I support this.

#016

Posted by **Veronica Ohara** on **03/26/2022** at **12:10pm** [Comment ID: 581] *Type: Suggestion Agree: 0, Disagree: 0* I support this.

#017

Posted by **Veronica Ohara** on **03/26/2022** at **12:12pm** [Comment ID: 583] *Type: Suggestion Agree: 0, Disagree: 0* I think this could be constantly problematic, though I applaud your effort in this area.

#018

Posted by **Veronica Ohara** on **03/26/2022** at **12:11pm** [Comment ID: 582] *Type: Suggestion Agree: 0, Disagree: 0* I support KKM in this role.

#019

Posted by **Veronica Ohara** on **03/26/2022** at **12:15pm** [Comment ID: 587] *Type: Suggestion Agree: 0, Disagree: 0* I support this idea.

#020

Posted by **Veronica Ohara** on **03/26/2022** at **12:17pm** [Comment ID: 590] *Type: Suggestion Agree: 0, Disagree: 0* Absolutely support this proposal.

#021

Posted by **Veronica Ohara** on **03/26/2022** at **12:17pm** [Comment ID: 589] *Type: Suggestion Agree: 0, Disagree: 0* Yes, by all means.

#022

Posted by **Veronica Ohara** on **03/26/2022** at **12:12pm** [Comment ID: 584] *Type: Suggestion Agree: 0, Disagree: 0* I support KKM on this.

#023

Posted by **Veronica Ohara** on **03/26/2022** at **12:15pm** [Comment ID: 586] *Type: Suggestion Agree: 0, Disagree: 0* This is a good idea, tourism is a toll on the fragile eco system.

#024

Posted by **Veronica Ohara** on **03/26/2022** at **12:14pm** [Comment ID: 585] *Type: Suggestion Agree: 0, Disagree: 0* I think there survey for historic properties has been sufficient.

#025

Posted by **Veronica Ohara** on **03/26/2022** at **12:16pm** [Comment ID: 588] *Type: Suggestion Agree: 0, Disagree: 0* I support this action.

Posted by **Veronica Ohara** on **03/26/2022** at **12:18pm** [Comment ID: 592] *Type: Suggestion Agree: 0, Disagree: 0* Very sound idea, thank you.

#027

Posted by **Veronica Ohara** on **03/26/2022** at **12:18pm** [Comment ID: 591] *Type: Suggestion Agree: 0, Disagree: 0* This will ensure that Maunakea is properly cared for.

DRAFT CMP 2022 SUPPLEMENT COMPLETED MANAGEMENT ACTIONS

CMP assigned management action numbers to minimize confusion about the origin of the ongoing management actions.

3 CULTURAL LANDSCAPE

3.1 INTRODUCTION

Section 7.1.1 of the 2009 CMP (Ho'akea, LLC dba Ku'iwalu, April 2009) provided information and formulated management actions relevant to the protection, preservation, and enhancement of the cultural resources of the UH Management Areas. In this update, the term "Native Hawaiian Cultural Resources" has been replaced with "Cultural Landscapeos" As used in the CMP, the cultural landscape is composed of physical elements which manifest with culture and human use through time. The cultural landscape includes akua, cultural practices and beliefs, resource extraction, traditional trail systems, navigation, and historic properties (e.g., archaeological sites). Cultural practices are (*i*) Native Hawaiian customary and traditional practices, and (*ii*) contemporary practices. Information concerning the current status of the cultural landscape can be found in Section 2.1 of the 2021 OAR (Appendix A).

3.2 DESIRED OUTCOME

The "desired outcome" with respect to the cultural landscape is to:

032

Increase understanding and appreciation of Native Hawaiian history and cultural practices related to Maunakea to ensure that these practices are proteco29 and respected. Identify, document the condition of, and protect cultural resources and historic properties in the UH Management Areas.⁹

3.3 NEED

Given the significance of the cultural landscape as a whole, there is a need to continue the implementation of the CMP's management actions related to the cultural landscape avoid and/or minimize disturbance and potential impacts to the cultural landscape. The CMP strategies reflect a series of general guidelines including:

- Recognizing that Maunakea is for some is a *wahi pana* (storied/legendary place) and for others is a *wao akua* (realm of the gods).
- Recognizing the need to continue and reinvigorate outreach to the Native Hawaiian community, including customary and traditional practitioners and families with li¹⁰²⁸ and historic connections to Maunakea, when formulating plans and guidelines.
- Recognizing that Native Hawaiian customary and traditional practices may evolve over time and that management needs may also change.
- Ensuring a balanced approach between Native Hawaiian customary and traditional practices related to the cultural landscape and the need to protect natural resources and historic properties.¹⁰

⁹ As used in this report, "cultural practices" means: (1) Native Hawaiian customary and traditional practices protected by the State of Hawai'i Constitution and (2) contemporary practices.

¹⁰ The 2009 CMP did, and this document confirms, that pursuant to the legal requirements under the Hawai'i Supreme Court's ruling in *Ka Pa'akai*, access to UH Management Areas for Native Hawaiian traditional and customary practices will not be restricted, except where safety, resource management, cultural appropriateness, and legal compliance considerations may require reasonable restrictions. It goes on to list the following as examples of the access that it expects will continue: (*i*) access for

Posted by Isa Badia on 03/02/2022 at 11:37am [Comment ID: 561]

Type: Correction

Agree: 0, Disagree: 0

You don't need to do outreach - Native Hawaiians are literally at the mauna TELLING you what they want, you're just not listening because you don't like what they're saying!

#029

Posted by Veronica Ohara on 03/26/2022 at 12:28pm [Comment ID: 593]

Type: Suggestion

Agree: 0, Disagree: 0

I appreciate this effort, we were naked eye astronomers and our culture was built around the movement of the heavens.

#030

Posted by Veronica Ohara on 03/26/2022 at 12:28pm [Comment ID: 594]

Type: Suggestion Agree: 0, Disagree: 0 Excellent.

#031

Posted by Isa Badia on 03/02/2022 at 11:35am [Comment ID: 560]

Type: Correction

Agree: 0, Disagree: 0

"Native Hawaiian" should not be erased from this title. The focus NEEDS to be on Native Hawaiian cultural resources and traditions - anything else should only operate with the permission of Native Hawaiians. Do not contribute to the erasure and invisibility of indigenous peoples by removing them. It is offensive and incorrect to associate "customary and traditional" practices with Native Hawaiians, and "contemporary" as not. Native Hawaiians ARE contemporary and so are their practices and traditions.

#032

Posted by Shainna Estepa on 03/10/2022 at 10:31am [Comment ID: 568]

Type: Suggestion

Agree: 0, Disagree: 0

Respecting the culture begins with respecting the people. The people of Hawai'i have made it clear in their opposition of this project. This is a sacred place for Native Hawaiians and the continuance of this project is a constant reminder of the disrespect that's brought upon them daily. Our leaders have failed us because they are not working for the people, they are working for themselves. This project will bring more damage and disrespect to the culture than any benefit. Let the Native Hawaiians build a telescope on your church or your ancestors grave if it's not disrespectful.

- Disseminating culturally sensitive and appropriate educational information to visitors and others who are not familiar with this cultural landscape or who do not engage in customary and traditional Native Hawaiian practices to protect the cultural landscape effectively and efficiently.
- Complying with and enforcing applicable rules and regulations to protect the cultural landscape.

3.4 MANAGEMENT ACTIONS

As discussed in detail in Section 2.1 of the 2021 OAR and summarized in Chapter 2 of this document, half of the 14 CMP management actions related to cultural landscape have been completed. The seven (7) management actions that are ongoing are listed in Table 3.1 and detailed in Sections 3.4.1 through 3.4.7.

Mgmt. Action	Description	Discussion	
	Management		
CR-1	UH will engage with families with lineal and cultural connections to Maunakea, Native Hawaiian customary and traditional practitioners, and other Native Hawaiian groups, including Kahu Kū Mauna Council (KKM), toward the development and maintenance of appropriate guidance regarding cultural issues.	3.4.1	
CR-2	Support application for designation of the summit region of Maunakea as a Traditional Cultural Property, under the National Historic Preservation Act of 1966, Public Law 89-665, as amended.	3.4.2	
CR-3	Conduct educational efforts to generate public awareness about the importance of preserving the cultural landscape.	3.4.3	
Native Hawaiian Cultural practices and knowledge			
CR-4	Collect information on customary and traditional Native Hawaiian cultural practices, contemporary cultural practices, and traditional Native Hawaiian knowledge.	3.4.4	
Historic properties			
CR-10	Continue to implement the Long-Term Historic Property Monitoring Plan for the University of Hawai'i Management Areas on Mauna Kea, Ka'ohe Ahupua'a, Hāmākua District, Hawai'i Island, State of Hawai'i (Pacific Consulting Services, Inc., April 2014) and seek SHPD approval of amendments.	3.4.5	
CR-13	Continue to implement the Burial Treatment Plan for Burial Sites in the Mauna Kea Science Reserve and the Mauna Kea Access Road Corridor, Ka'ohe Ahupua'a, Hāmākua District, Island of Hawai'i (Pacific Consulting Services, Inc., July 2014).	3.4.6	
CR-14	Continue to immediately report any disturbance of a historic shrine or burial site to DOCARE, KKM, and SHPD.	3.4.7	
Note: Source:	The exact wording of the management actions listed in the table has been revised from the 2009 CMP and the 2021 OAR to reflect the progress made to date, adaptation made based on the lessons learned, information collected, and input received. Adapted from the 2021 OAR, Table 2.5.		

 Table 3.1 Ongoing Cultural Landscape Management Actions

traditional and customary practices, including the gathering of cultural resources; (*ii*) access for families to visit *na iwi kupuna* (the bones of their ancestors); (*iii*) access to scatter 'ohana ashes; (*iv*) access through the trails located within the UH Management Areas for subsistence gathering and hunting; (*v*) access for families to continue to bury their 'ohana piko; (*vi*) access for traditional and customary practices, including religious and spiritual observances, pilgrimage, offerings, and prayers; and access for families to gather water from Lake Waiau for religious and spiritual purposes. The CMP also outlines an approach to be used in the event of disputes or determination of appropriateness of traditional and customary practices, including cultural, historical, and natural resources.



Posted by wildernesswalker on 03/31/2022 at 9:38pm [Comment ID: 603]

Type: Correction

Agree: 0, Disagree: 0

As affirmed in the TMT contested case hearings, testimony given by cultural practitioners described the collection of water from snow from areas in the summit region for healing and spiritual practices. Gathering of water is not confined to Lake Waiau.

Testimony regarding cultural practices could be appended or referenced at the end of this document.

#034

Posted by Isa Badia on 03/02/2022 at 11:38am [Comment ID: 562]

Type: Suggestion

Agree: 0, Disagree: 0

How can you tell visitors what not to do to "protect the cultural landscape" when you yourselves, and this management plan, are actively harming "the cultural landscape"?

3.4.1 <u>CR-1: ENGAGE WITH CULTURAL COMMUNITY AND DEVELOP AND MAINTAIN</u> <u>APPROPRIATE GUIDANCE REGARDING CULTURAL ISSUES</u>

UH continues to take into account the Hawai'i Supreme Court's analytical framework to ensure that traditional and customary Native Hawaiian rights are preserved and protected. This framework has its foundation in *Ka Pa'akai*.¹¹ This includes at a minimum addressing: "(1) the identity and scope of 'valued cultural, historical, or natural resources' in the petition area, including the extent to which traditional and customary native Hawaiian rights are exercised in the petition area; (2) the extent to which those resources – including traditional and customary native Hawaiian rights – will be affected or impaired by the proposed action; and (3) the feasible action, if any, to be taken by the [agency] to reasonably protect native Hawaiian rights if they are found to exist."

To achieve this, UH will continue to work cooperatively with KKM, families with lineal and cultural connections to Maunakea, Native Hawaiian customary and traditional practitioners, the Office of Hawaiian Affairs (OHA), and other Native Hawaiian groups. In carrying out this work:

- CMS will increase the frequency with which it reaches out to representatives of the types of groups listed above as part of its interaction and relationship building with the community. CMS anticipates that the outreach will include:
 - Maintain a CR-1 mailing list (with a preference for email communication) that includes individuals and families that self-identify as Native Hawaiian, including those that self-identify as having lineal and cultural connections to Maunakea and/or self-identify as customary and traditional practitioners, OHA, and other Native Hawaiian groups. The CR-1 mailing list will be updated regularly.
 - Provide regular updates (minimum once a year) to those on the CR-1 mailing list. Timely updates will be sent so that those on the CR-1 mailing list are informed about and can provide input on the following; thus, updates will be sent at least 6 days prior to these items appearing on public MKMB agendas:
 - Land use proposals¹² (during Phase 2, 3 and 4 proposal reviews);
 - Proposed procedures and guidelines that are being developed as part of this management action;
 - Updates to plans;
 - Annual Archaeological Monitoring Reports (CR-10, Section 3.4.5); and
 - Other actions being considered or reports prepared by/for UH and CMS that may be of interest or concern to those on the CR-1 mailing list.

By this process, Native Hawaiians and organizations that represent Native Hawaiians will be informed and have opportunities to provide input early in the process, well before proposed uses, plans, and guidelines are finalized and adopted by UH. The materials that will be used in support of this outreach will include copies of draft plans

¹¹ Ka Pa'akai O Ka 'Aina v. Land Use Commission, 94 Hawai'i 31 (2000) (Ka Pa'akai).

¹² Land use is defined in HAR § 13-5-2, as (1) the placement or erection of any solid material on land if that material remains on the land more than fourteen days, or which causes a permanent change in the land area on which it occurs; (2) the grading, removing, harvesting, dredging, mining or extraction of any material or natural resource on land; (3) the subdivision of land; or (4) the construction, reconstruction, demolition, or alteration of any structure, building, or facility on land.

and guidelines and detailed written information regarding opportunities to review and comment on draft proposals and plans.

- CMS will provide regular updates to the individuals that the Hawai'i Island Burial Council recognizes as lineal and cultural descendants of Ka'ohe Ahupua'a. In all cases the updates will be provided at least once each calendar year.
- CMS will make efforts to have KKM's seven members represent a broad spectrum of perspectives on Maunakea's cultural landscape and Native Hawaiian issues.
- Based on the results of its outreach efforts and input from the Native Hawaiian community, CMS will, if appropriate, develop new and/or modify existing management guidelines regarding cultural issues and it will continue to consider, and potentially amend or modify, adopted management guidelines regarding cultural issues, including those associated with completed CMP management actions CR-5, CR-6, CR-7 (which also addresses CR-9), CR-8, and CR-12 (see https://hilo.hawaii.edu/maunakea/culture/management). This will be done in a manner that is consistent with the CMP, 2022 Master Plan, and Maunakea Administrative Rules.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). The title of this management action previously stated "Kahu Kū Mauna shall...." KKM is an advisory body, not an action entity; therefore, this management action has been adapted to specify that "UH will...." Based on community input, this management action has been adapted to place greater emphasis on outreach to the Native Hawaiian community and specify that such outreach will not be limited to establishing guidelines related to appropriate behavior within the UH Management Areas, but be expansive and seek input on all proposals, plans, and actions early and often. Other aspects of the management action are retained, such as developing policy regarding cultural issues.

3.4.2 CR-2: SUPPORT APPLICATION FOR DESIGNATION OF SUMMIT AS TCP

UH will share its reports and studies related to the cultural landscape within the summit region of Maunakea with others and not oppose an application submitted by any entity that requests portions of the summit region of Maunakea be designated a Traditional Cultural Property (TCP), under the National Historic Preservation Act of 1966, Public Law 89-665, as amended.

Kūkahau'ula has been assigned State Inventory of Historic Places (SIHP) site number 50-10-23-21439; however, UH is not aware of an application being submitted for its or any other portion of Maunakea to the National Register of Historic Places to be listed as a TCP. Should an application be prepared to designate the portions of the Maunakea summit region similar to those shaded yellow in Figure 3.1, UH's reports and studies may be used to inform it and UH would not oppose it.

CULTURAL LANDSCAPE

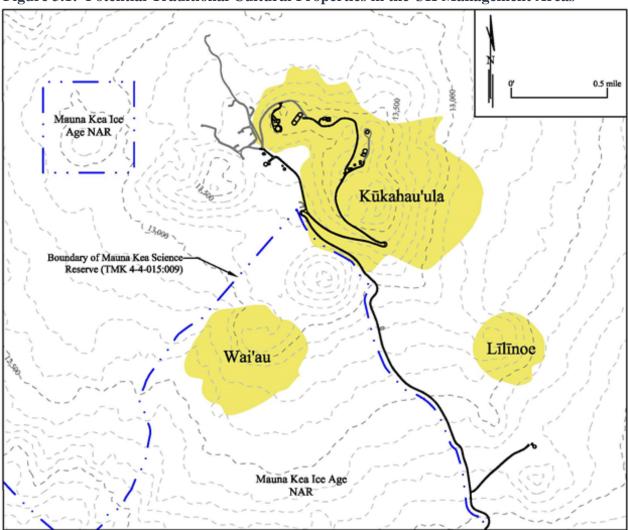


Figure 3.1: Potential Traditional Cultural Properties in the UH Management Areas

Source: Planning Solutions, Inc.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). The management action, which in 2009 was a single sentence, has been expanded to clarify what "support" means (e.g., sharing its reports if an entity nominates portions of the summit region of Maunakea to be designated a TCP).

3.4.3 <u>CR-3: CONDUCT EDUCATIONAL EFFORT TO RAISE PUBLIC AWARENESS OF</u> <u>IMPORTANCE OF PRESERVING THE CULTURAL LANDSCAPE</u>

UH's ongoing efforts have two interrelated, but distinct, thrusts. The first, which is focused on raising the level of public awareness of the importance of preserving the cultural landscape on Maunakea, consists of the combined effort by CMS and 'Imiloa that are discussed elsewhere in this document (see, for example, Section 5.4.3.1). The second, which is oriented toward limiting threats to the cultural landscape through management of activities and uses, is discussed in Section 7.4. To achieve this, UH and CMS will:

- Ensure CMS' staff members who are knowledgeable about the cultural landscape participate in the implementation of EO-# coded management actions (Sections 5.4.1, 5.4.2, and 5.4.3), which focus on education and outreach. The education and outreach programs will be managed so that materials are regularly updated by personnel knowledgeable about the cultural landscape. This may include:
 - Adding cultural landscape content to the educational materials prepared as part of EO-# coded management actions (Sections 5.4.1, 5.4.2, and 5.4.3) that, among other things, affirms Maunakea as a wahi pana and wao akua.
 - Compile cultural, archaeological, and historic background materials, maps, chronology, and photographs to aid staff presentation or interactions with public.
- Ensure CMS' cultural resource specialists participate in the implementation of ACT-# coded management actions focused on managing activities and uses that are discussed in detail in Section 7.4.
- Partner with other cultural-based entities within UH Hilo and the community to increase Native Hawaiian participation in programs like Maunakea Scholars (www.maunakeascholars.org) and identify opportunities and create programs that build a cultural component to the Multidisciplinary Field Station concept at Halepōhaku.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). The second thrust of limiting threats to the landscape was added to this management action, related to ACT-# coded management actions, to make it clear that cultural resources shall be considered during the management of activities and uses, like the natural resources management action NR-1. This was done because, during implementation of the CMP, UH recognized that the CR and NR management actions did not, but should, have similar scopes.

3.4.4 <u>CR-4: Collect Information on Traditional, Customary, and Contemporary</u> <u>Cultural Practices and Knowledge</u>

In accordance with management action CR-4, UH has collected and is continuing to collect information on traditional, customary, and contemporary cultural practices on Maunakea. One of UH's core value, *'ike Hawai'i; nohona Hawai'i* (traditional knowledge; traditional practices), involves integrating traditional knowledge and practice into its stewardship to strengthen the protection and conservation of Maunakea's resources. CMS will partner with educational institutions such as the UH Hilo and Hawai'i Community College to establish an oral history program that is devoted to memorializing the traditional and customary practices and knowledge associated with Maunakea.

In addition, Native Hawaiian families or communities that self-identify as having a cultural connection to Maunakea have been and will continue to be invited to work with CMS (CR-1, Section 3.4.1). While there are several reports on Native Hawaiian customary and traditional practices and cultural sites on Maunakea, identifying these practices and sites is an ongoing process to ensure those practices are protected and respected.

Examples of the ongoing efforts related to the collection of information on traditional, customary, and contemporary practices that CMS expects to undertake include the following:

- Conduct and update oral histories and ethnographic studies gathered from those knowledgeable of cultural practices on Maunakea.
- Work with 'Imiloa to capture and incorporate information on cultural practices in curriculum and education/outreach program development.
- Hold events, similar to the Maunakea Speakers Series, that focus on cultural topics that can serve as convening events for those knowledgeable of cultural practices on Maunakea.
- Work with UH Hilo entities, including those associated with Hawaiian language and Hawaiian studies, to develop programs that delve more deeply into Maunakea's cultural connections and take advantage of UH's objective to utilize the facilities at Halepōhaku as a Multidisciplinary Field Station.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Traditional knowledge was added to the management action to recognize that 'ike Hawai'i can inform UH's broad stewardship of Maunakea. Community events were added to this management action because UH has learned that conversations at these events often provide insights into cultural practices.

3.4.5 CR-10: IMPLEMENT THE HISTORIC PROPERTY MONITORING PLAN

UH will continue to implement its SHPD-approved *Long-Term Historic Property Monitoring Plan* (Pacific Consulting Services, Inc., April 2014). This includes: (*i*) an annual assessment of historic properties in relatively close proximity to land uses (e.g., near astronomy facilities and alongside the Mauna Kea Access Road); (*ii*) assessment of the more remote sites within the MKSR on a three- and five-year rotational basis; and (*iii*) submission of annual reports regarding the status of historic properties to SHPD after seeking the advice of the KKM on management action recommendations.

As discussed in Section 2.1.4.1 of the 2021 OAR, experience gained during years of intensive historic properties monitoring and reporting, has led CMS to conclude that it is appropriate to adjust the monitoring in a way that maintains effective stewardship of cultural resources while at the same time better utilizing the finite financial resources that are available for this purpose. CMS hopes to revise the monitoring plan so that it focuses on the resources that are demonstrably the most vulnerable, while limiting monitoring of the least vulnerable resources to *ad hoc* surveillance. Specifically, it will likely be asking SHPD for permission to revise the monitoring program as follows:

- Reassess the current annual assessment program for sites on the 1-year list (including sites on Pu'umākanaka [as per the Burial Treatment Plan (BTP), see CR-13], and all sites near astronomy facilities and the road corridor). Remove sites from the 1-year list (and place them on 3-year or 5-year assessment lists) that are farther away from facilities and roads and have shown no changes throughout the 10 years of monitoring.
- Reduce the number of sites requiring visits during the 3-year and 5-year assessments (possibly excluding shrine sites with no upright/erect stones or surface lithic scatters).
- Conduct a full assessment once every ten years rather than once every five years (as is now the case).

- Update the list of historic properties sites to reflect new sites found, if any, during the monitoring, and add new information about historic properties, if any, that may have been identified since the baseline.
- Link ad hoc visits to historic resources (not assessed annually) to work conducted as part of other projects or studies (e.g., biological and geological surveys).
- Make the report submitted to SHPD labeled as neither a "draft" or "final." Instead title the reports as Year Historic Property Monitoring Report, UH Maunakea Lands (e.g., "2022 Historic Property Monitoring Report, UH Maunakea Lands"). The report will only be modified to address SHPD comments in the event that comments are received.

Going forward, CMS will review the recommendations in the annual historic properties monitoring reports and those found to be appropriate for implementation will be incorporated into the ongoing historic property monitoring program, historic property mitigation program, or other CMP program as appropriate for implementation in subsequent years.

CMS will also seek to use budget made available through the amendment of the monitoring plan to implement the data recovery efforts that are outlined below. These data recovery efforts were recommended in past annual historic property monitoring reports, which indicate data recovery at several historic properties is appropriate before the sites' integrity diminishes to a point where they are no longer considered significant. The types of data recovery efforts deemed appropriate vary from archaeological excavation to archaeological mapping. Specific "still-to-be-acted-upon" recommendations from the archaeological monitoring reports include the following:

- <u>SIHP No. 50-10-23-16204</u>. With advice from KKM and in coordination with SHPD, develop a data recovery plan as a proactive response to collect baseline data before the likely loss of data due to continued alteration at the site. The plan should include: (*i*) a subsurface testing strategy for features with likely subsurface deposits (i.e., the enclosures and lithic scatters) and (*ii*) detailed mapping of the site (potentially using technologies such as LIDAR and 3-dimensional scanning) that not only records archaeological features, but non-feature-related rocks within the site complex.
- <u>SIHP No. 50-10-23-25766</u>. Develop a data recovery plan, in coordination with SHPD and KKM, to determine whether a subsurface component to the site exists and whether that deposit retains any significance; and upon completion of the subsurface excavations, re-evaluate the significance of Site 25766.
- <u>SIHP Nos. 50-10-23-9074 and -9075</u>. Consult with Architectural historian or engineer to determine the proper level of conservation for Sites 9074 and 9075.
- <u>SIHP No. 50-10-23-25770</u>. With advice from KKM and in coordination with SHPD, develop a plan to append site map for Site 25770 and track possible movement of surface artifacts.
- <u>SIHP No. 50-10-23-10314</u>. With advice from KKM and in coordination with SHPD, develop a data recovery plan to collect baseline data for Site 10314. The plan should include a research design, planned analyses, as well as a review of the site's known history of research; upon completion of the subsurface excavations, re-evaluate the significance of Site 10314.

• <u>SIHP Nos. 50-10-23-18683, 25768, 25769, 21214, 21452, 25807, and newly recorded lithic scatters</u>. With advice from KKM and in coordination with SHPD, develop a plan to map sites and track possible movement of surface artifacts.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Over many years of implementing the *Long-Term Historic Property Monitoring Plan*, UH has learned that (*i*) monitoring the remote historic properties subjects staff and consultants to unnecessary safety risks, (*ii*) monitoring the remote historic sites is costly, and (*iii*) the remote historic sites are not being adversely impacted by ongoing activities and uses in the UH Management Areas. Another realization has been that greater efforts are necessary to preserve and document historic sites near activities, facilities, and uses in the UH Management Areas that are being impacted directly or indirectly by those activities, facilities and uses. Therefore, UH proposes to amend the monitoring plan and direct savings, if any, to recommended preservation and documentation tasks.

<u>3.4.6</u> CR-13: IMPLEMENT THE BURIAL TREATMENT PLAN

UH will continue to implement the SHPD-approved *Burial Treatment Plan* (BTP) (Pacific Consulting Services, Inc., July 2014). It is important to note that the BTP concerns historic burials. The modern scattering or leaving of ashes within the UH Management Areas is not covered in the BTP; guidance regarding the scattering or leaving of ashes can be found at <u>https://hilo.hawaii.edu/maunakea/culture/management</u> (see guidance associated with completed CMP management action CR-8).

In addition to implementing the BTP, UH will establish and regularly update guidelines that define such things as: (*i*) the way that lineal descendants and/or others wishing to visit burial sites should notify the Maunakea Rangers and other management staff in advance so that the visits can be made safely and securely; (*ii*) the way UH notifies commercial tour operators that visits to burial sites are prohibited; and (*iii*) the procedures, which are discussed in CR-1 (Section 3.4.1), that UH will follow to provide annual or more frequent updates to individuals that the Hawai'i Island Burial Council recognizes as lineal and cultural descendants of Ka'ohe Ahupua'a on the status of known burials on the mountain.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). The information obtained during preparation of the 2021 OAR did not indicate a need to change these procedures at this time, i.e., no adaptive management actions are required.

3.4.7 CR-14: REPORT DISTURBANCE OF HISTORIC SHRINE OR BURIAL SITE

As part of their regular activities the Rangers will continue to monitor activities within the UH Management Areas on a daily basis and are in a good position to monitor for/observe disturbance of a historic property which may include shrines or possible burial sites and/or to take reports from others who have seen such actions. Changes to a historic property may include rebuilding or "restoration" of a shrine. Per this management action and consistent with HRS Chapter 6E and its implementing rules, the Rangers will immediately report historic property disturbances to CMS, and then CMS will immediately forward the report to DOCARE, KKM Council, and SHPD via electronic mail.

4 NATURAL RESOURCE

4.1 INTRODUCTION

Section 7.1.2 of the 2009 CMP (Ho'akea, LLC dba Ku'iwalu, April 2009) contains information and management actions intended to ensure the protection, preservation, and enhancement of the natural resources of the UH Management Areas. Based on a comprehensive review of existing scientific studies, biological and physical resource inventories, and historical documentation that are referenced in the 2009 CMP and OAR (Appendix A), the CMP addressed the protection and preservation of natural resources and examined human uses of the area, with particular emphasis on those uses' impacts on natural resources. Information concerning the current status of the natural resources can be found in Section 2.2 of the 2021 OAR (Appendix A).

4.2 DESIRED OUTCOME

The "desired outcome" with respect to natural resources is to:

Increase understanding of the status of natural resources (biotic and abiotic) and identify threats to these resources to better protect and preserve unique geological features, ecosystem functions, subalpine and alpine habitats, and biological communities through adaptive management of stressors and threats.

4.3 NEED

There is a need to continue the implementation of the CMP's management actions related to natural resources to avoid and/or minimize actual and potential impairment. The CMP strategies reflect a series of general precepts including:

- Sustainable management needs to allow for multiple uses and activities including astronomy and other scientific research, education, recreation, and cultural practices.
- UH needs to focus on limiting the impacts of human activities on natural resources, starting with educating/orienting individuals about the natural resources before they engage in uses and activities, so that they know how to minimize their impacts on the resources.
- Natural resources management planning should use an ecosystem¹⁴ approach.
- The planning and execution of natural resources management programs should involve the community during planning and implementation (including scientists, educators, volu035rs, and the public—as well as from natural resource managers).

¹⁴ Ecosystem is defined as a dynamic system of living organisms (plants, animals, and microorganisms) within an area, the environment that sustains them, and their interactions.

Ecosystem management is an important concept in natural resource management. Management at the ecosystem level approaches the protection, enhancement, and restoration of natural resources from the perspective that ecosystems are structural wholes, and it recognizes that people, policies, and politics are as much a part of an ecosystem as are plants and animals. The five general goals of ecosystem management are: (*i*) maintaining viable populations; (*ii*) having a representation of all ecosystem types on the landscape; (*iii*) maintaining ecological processes, notably natural disturbance regimes; (*iv*) protecting the evolutionary potential of species and ecosystems; and (*v*) accommodating human uses of the landscape. These five goals have been incorporated into the natural resources management actions.

Posted by Veronica Ohara on 03/26/2022 at 12:30pm [Comment ID: 595]

Type: Suggestion Agree: 0, Disagree: 0 Agreed to all 4.

- The habitats and ecosystems in UH Management Areas are sensitive and unused and, although not known to harbor threatened and endangered species, warrant protection.
- Enhancing the existing native bio-communities and rehabilitating damaged ecosystems is feasible in certain situations and should be conducted primarily in high-use areas where native biological communities may have become degraded or disturbed.
- Mitigating adverse impacts to natural resources by land uses and activities should be a component of the planning process (see also FLU-6).
- Long-term global environmental factors such as climate change should be considered when planning natural resource management activities.
- Ensuring that compliance personnel, such as Rangers, are present is necessary to ensure that rules and regulations are followed and natural resources are protected.

4.4 MANAGEMENT ACTIONS

As discussed in detail in Section 2.2 of the 2021 OAR and summarized in Chapter 2 of this document, only one (1) of the 18 management actions related to natural resources has been completed. ¹⁵ The 17 that are ongoing are listed in Table 4.1 and detailed in Sections 4.4.1 through 4.4.17.

¹⁵ Only NR-15, which called for UH to conduct baseline inventories of high-priority resources, has been completed, see Chapter 2.

Posted by Veronica Ohara on 03/26/2022 at 12:30pm [Comment ID: 596]

Type: Suggestion Agree: 0, Disagree: 0 Agree to all 5.

Table 4.1	Ongoing Natural Resource Management Actions			
Mgmt. Action	Description	Discussion		
THREAT PREVENTION AND CONTROL				
NR-1	Limit threats to natural resources through management of activities and uses.	4.4.1		
NR-2	Implement the <i>Maunakea Invasive Species Management Plan</i> (C. Vanderwoude, February 2015) and modify, amend, and update it as warranted.	4.4.2		
NR-3	Minimize loss of native biodiversity.	4.4.3		
NR-4	Minimize barriers to species migration.	4.4.4		
NR-5	Allow, and where possible facilitate, ecosystems to respond to climate change.	4.4.5		
NR-6	Conduct educational efforts to generate public awareness about the importance of preserving Maunakea's natural resources.	4.4.6		
ECOSYSTEM PROTECTION, ENHANCEMENT, AND RESTORATION				
NR-7	Protect areas with high biodiversity or unique communities/features from development.	4.4.7		
NR-8	Establish conditions under which UH would fence areas to keep out feral ungulates.	4.4.8		
NR-9	Increase native plant density and diversity through an outplanting program.	4.4.9		
NR-10	Require mitigation measures in plans for new development.	4.4.10		
NR-11	Conduct habitat rehabilitation projects following unplanned disturbances.	4.4.11		
NR-12	Plan and conduct habitat restoration activities, as needed.	4.4.12		
PROGRAM MANAGEMENT				
NR-13	Increase communication, networking, and collaborative opportunities that support management and protection of natural resources.	4.4.13		
NR-14	Follow adaptive management principles when reviewing/updating programs.	4.4.14		
INVENTO	RY, MONITORING, AND RESEARCH			
NR-16	Continue regular long-term monitoring.	4.4.15		
NR-17	Conduct research to fill knowledge gaps that cannot be addressed through monitoring.	4.4.16		
NR-18	Maintain geospatial database of natural resources.	4.4.17		
Note: The exact wording of the management actions listed in the table has been revised from the 2009 CMP and the 2021 OAR to reflect the progress made to date, adaptation made based on the lessons learned, information collected, and input received. Source: Adapted from the 2021 OAR, Table 2.6.				
Source. Au				

Tab

NR-1: LIMIT THREATS THROUGH MANAGEMENT OF ACTIVITIES AND USES 4.4.1

CMS' administrators and natural resource managers will continue to participate in the implementation of all the ACT-# coded management actions, which focus on man¹⁰³⁷g activities and uses. Those management actions, which are discussed in Section 7.4 of this document, include such things as:

- Managing access and parking (ACT-1, ACT-2. ACT-4).
- Maintaining interpretive and compliance personnel (Rangers) on the mauna to educate users, deter violations, and encourage adherence to restrictions (ACT-3).
- Implementing guidelines to reduce impact of recreational hiking (ACT-5) and snow play (ACT-6).
- Confining tours and stargazing activities to previously disturbed areas and established parking areas (ACT-7) and managing commer tours (ACT-9).
- Overseeing and providing recommendations concerning the issuance of film permits (ACT-10).

Posted by Veronica Ohara on 03/26/2022 at 12:32pm [Comment ID: 597]

Type: Suggestion Agree: 0, Disagree: 0 I support this management approach.

#038

Posted by Shane Palacat-Nelsen on 03/01/2022 at 1:38pm [Comment ID: 558]

Type: Suggestion

Agree: 0, Disagree: 0

4.4.1 NR-1: ACT-7/ACT-9: Commercial tours and stargazing activities shall be limited to below the 9200 ft level (Hale Pōhaku and below). Justification 1. Safety: Tour operators have no way to determine if someone is suffering altitude sickness, a waiver may be signed but that doesn't protect the visitor, it protects the commercial entity. 2. Traffic: alleviate traffic situations above Hale Pohaku, the road is not adequate to maintain commercial, recreational, astronomical and others who access the mauna daily, 3. Hale Pohaku is a safe place where adequate viewing of the stars for the novice visiting stargazer, 4. limits the footprint on natural and cultural resources. If UH says the mauna is sacred then impose regulations that effect that respect.

• Ensuring input by CMS staff, MKMB, KKM, and EC on all scientific research permits (ACT-12).

In addition, UH will continue to implement several other measures to minimize or prevent habitat alteration and disturbance related to:

- Facilities and land uses via the Future Land Use (FLU) management actions in Section 12.4.
- Construction activities via the Construction Guideline (C) management actions in Section 8.4.
- Inspecting facilities compliance with permits, rules, and regulations via the Permitting and Enforcement (P) management actions in Section 8.4, in particular management actions P-7 and P-8.
- Maintaining spill response materials in Ranger staff vehicles per management action OI-5 (Section 13.4.3).
- Requiring those entering the UH Management Areas have educated themselves through the orientation per management action EO-2 (Section 5.4.3).
- Removing trash at the end of each snow play season from areas where snow play has taken place, which will be done in addition to the Rangers' normal trash removal efforts as specified in management action ACT-6 (Section 7.4.6).
- Maintaining infrastructure in a manner that encourages compliance with rules and limits the potential for adverse impacts to resource per the Infrastructure and Maintenance (IM) management actions (Section 9.4).

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during the preparation of the 2021 OAR indicated that no changes to this management action are needed at this time; however, greater specificity and examples have been added to the discussion and those measures in the Natural Resources Management Plan (NRMP) that have been found to be effective/implementable have been incorporated.

4.4.2 NR-2: IMPLEMENT THE MAUNAKEA INVASIVE SPECIES MANAGEMENT PLAN

As discussed in the 2021 OAR, the *Maunakea Invasive Species Management Plan* (C. Vanderwoude, February 2015) provides detailed guidance regarding ways to limit the incursion of invasive species into the UH Management Areas. UH will continue to fully implement the measures called for in the plan.

The *Maunakea Invasive Species Management Plan* is an adaptive plan and will be updated as needed to be consistent with broader state or federal biosecurity guidelines, and to support any new guidelines or methods that increases our ability to effectively manage invasive species. New or modified Standard Operating Procedures (SOPs) will be put into effect as needed. Any updates to the plan or associated SOPs will follow guidelines identified in <u>SOP-Z: Revising the Invasive Species Management Plan</u>. CMS will also continue to coordinate with neighboring land managers of other subalpine and alpine lands on Maunakea (NR-13, Section 4.4.13) regarding the management of invasive species.

adaptations to the *Maunakea Invasive Species Management Plan* and related measures, such as C-2 (Section 10.4.2).

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). The management action was adapted to recognize that a plan has been created, adopted, and is being implemented.

4.4.3 NR-3: MINIMIZE LOSS OF NATIVE BIODIVERSITY

As discussed in the 2021 OAR, the native plant and animal populations that are present within the UH Management Areas are a function of large-scale natural processes which are beyond the control of UH alone (for example, changes in rainfall and temperature due to climate change). However, CMS will continue to support this action through: (*i*) implementing the *Maunakea Invasive Species Management Plan* (NR-2, Section 4.4.2); (*ii*) conducting invasive weed removal (NR-2) including facilitating volunteer weed pull events (EO-8, Section 5.4.2.2); (*iii*) supporting efforts to increase native plant density and diversity (NR-9, Section 4.4.9); (*iv*) educating the public and stakeholders about resources (NR-6, Section 4.4.6); and (*v*) managing ecosystems to respond to climate change (NR-5, Section 4.4.5).¹⁶ It will also continue to provide support for implementation of DLNR's 2011 *Mauna Kea Wildland Fire Management Plan* (Beavers, June 2011).

UH will continue to evaluate measures to address other causes of population and/or diversity decline, including habitat loss, sample collection, pollution, loss of pollinators and seed distributors, genetic bottlenecks, and small population size.¹⁷ For example, the following were identified in the NRMP and will continue to be considered as part of the adaptive management effort going forward:

- For loss of pollinator populations: (*i*) hand pollination (work with experts to develop guidelines or collaborate in existing programs); (*ii*) outplanting of greenhouse-grown plants to increase plant density; and (*iii*) collaborating with outside experts if opportunities present themselves to create and take advantage of opportunities for the rearing and re-introduction of native pollinators.
- <u>For missing seed dispersers</u>: (*i*) hand-spreading of seed (pre-treat seed, if necessary, for germination); (*ii*) re-introducing seed dispersers; and (*iii*) studying effectiveness of other species as seed dispersers.
- For fire prevention, control weeds in the following locations (particularly around Halepōhaku): (*i*) roadsides; (*ii*) pullouts used by the tour companies; (*iii*) unpaved parking lots and roads; and (*iv*) around Halepōhaku to create a firebreak.
- <u>For fire threat reduction</u>: (*i*) require tour companies not idle their vans in unpaved areas and (*ii*) provide educational signage requesting that visitors do not smoke on trails, in the DOFAW silversword exclosure, or in other unpaved areas.

¹⁶ This includes training Rangers and staff to recognize new introduced plants and remove known invasive plants visible near observatories, roads, or other facilities, and in pavement cracks and retaining walls along the Mauna Kea Access Road.

¹⁷ In doing this, it will continue to consider the full range of measures discussed in the NRMP, but implementation of many of these is likely to be constrained by budgetary constraints.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time; however, greater specificity and examples have been added to the discussion and those measures in the NRMP that have been found to be effective/implementable have been incorporated.

4.4.4 NR-4: MINIMIZE BARRIERS TO SPECIES MIGRATION

As discussed in the 2021 OAR, neither UH nor its sublessees have erected any structures that reduce the ability of species to migrate across UH Management Areas, and going forward, through implementation of the 2022 Master Plan and the Future Land Use (FLU) management actions (Section 12.4), UH will not undertake any actions that would create barriers to species migration. UH staff will continue to coordinate with Forest Reserve, Natural Area Reserve, and Department of Land and Natural Resources technical staff to identify issues, craft appropriate responses, and investigate concerns regarding ecosystems and flora and fauna populations (NR-13, Section 4.4.13).

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time; however, reference to the 2022 Master Plan, which is substantially different from the 2000 Master Plan in place when the 2009 CMP was drafted, have been added.

4.4.5 NR-5: ADDRESSING CLIMATE CHANGE

UH will continue to do what it can within the UH Management Areas to allow and facilitate responses to climate change. Examples of the kinds of actions that are supportive of this include, but are not limited to:

- Collecting weather data within the UH Management Areas and make it publicly available for use in climate change modeling and other studies.
- Examining weather data and other long-term monitoring information (NR-16) for trends and impacts potentially associated with climate change.
- Continuing to coordinate frequently with Forest Reserve and Natural Area Reserve staff (NR-13) to ensure that UH's management activities do not inadvertently impede natural ecosystem responses to change, including those related to climate change. Cooperation will allow the agencies to make better management decisions regarding climate change responses.
- Reducing non-climate stressors by limiting the further incursion of/removing existing invasive species (NR-2) so that native species within the UH Management Areas can adapt to climate change without added pressures from competition, predation, etc.
- Increasing native plant density by outplanting (NR-9) and conducting habitat restoration (NR-11) to enhance native ecosystems in a manner that aids or supplements the natural migration of communities and helps maintain ecosystem interactions.

- Collecting seeds from various individuals and at higher elevations (when possible) within the ecotype to increase genetic diversity, thereby helping ecosystems adapt to climate change.
- Considering information in recent publications and guidelines related to ecosystem resilience and climate change for inclusion in management activities (i.e. <u>U.S. Climate</u> <u>Resilience Toolkit</u>).

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time; however, additional references to other management actions and ecosystem resilience toolkit has been added.

4.4.6 NR-6: EDUCATE PEOPLE ABOUT MAUNAKEA'S NATURAL RESOURCES

As documented in the 2021 OAR, UH has implemented many measures aimed at reducing threats to Maunakea's natural resources by educating those working in and visiting the UH Management Areas and the public about them.¹⁸ CMS is committed to continuing and expanding these efforts in the future. CMS will ensure that its natural resource staff participates in the implementation of all the EO-# coded management actions (Chapter 5). That participation will improve education program quality and help keep them current.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time; however, adaptations to the overall educational programs are discussed in Chapter 5.

4.4.7 NR-7: PROTECT BIODIVERSE AND UNIQUE AREAS FROM DEVELOPMENT

As discussed in several sections of the 2021 OAR, UH has assembled additional information related to these topics for areas in the vicinity of the astronomy facilities and Halepōhaku since the CMP was completed, and the work is nearly complete. Moreover, its ongoing monitoring helps it better understand the ecosystem and CMS expects to conduct some additional research related to NR-7 as funding permits. Monitoring and research are being used to inform adjustments to management actions aimed at increasing the level of protection that is provided.

Protection from development will largely be achieved through implementing the 2022 Master Plan (FLU-1, Section 12.4.1), which calls for:

- Astronomy facilities to be restricted to a limited number of "astronomy sites" already being utilized and/or approved for astronomy facilities through conservation district use permits issued by BLNR.
- A preference for siting non-astronomy facilities in previously disturbed areas, including former astronomy sites.

¹⁸ See, for example, the 2021 OAR discussions of CR-3 (Section 2.1.3.3), community engagement (Section 3.1.3), ACT-3, P-4 (Section 3.5.2.5), and C-8 (Section 3.7.2.8).

• Repurposing/reusing existing facilities at Halepōhaku, rather than new construction, to accommodate the expanded educational activities that the 2022 Master Plan now envisions.

For those few and minor land uses that may be placed in areas not previously developed, it will remain important that areas with high biodiversity or unique communities/features continue to be known and avoided to the extent practicable. This includes areas with cultural and historic resources, unique geological features, and habitat for rare, threatened, or endangered native species. The implementation of other FLU-# management actions (Section 12.4) and the implementation of the proposal review process in the 2022 Master Plan will also contribute to the identification, delineation, and protection from development of important natural resources.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Adaptations centered on incorporating references to the FLU-# management actions (Section 12.4) and incorporating applicable aspects of the 2022 Master Plan.

4.4.8 NR-8: ESTABLISH CONDITIONS UNDER WHICH UH WOULD BUILD UNGULATE FENCES

The primary purpose of building fences is to keep feral ungulates out of areas. As discussed in the 2021 OAR, UH has not built any ungulate fences in the UH Management Areas and it is unlikely to do so given DLNR's efforts to encircle Maunakea with ungulate fencing at a lower elevation. Nevertheless, there may be conditions or situation under which UH would build ungulate fences. CMS, working with DLNR and the EC, will prepare a document that enumerates those conditions and/or situations. Then, should such a condition or situation arise, UH would propose building a fence. Because fencing is likely to qualify as a "land use" under the Conservation District Rules, those efforts will need to comply with the provisions of the 2022 Master Plan, including the proposal review process, prior to implementation.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action now recognizes that DLNR has made substantial gains in completing an ungulate fence at a lower elevation on Maunakea. Based on input from DLNR, this may not eliminate every situation under which UH might build a fence and UH should identify the situations under which it would build a fence.

4.4.9 <u>NR-9: INCREASE NATIVE PLANT DENSITY AND DIVERSITY THROUGH AN OUTPLANTING</u> <u>PROGRAM</u>

UH has established a greenhouse within the Halepōhaku parcel and will continue to maintain and utilize it to propagate native plants for outplanting to the UH Management Areas. All plants in the greenhouse will be grown from seeds collected locally within the ecotype (NR-5, Section 4.4.5), and approved by DLNR through CMS's seed collecting permit which will be renewed annually. CMS will continue to outplant subalpine species within Halepōhaku and potentially expand the program to the road corridor and neighboring Forest Reserve if needs are met within the UH Management Areas. The outplanting program at Halepōhaku will extend to establishing and maintaining native gardens that help educate the public by providing living examples of unique and rare plant species native to the region. In addition, CMS is working with DOFAW to propagate additional native species in the greenhouse to be outplanted in the alpine and subalpine ecosystems on Maunakea.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action now recognizes that UH has established a nursery and will utilize it to support specific outplanting efforts.

4.4.10 NR-10: REQUIRE MITIGATION MEASURES IN PLANS FOR NEW DEVELOPMENT

Commitments and provisions in the 2022 Master Plan will: (*i*) result in a contraction in astronomy uses through decommissioning and the reduction in the number of available astronomy sites; (*ii*) ensure future astronomy uses avoid adverse effects to natural resources by confining them to the existing astronomy sites; and (*iii*) require review and approval of all land use proposal by UH, including natural resource staff and specialists, during early planning phases.

As documented in the 2021 OAR (see, for example, Sections 3.6.2.1 and 3.9.2.6), UH's proposal review process requires those proposing new development within the UH Management Areas to incorporate, and UH to approve, measures to avoid, minimize, and mitigate potential adverse effects to natural resources, including sensitive habitats. This ensures that mitigation measures will be implemented as appropriate whenever new development occurs, and CMS will continue to enforce these requirements. In overseeing other entities use of the lands that it manages, UH will:

- Ensure that any habitat that will be permanently removed is replaced on at least a one-to-one basis, through either creation of new habitat, restoration of degraded habitat, or by permanent protection of similar unique habitats.¹⁹
- Make the full implementation of mitigation plans the responsibility of the proposal proponent.
- Require that those performing mitigation projects include a monitoring program in their plans that calls for at least three (3) years of monitoring to assess success and to inform future conservation projects in the region.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). References to the 2022 Master Plan have been added and, because UH has learned that the harshness of the environment means it can take longer to detect mitigation project benefits, effectiveness monitoring was increased to at least three years.

4.4.11 NR-11: CONDUCT HABITAT REHABILITATION PROJECTS FOLLOWING UNPLANNED DISTURBANCES

UH has conducted and will continue to conduct damage assessments for rehabilitation in the event of unplanned disturbances (e.g., spills, vehicle accidents). Habitat restoration is also an option following an unplanned disturbance. The nature of the appropriate rehabilitation or restoration will necessarily continue to be determined on a case-by-case basis following an assessment of the specific circumstances of the unplanned disturbance. The Maunakea Administrative Rules state that those engaged in permitted activities are responsible for corrective actions in the event of an accident or non-compliance with conditions. For example, if an unplanned disturbance occurs during a permitted construction project, that project, not UH, will be responsible for rectifying the

¹⁹ Mitigation projects that result from a planned impact to designated critical habitat or threatened or endangered species will have different requirements, which will be established through coordination with the USFWS.

Posted by wildernesswalker on 03/31/2022 at 9:45pm [Comment ID: 604]

Type: Suggestion

Agree: 0, Disagree: 0

IF UHH is the applicant (CDUA) for a proposed use is UHH the responsible party for the mitigation in the proposal? Is the taxpayer the ultimate party fiscally responsible? CMP must include an opinion from Corp Counsel for DLNR, and Corp Counsel for UH, re. is UH responsible for mitigation if UH applied to the CDUA for a project? If so can UH legally make the project responsible for mitigation? unplanned disturbance, under UH's supervision. Should a disturbance be the result of other activities (for example, public access) or due to the cumulative impacts of multiple activities, UH will both assess and rectify the unplanned disturbance. Examples of unplanned disturbances that may require rehabilitation or restoration responses include:

- Discrete incident disturbance:
 - Off-road driving or vehicle accidents.
 - Construction equipment disturbing areas beyond their approved limits.
 - Hazardous material spills.
- Cumulative disturbance:
 - Cinder compaction and soil erosion from over use of existing dirt roads and trails.
 - Creation of new trails, trail widening, or trail realignment.
 - Stormwater runoff causing erosion, which is of particular concern at Halepōhaku.

Depending on the scope and scale of the rehabilitation or restoration, effectiveness monitoring may be appropriate to assess success and inform future conservation projects in the region.

Because certain rehabilitation and restoration response efforts are likely to qualify as "land uses" under the Conservation District Rules, those efforts will need to comply with the provisions of the 2022 Master Plan prior to implementation.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). The discussion expanded to clarify who is responsible for rehabilitation and added some examples and details.

4.4.12 NR-12: PLAN AND CONDUCT HABITAT RESTORATION ACTIVITIES, AS NEEDED

As discussed in the 2021 OAR (see, for example, Sections 2.2.8.3, 2.2.9.3, and 2.2.10.3), UH intends to continue habitat restoration as needed and as the opportunities present themselves. The effort will continue to be informed by the extensive information collected by UH during the preparation and implementation of the CMP. This management action is closely associated with management actions NR-8 (Section 4.4.8) and NR-9 (Section 4.4.9). Also associated is the restoration of the astronomy sites, which is discussed in SR-2 (Section 11.4.1) and SR-3 (Section 11.4.2).

The greenhouse at Halepōhaku will continue to be used to support restoration activities within the UH Management Areas and elsewhere on Maunakea. CMS will endeavor to see that restoration planning is coordinated with the other agencies (NR-13) that operate on Maunakea, many of which have existing restoration programs or projects that might be expanded to include UH Management Areas. Where appropriate, it will seek funds and staff resources that will allow it to provide assistance or funding for habitat restoration activities in response to requests from other parties conducting activities on Maunakea and provide guidance and techniques for restoration planning.

Habitat restoration efforts involve three phases: (*i*) planning, (*ii*) implementing, and (*iii*) monitoring effectiveness. Efforts within the UH Management Areas will focus on the following areas:

- Creating viable habitat for the endangered Palila bird (*Loxioides bailleui*), other native bird species, and for native insects and pollinators such as the Hawaiian Yellow-faced bees (*Hylaeus spp.*), which are critical to the reproductive success of many native plant species.²⁰ The only portion of the UH Management Areas that is within the Subalpine Māmane Woodlands is Halepōhaku. The area is too small (~19 acres) to establish an independently viable woodland plot. However, it is located at the upper reaches of māmane woodlands which can provide some habitat and resources for native birds that follow the elevational flowering patterns of māmane. This upper elevation māmane woodlands can also serve as a refuge where birds can escape from avian malaria which is expected to extend its range higher on the mountain as climate change accelerates and raises the mosquito line. Neighboring land managers are also working on bird corridors to connect the lower elevation māmane woodlands to the higher elevation woodlands, and the UH managed lands will play a role in those efforts. This area is also suitable (and is being used for) the propagation of native subalpine and alpine plants on Maunakea.
- Supporting efforts to increase the density and abundance of endangered Mauna Kea silversword, or 'āhinahina (*Argyroxiphium sandwicense sandwicense*). Mauna Kea silversword has historically been found on Maunakea at elevations from 8,500 feet to 12,300 feet and two small wild populations are still present in that range.
- Improving wēkiu bug habitat where habitat is impaired.
- Restoring roadside native plant communities in the distinctive ecological zones between 9,500-13,000 feet.
- Continuing invasive species management (NR-2, Section 4.4.2) that is vital for supporting restoration efforts.

Restoration effectiveness should be monitored for at least three (3) years following completion to assess success and inform future conservation projects in the region. Moreover, because the results of restoration are unlikely to be fully felt within three years, UH will attempt to budget for a subsequent follow-up survey at the 8 to 10-year mark.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). The focus areas were added, as informed by UH's experience managing the area since the CMP was approved. Effectiveness monitoring was also added to provide consistency with other restoration and mitigation management actions.

4.4.13 <u>NR-13: INCREASE COMMUNICATION, NETWORKING, AND COLLABORATION THAT</u> <u>SUPPORTS MANAGEMENT AND PROTECTION OF NATURAL RESOURCES</u>

As discussed in various parts of the 2021 OAR (see, for example, Sections 3.1.3 and 3.10.2.1), UH has established the relationships and put in place the communication procedures needed to carry out this measure. UH's overall outreach effort, which incorporates this management action, is discussed in detail in the "Outreach/Coordination Cluster" in Section 5.4.2.

UH is working vigorously to continue and strengthen these relationships and the fruit they bear. For example, it is: (i) producing reports to inform stakeholders, public, and collaborating agencies

²⁰ The subalpine māmane woodlands on Maunakea which includes Halepōhaku is designated as critical habitat for the Palila.

about the status of the natural resources; (*ii*) sharing its reports with collaborating agencies and stakeholders; (*iii*) placing its summary reports on its website, where they are readily available to the general public; (*iv*) presenting the results of its management activities and monitoring program at scientific meetings; (*v*) producing this CMP 2022 Supplement detailing changes over time, and resource responses to management actions; and (*vi*) increasing the level of effort that it expends coordinating with the public and with the Maunakea Watershed Alliance, DLNR, and other agencies and organizations.

UH is also continuing to identify opportunities for collaborative data collection and resource management. It is doing this by (i) regularly communicating and meeting with other natural resource management agencies and scientists to discuss natural resource conditions on Maunakea; (ii) hosting such meetings at Halepōhaku or UH Hilo facilities; (iii) inviting agencies, researchers, and others involved in high-elevation natural resource management or research in Hawai'i to undertake work on Maunakea; (iv) sharing data with other agencies and using data collected by other agencies; and (v) entering into agreements with collaborating agencies as needed to facilitate cooperative work.

The COVID-19 pandemic, budget limitations, and organizational and staff changes have limited the extent to which UH has been able to pursue networking and collaboration opportunities over the past few years. However, CMS has made the re-establishment of close ties with land management groups a high priority and is working collaboratively with the staff of 'Imiloa Astronomy Center ('Imiloa) to establish new relationships and partnerships that it believes will enable UH to better achieve the CMP's desired outcomes.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time; however, greater specificity has been added to the discussion and those measures in the NRMP that have been found to be effective/implementable have been incorporated.

4.4.14 <u>NR-14: Follow Adaptive Management Principles When Reviewing/Updating</u> <u>Programs</u>

In accordance with this measure, UH will continue to use the principles of adaptive management when developing programs and methodologies. As discussed in the 2021 OAR, UH has established and continues to implement a process through which potential adjustments and revisions to CMP management actions are informed by data collected and documented in annual reports and periodic updates. Similarly, it regularly updates program plans, such as the *Maunakea Invasive Species Management* Plan (C. Vanderwoude, February 2015), as it learns from experience and communicates these to interested parties at MKMB meetings and elsewhere.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time.

4.4.15 NR-16: CONDUCT REGULAR LONG-TERM MONITORING

UH will continue to conduct regular long-term monitoring within the UH Management Areas. The authors of the 2009 CMP anticipated that the long-term monitoring would be conducted in accordance with an "inventory, monitoring, and research plan." For a variety of reasons, CMS has concluded that a single formal inventory, monitoring, and research plan would not be useful as there are multiple, coordinated programs that are already in place which serve this purpose. These ongoing long-term monitoring programs will continue.

Generally, the long-term monitoring effort will periodically consider the following steps:

- 1. Re-evaluating which resources to monitor.
- 2. Considering new monitoring tools, methodologies and research and update established monitoring guidelines based on available information.
- 3. Writing or revising resource-specific monitoring plans so that they fully consider such things as whether the monitoring can: (*i*) be accomplished using in-house staff; (*ii*) be streamlined to address multiple resources, minimize expenses while improving safety, and avoid impacts to the resources; and (*iii*) focus on the provision of scientifically and statistically sound data that can be used to identify trends and program needs.
- 4. Implementing monitoring plans.
- 5. Identifying data gaps and trends and periodically identifying actions needed to address them. Consideration of the tracking and assessment metrics identified in this plan will be one component of this effort.
- 6. Drawing conclusions, evaluating if the correct resources are being monitored, and considering if existing monitoring should continue or the program adapted by returning to step 1.

Some of the underlying objectives of the long-term monitoring include:

- Measuring progress toward achieving the desired outcome.
- Identifying trends (range expansion or contraction, population size or density changes, etc.) in the status of natural resources.
- Detecting short-term changes and threats to high-elevation ecosystems.
- Detecting long-term changes and threats to high-elevation ecosystems.
- Assessing the effectiveness of enhancement, mitigation, restoration, and rehabilitation projects so that lessons can be applied to future projects.

Continuing long-term monitoring will involve:

- Continuing to obtain data on certain climatic parameters (e.g., temperature, precipitation, wind, etc.).
- Annual arthropod monitoring.
- Invasive species monitoring/early detection, prevention, rapid response, and control efforts (NR-2).



#040

Posted by wildernesswalker on 03/31/2022 at 9:49pm [Comment ID: 605]

Type: Suggestion

Agree: 0, Disagree: 0

problems with data collection, data management and long term record storage have been discussed on numerous occasions in the Environment Committee (EC). Use of standardized metrics, detailed collection techniques and notes, standardization of reporting and more have been discussed. Please go into detail about how data will be collected and managed for consistency, stored for use in the near and far future. • Tracking the outcome of the restoration and rehabilitation projects that are undertaken (NR-11, NR-12, and others).

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). The concept for an inventory, monitoring, and research plan has been removed for the reasons presented above. Those measures in the NRMP that have been found to be effective/implementable, such as the six-step process, have been incorporated. Including list of some of the long-term monitoring topics were added.

4.4.16 NR-17: CONDUCT RESEARCH TO FILL KNOWLEDGE GAPS THAT CANNOT BE ADDRESSED THROUGH MONITORING

The OAR describes the extensive research that UH has funded since the CMP went into effect and notes that the results of that research have helped guide many of the ongoing management actions that UH is carrying out. UH will continue to seek funding for research projects deemed appropriate to filling data gaps and inform its management actions. The research funding will be based on a rigorous evaluation and prioritization process. In developing its proposed research funding priorities, CMS will:

- Maintain and regularly update a list of potential research projects based on knowledge gaps identified during completed and ongoing reviews, studies, monitoring, and research.
- Prioritize research projects based on:
 - The breadth of the results' applicability (e.g., a research project that can provide information that will be useful for management of a variety of natural resources or a large area would generally be prioritized over research whose results are applicable to only a single resource or a small area).
 - The immediacy of the need for the information the results would provide (e.g., a question that must be answered quickly to prevent a significant decline in conditions in natural resources, would be given a high priority).
 - The status of the resource being researched (e.g., research on endangered species would generally be prioritized over research on a native but non-threatened species).
 - The speed with which information must be available to be useful (e.g., research into natural resources that respond very quickly to perturbations would generally be prioritized over those that are slower to respond).

Based on its prioritized list of desirable research projects, CMS will continue to work with scientists to develop research guidelines and seek funding for prioritized research projects. In doing this, it will:

- Review literature and consult with experts regarding methodologies best suited to answer research questions.
- Assess where the research project can be conducted and determine if enough replicates can be established to ensure statistical rigor, consulting with statisticians as needed.
- Explore opportunities for collaboration or cooperation with other land management agencies (NR-13), especially if the resource being studied crosses property boundaries.

- Review research guidelines to ensure compatibility of data with the data already obtained.
- Estimate personnel and equipment and supplies costs of the research and seek the internal and/or outside funding needed to complete the project.
- Obtain, when appropriate, peer review from other natural resource managers and local experts, if feasible.

Regardless of whether the research is conducted by CMS' own staff or by outside entities, CMS will:

- Enter the data into the CMS database. When the research is conducted by CMS's own staff, the goal will be to assemble and analyze the data the research generates within a year of the completion of the dataset's collection.
- Prepare and issue a report summarizing the results of research, with a goal of doing so within one year of the completion of the analysis. For long-term research projects, if any, a summary progress report will be prepared annually.
- Share the results of research projects through attendance at conferences and meetings, publication in scientific journals, publication on CMS website and newsletter, and through press releases, as appropriate and desired.

CMS will evaluate the information obtained through relevant studies and, where appropriate, use it to:

- Evaluate the success of the research, i.e., the extent to which it answered the questions that had been posed.
- Assess the extent to which the research had identified (or left) gaps in the data or raised further questions that ought to be the subject of further investigations.
- Use the information obtained from the research to improve the way in which resources are managed (i.e., adaptive management, NR-14).

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Those measures in the NRMP that have been found to be effective/implementable, such as how research funding is prioritized, have been incorporated.

4.4.17 NR-18: MAINTAIN GEOSPATIAL DATABASE OF NATURAL RESOURCES

As described in the 2021 OAR, a GIS database of resources surveyed utilizing ArcGIS and distributed as GoogleEarth layers has been developed; as new data becomes available, it is added to this database. CMS will maintain that database and commits to entering additional data into it as rapidly as staffing and other resource limitations allow.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time.

5 EDUCATION AND OUTREACH

5.1 INTRODUCTION

Section 7.1.3 of the 2009 CMP (Ho'akea, LLC dba Ku'iwalu, April 2009) established eight management actions regarding UH's education and outreach efforts (EO-1 through EO-8). As used in the CMP, the term "Education" includes providing information about natural, cultural, and astronomical resources to the public, through on-site and off-site materials and programs. The term "Outreach" refers to activities intended to increase public participation in the stewardship of Maunakea, through community engagement and community involvement in resource management activities, especially through volunteer-based programs. Information concerning the current status of education and outreach can be found in Section 3.2 of the 2021 OAR (Appendix A).

The discussion of education and outreach are presented as "clusters" in this supplement. This is done to better capture, in one section, the diverse CMP management actions that address these two topics and to avoid repetition and inconsistency. Importantly, clustering reflects UH's holistic approach to them and identifying opportunities for place-based and community-based programs that can amplify UH's efforts and benefits to the community.

5.2 DESIRED OUTCOME

The "desired outcome" for the education and outreach program is to:

Build and maintain a constituency to engage in active and meaningful stewardship of Maunakea, through education and involvement of the public, to support/enhance conservation, and sustain the natural, cultural, and astronomical resources of Maunakea.

5.3 NEED

5.3.1 EDUCATION NEEDS

As discussed in the 2021 OAR and in accordance with the guidance contained in UH's recently updated 2022 Master Plan, protecting Maunakea's unique resources in the face of the increasing numbers of persons who wish to visit it requires improved methods and programs to adequately educate visitors about such things as: (*i*) the status and threats to natural and cultural resources; (*ii*) appropriate vehicle use; (*iii*) personal safety; and (*iv*) applicable laws, rules, and regulations while visiting the mountain. UH has made great strides related to education but there remains a need to continue and enhance the programs that have been established. Specific educational needs include the following:

- Producing a succinct video that provides an orientation for visitors, which is required in the Maunakea Administrative Rules, and incorporates Native Hawaiian cultural perspectives and cultural sensitivity.
- Enhancing efforts to present the orientation and provide other information to the entire community.

5.3.2 OUTREACH NEEDS

As outlined in the 2021 OAR and in accordance with the guidance contained in UH's 2022 Master Plan, there is a need for greater effort to reach and inform the Native Hawaiian community so that input from its members informs decision-making. This outreach should be done in coordination with management action CR-1 (Section 3.4.1). At the same time, continuing outreach to and participation by other community constituencies remains important. In accordance with this there is a need to redouble effort regarding outreach and community engagement in a manner that results in:

- The community being in the decision-making process early and often through the CMS volunteer advisory groups (e.g., MKMB, KKM, and EC) and diverse community engagement and outreach activities.
- Diverse community representation on the CMS volunteer advisory groups.

5.4 MANAGEMENT ACTIONS

As discussed in detail in Section 3.2 of the 2021 OAR (Center for Maunakea Stewardship, August 2021), all eight of the education and outreach management actions (Table 5.1) are ongoing.

Mgmt.			
Action	Description	Discussion	
Program Development			
EO-1	Modify, amend, and update the Maunakea Education & Outreach Plan (MEOP)	5.4.1	
	(University of Hawaii, December 2019) as warranted.		
Education	l		
EO-2	Require orientation of all persons accessing the UH Management Areas in a manner	5.4.3	
	consistent with the MEOP and Maunakea Administrative Rules.		
EO-3	Consistent with the MEOP, continue to develop, update, and distribute materials		
	explaining important aspects of Maunakea.		
EO-4	Consistent with the MEOP, implement the Maunakea Sign Plan (Office of Mauna Kea		
	Management, February 2017) and modify, amend, and update it as warranted.		
EO-5	Consistent with the MEOP, develop interpretive themes and features.		
EO-6	Consistent with the MEOP, engage in outreach and partnerships with schools.		
Outreach			
EO-7	Consistent with the MEOP, continue and increase opportunities for community	5.4.2	
	members to provide input on management plans and activities.		
EO-8	Consistent with the MEOP, continue and increase opportunities for community		
	members to participate in stewardship activities.		
Note: The Note:	he exact wording of the management actions listed in the table has been revised from the 2009 CMP and the 202		
the progress made to date, adaptation made based on the lessons learned, information collected, and input received. Source: Adapted from the 2021 OAR, Table 3.11.			
Source: A	dapted from the 2021 OAK, Table 5.11.		

 Table 5.1
 Ongoing Education and Outreach Management Actions

Through the course of implementing the CMP, UH has learned that the eight education and outreach management actions are complementary and draw from the same materials. That is why the *Maunakea Education & Outreach Plan* (MEOP) (University of Hawaii, December 2019) address all of them at some level. Furthermore, other CMP management actions are closely associated or directly related to these EO management actions. Therefore, this group of CMP management actions are discussed as two clusters – the "Outreach Cluster" (Section 5.4.2) and the

"Education Cluster" (Section 5.4.3) – in order to avoid repetition and confusion by discussing each management action separately.

5.4.1 EO-1: MAINTAIN THE MAUNAKEA EDUCATION AND OUTREACH PLAN

The *Maunakea Education & Outreach Plan* (MEOP) (University of Hawaii, December 2019) was developed collaboratively by representatives of 'Imiloa Astronomy Center, Maunakea Observatories, the Maunakea Visitor Information Station (VIS), and OMKM and approved by the MKMB in July 2020.²¹ The implementation of the MEOP is addressed in Sections 5.4.2 and 5.4.3. Hence, this section concerns only its modification, amendment, and updating.

The MEOP does not specify a process for its modification or amendment, nor does it specify that it needs to be updated after the passage of a certain period of time or the occurrence of a certain event. Currently, CMS anticipates that it will monitor the effectiveness of the measures called for in the plan on an ongoing basis and will adjust the activities it engages in as quickly as it is able. It will formally modify, amend, and/or update the MEOP document as appropriate and consistent with adaptive management principles.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Because the MEOP has been adopted this management action now addresses the modification, amendment, and updating based on the principles of adaptive management.

5.4.2 OUTREACH/COORDINATION CLUSTER (EO-7, EO-8, AND RELATED)

The outreach/coordination cluster of CMP management actions includes all those actions that address outreach and coordination. There are management actions in several CMP sections that guide outreach and coordination activities, sometimes broadly as EO-7 does, and sometimes specifically, such as NR-13, which guides outreach to agencies and entities with similar natural resource management challenges. To avoid repetition or inconsistency, all the outreach and coordination are listed and discussed together in this section as a "cluster."

The CMP management actions in the outreach/coordination cluster include the following:

- EO-7: Consistent with the MEOP, continue and increase opportunities for community members to provide input on management plans and activities. All the outreach and coordination activities associated with this management action are discussed in this section and involve the implementation of the MEOP.
- EO-8: Consistent with the MEOP, continue and increase opportunities for community members to participate in stewardship activities. All the outreach and coordination activities associated with this management action are discussed in this section and involve the implementation of the MEOP.
- EO-1: Maintain the Maunakea Education and Outreach Plan (Section 5.4.1). This management action concerns the modification, amendment, and/or updating of the MEOP

²¹ Note: The CMP calls for the education and outreach plan to "...outline the process and discuss a venue for mandatory visitor orientation, and community consultations." The program that was formally adopted makes the program "mandatory" only for "users", which Section 1.1.1 of the MEOPO defines as "...individuals working under the auspices of a land-use permit on Maunakea. Examples of users include observatory employees, observatory vendors, University support staff, and other public agency employees." However, mandatory visitor orientation is addressed further in EO-2.

when deemed appropriate. The MEOP provides guidance for all outreach and coordination activities.

- EO-6: Consistent with the MEOP, engage in outreach and partnerships with schools. To the extent that this action involves outreach to the schools, it is addressed in this section; education programs that involve schoolteachers and/or students are discussed in Section 5.4.3.
- CR-1: Engage with Cultural Community and Develop and Maintain Appropriate Guidance Regarding Cultural Issues (Section 3.4.1). Briefly, this management action discusses: (*i*) maintaining a CR-1 mailing list (a list of Native Hawaiians and others with cultural interests) and providing those on the list with timely updates regarding MKMB agendas, land use proposals, the development of cultural guidelines, reports, and other items of potential interest, and (*ii*) providing regular updates to the individuals that the Hawai'i Island Burial Council officially recognizes as cultural descendants of Ka'ohe Ahupua'a.
- NR-13: Increase Communication, Networking, and Collaboration that Supports Management and Protection of Natural Resources (Section 4.4.13). This management action involves identifying opportunities for collaborative data collection and resource management with agencies and entities with similar lands, needs, and/or experience.
- P-5: Coordinate Enforcement Efforts with Other Agencies (Section 8.4.4). This management action involves UH sharing Ranger reports and actively coordinating with other agencies (e.g., NAR, DOFAW, U.S. Fish and Wildlife Service (USFWS), and others) regarding enforcement of the rules and regulations that are applicable within the UH Management Areas and on immediately adjacent lands.
- OI-3: Coordinate Approach to Resource Management (Section 13.4.1). This action involves UH working closely with neighboring landowners and managers (e.g., DLNR, Department of Hawaiian Home Lands (DHHL), Mauna Kea Watershed Alliance, and others) to coordinate its actions within the UH Management Areas with their activities.

So that outreach and coordination is considered comprehensively, UH stewardship staff (CMS, 'Imiloa, and potentially others) involved in outreach and coordination activities associated with the UH Maunakea Lands will be aware of all these CMP management actions, their interrelationships, and their directives.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). The cluster approach detailing the outreach and coordination management actions reflects UH's efforts to integrate and consolidate outreach across all topics of concern within the UH Management Areas. The management actions also recognize that plans have been established to aid this effort.

5.4.2.1 Outreach Overview

CMS will continue its implementation of the outreach called for in the CMP and the MEOP, including ongoing efforts to expand opportunities for community members to: (*i*) provide input to cultural and natural resources management activities on Maunakea and (*ii*) ensure systematic input regarding planning, management, and operational decisions that affect natural resources, sacred materials or places, or other ethnographic resources with which they are associated. This will include such things as contacting local civic and environmental groups, local experts in natural

and cultural resources, families with lineal and cultural connections to Maunakea, kūpuna, cultural practitioners, the Office of Hawaiian Affairs, and other Native Hawaiian groups.

One component of this effort is to distribute information to the community so that the public remains well-informed. An equally important component is to continue collecting community input so that CMS can adjust its efforts accordingly. In furtherance of this outreach effort, CMS will continue to regularly update its list of community members who wish to be notified and from whom input should be sought on the following:

- Implementation of UH's 2022 Master Plan and CMP, including any updates, revisions, or amendments to them.
- Land use proposals being evaluated by UH (e.g., astronomy facilities, conservation actions, etc.).
- Proposed procedures and guidelines (e.g., concerning appropriateness of constructing new Hawaiian cultural features, invasive species SOPs, etc.) that are being developed.
- The availability of new information (e.g., Annual Archaeological Monitoring Reports, research reports, etc.).
- Other actions being considered or reports prepared by/for UH and CMS that may be of interest or concern to the community.

Information will be distributed and input sought via the method(s) that CMS's experience regarding community interest in a topic or product suggests would be most appropriate. As discussed in the 2022 Master Plan, one of UH's strategies is to involve the community in the decision-making process early and often through the CMS volunteer advisory groups (e.g., MKMB, KKM, and EC) and diverse community engagement and outreach activities. The methods that CMS will use may include:

- Posting on CMS website.
- Distribution to mailing list (via Email and/or U.S. mail).
- Inclusion in eNewsletters distributed by CMS.
- Regular updates regarding current activities and interaction with interested community members will be undertaken via CMS' website and social media accounts.
- Informal talk-story sessions (telephone, virtual meetings, and in-person meetings) with community members.
- Discussions with community representatives during advisory group (KKM, EC, and MKMB) meetings and with the public during MKMB meetings.²²
- Formal virtual and in-person meetings, open houses, and forums.

Some agencies and several types of community members will receive additional focus under the outreach program, they include:

²² UH is diversifying community representation on the CMS volunteer advisory groups, including KKM, EC, and MKMB. This is included as a strategy in the 2022 Master Plan.

- DLNR, generally as the agency responsible for the lands and as the agency that issued the permits for the existing land uses, and specifically certain divisions as follows: (*i*) OCCL related to planning and land use; (*ii*) SHPD related to historic and cultural resource monitoring and protection (P-5: Coordinate Enforcement Efforts with Other Agencies (Section 8.4.4)); (*iii*) DOFAW related to overall management and ecosystem restoration (NR-13: Increase Communication, Networking, and Collaboration that Supports Management and Protection of Natural Resources (Section 4.4.13)); and (*iv*) DOCARE related to enforcement in general (P-5: Coordinate Enforcement Efforts with Other Agencies (Section 8.4.4), criminal enforcement (ACT-1: (Section 7.4.1)), and issues related to hunting (ACT-8: Monitor Hunting Activity and Adherence to Applicable DLNR Hunting Rules (Section 7.4.8)). UH will meet with DLNR representatives at least once a year to address these and other topics.
- Families with lineal and cultural connections to Maunakea, cultural practitioners, OHA, and other Native Hawaiian groups (CR-1: Engage with Cultural Community and Develop and Maintain Appropriate Guidance Regarding Cultural Issues (Section 3.4.1)).
- Other nearby property owners (OI-3: Coordinate Approach to Resource Management (Section 13.4.1)).
- Others (e.g., state agencies, federal agencies, nearby landowners, and non-governmental organizations) conducting conservation, restoration, and rehabilitation projects, especially those that involve volunteers, on Maunakea or in similar environments (NR-13: Increase Communication, Networking, and Collaboration that Supports Management and Protection of Natural Resources (Section 4.4.13)).
- Schools in association with EO-6 and expanding education for Hawai'i's students (Section 5.4.3.3).

5.4.2.2 Community Opportunities to Participate in Stewardship Activities

CMS anticipates continuing and intensifying the opportunities it creates for community members to participate in stewardship activities. Examples of these include workshops, meetings with citizen advisory groups, volunteer opportunities, and school-related programs that will help involve children. To the extent that these opportunities occur on UH Maunakea Lands, all participants will be required to comply with applicable provisions of the CMP and Maunakea Administrative Rules. Among other things, participants will need to have viewed the Maunakea orientation (Section 5.4.3.1) and park their vehicles in designated areas. These programs will also be offered and operated in a manner consistent with UH's intent to: (*i*) not expand its VIS offerings in a manner that would generate a greater number of visitors and (*ii*) preserve the ambiance and feeling of the cultural landscape and minimize adverse effects on the alpine and subalpine ecosystems and other resources.

After evaluating the CMP's and OAR's recommendation that UH establish a docent program to provide guided tours highlighting the cultural landscape and natural resources, CMS is evaluating the feasibility (from a cost, staffing, and desire to limit visitation levels) of reinstituting the kind of guided driving tours that ran on Saturdays and Sundays between 2005 and 2015 and was available to those having their own 4WD vehicle. Beginning with a safety brief by CMS staff at the VIS, knowledgeable volunteer docents could then lead guests up the Mauna Kea Access Road while stopping to describe various cultural, natural, and scientific points of interest.

CMS has made/is in the process of making arrangements for a variety of service projects that fulfill stewardship objectives that are in both the CMP and the 2022 Master Plan while also providing education and enjoyment to volunteers. Examples of the kind of such efforts that were made in the past (prior to 2016) include weekly trail maintenance by VIS staff on the path to Pu'ukalepeamoa and twice-annual trash pickup along the Humu'ula trail; both were intended to help reduce the impact of visitors and educate staff. In doing this UH is cooperating and collaborating with other entities that run volunteer-based projects. One aspect of that collaboration would be to increase the volunteer pool so that UH and others could conduct larger-scale projects on Maunakea than would be impossible with only their in-house resources.

The kinds of projects related to natural resources that CMS believes could benefit most from greater community participation include: (*i*) basic maintenance, such as trash pick-up and inspection for damage to facilities or signs; (*ii*) care of the botanical enclosure, such as weeding, watering, and inspecting the enclosure; (*iii*) enhancing native plant communities, such as weeding, outplanting, and care of native species around VIS and dormitories; (*iv*) trail maintenance and development; and (*v*) restoration projects for native plant communities. Potential service projects related to the cultural landscape that appear most likely to benefit from greater public participation in stewardship activities include the involvement of archaeology students and interested persons from the Native Hawaiian community knowledgeable in field methods related to the monitoring of cultural properties.

In addition to these "action-oriented" items, meetings of the MKMB, KKM, and the EC provide opportunities for members of the community to discuss and provide advice regarding the way the mountain is managed and the specific types of stewardship programs that ought to be undertaken. The latter is intended to be responsive to the concerns that some community members, particularly members of the Native Hawaiian community, have expressed about UH not listening and responding appropriately to their concerns and/or not undertaking certain stewardship activities they believe are important.

5.4.3 EDUCATION CLUSTER (EO-2, EO-3, EO-4, EO-5, EO-6, AND RELATED)

The education cluster of CMP management actions includes all those actions that address educational efforts. There are management actions in several CMP sections that direct educational activities, sometimes broadly as EO-3 does, and sometime specifically, such as CR-3, which addresses cultural elements of the educational effort. To avoid repetition or inconsistency, all the education management actions are listed and discussed together in this section as a "cluster." Another aspect of the cluster is to approach education more holistically and identify opportunities for place-based and community-based educational programs that can amplify their benefits. The CMP management actions in this cluster include the following:

- EO-2: Require orientation of all persons accessing the UH Management Areas in a manner consistent with the Maunakea Administrative Rules. All activities associated with this management action are discussed in this section (Subsection 5.4.3.1).
- EO-3: Consistent with the MEOP, continue to develop, update, and distribute materials explaining important aspects of Maunakea. All activities associated with this management action are discussed in this section (Subsection 5.4.3.2).
- EO-4: Consistent with the MEOP, implement the *Maunakea Sign Plan* (Office of Mauna Kea Management, February 2017) and modify, amend, and update it as warranted. All

activities associated with this management action are discussed in this section (Subsection 5.4.3.2).

- EO-5: Consistent with the MEOP, develop interpretive themes and features. All activities associated with this management action are discussed in this section (Subsection 5.4.3.2).
- EO-6: Consistent with the MEOP, engage in educational partnerships with schools. All activities associated with this management action are discussed in this section (Subsection 5.4.3.3).
- EO-1: Maintain the Maunakea Education and Outreach Plan (Section 5.4.1). This management action concerns the modification, amendment, and/or updating of the MEOP when deemed appropriate. The MEOP provides guidance for all education activities.
- CR-3: Conduct Educational Effort to Raise Public Awareness of Importance of Preserving the Cultural Landscape (Section 3.4.3). This management action involves the cumulative implementation of all the education activities outlined in this section.
- NR-6: Educate People About Maunakea's Natural Resources (Section 4.4.6). This management action involves the cumulative implementation of all the education activities outlined in this section.
- ACT-3: Maintain Ranger Program (Section 7.4.3). This management action involves the continuation of the Maunakea Rangers and is detailed in Subsection 5.4.3.4.
- P-4: Promote Manager and Permittee Awareness of Applicable Rules & Permit Requirements (Section 8.4.3). This management action involves the cumulative implementation of all the education activities outlined in this section.
- IM-2: Require Maintenance Worker Orientation (Section 9.4.2). This management action involves the cumulative implementation of all the education activities outlined in this section.
- C-7: Educate Construction Workers Regarding Historical and Cultural Significance (Section 10.4.7). This management action involves the cumulative implementation of all the education activities outlined in this section as they apply to personnel working on construction projects within the UH Maunakea Lands.
- C-8: Educate Construction Workers Regarding Environment, Ecology, and Natural Resources (Section 10.4.8). This management action involves the cumulative implementation of all the education activities outlined in this section as they apply to personnel working on construction projects within the UH Maunakea Lands.

UH will endeavor to provide all education materials discussed in this section in a multilingual format (i.e., make them available in English, Hawaiian, Japanese, etc.) as deemed appropriate.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). The cluster approach detailing the education management actions reflects UH's efforts to integrate and consolidate educational efforts across all topics of concern within the UH Management Areas. The management actions also recognize that a plan has been established to aid this effort and that 'Imiloa has been engaged to aid in educational efforts, particularly orientations.

5.4.3.1 Mandatory Visitor Orientation

HAR § 20-26-5 of the Maunakea Administrative Rules provides that:

As set forth in the comprehensive management plan, all persons accessing the UH management areas shall be required to complete an orientation regarding cultural and natural resources, safety matters, and other relevant information prior entering the UH management areas.

UH has required and provided an orientation for those working on the mountain since 2013. The worker orientation program will continue to be a more robust orientation than the visitor orientation program that CMS is implementing. Astronomy facility staff, tour operators, support staff, contractors, vendors, Rangers, and others working within the UH Maunakea Lands will be required to complete the worker orientation prior to starting their work. The worker orientation will consist of an approximately 25-minute video and will require satisfactory scores on a brief assessment quiz given at its conclusion. The updated worker orientation video, produced by CMS website 'Imiloa, will be placed on the once complete (https://hilo.hawaii.edu/maunakea/stewardship/orientation). The worker orientation must be repeated every three (3) years, more frequently if required by a permit, or as directed by UH in accordance with the Maunakea Administrative Rules. For those working on Maunakea under a permit (CDUP or permit issued under the Maunakea Administrative Rules), participation is tracked and CMS will continue to report summary statistics annually to BLNR.

The requirement that all <u>visitors</u>²³ also receive and demonstrate reasonable proficiency with the material contained in the orientation is relatively new. 'Imiloa is developing a brief (approximately 10 minute) visitor orientation video that will satisfy this requirement. It will be posted on the CMS website. Enforcement of the visitor orientation requirement will require procedures, personnel, and equipment that have, with some exceptions, not heretofore been in place. CMS believes that the most efficient implementation method is by making orientation enforcement part of its overall program to manage access to the UH Maunakea Lands, which is discussed in CMP management action ACT-1 (Section 7.4.1).

5.4.3.2 Develop, Update, & Distribute Materials Explaining Important Aspects of Maunakea

As described in Section 3.2.2.3 of the 2021 OAR, UH has prepared a variety of printed materials covering topics such as safety, cultural landscape, natural resources, and recreational activities and is continuing to distribute these free of charge from various outlets (e.g., VIS, IfA/CMS office in Hilo, 'Imiloa, commercial tour operators, at events CMS holds or attends, etc.). It also makes copies of most of these available on its website. These materials have included and will continue to include:

• <u>Informational brochures</u> (available as handouts and on website), which will be updated periodically by knowledgeable personnel, regarding the following: (*i*) Visiting Maunakea Safely and Responsibly; (*ii*) Maunakea Heritage and Natural Resources Guide²⁴ (English and Japanese versions); (*iii*) copies of previous literature shared with visitors to Maunakea and at public events (e.g., "Maunakea: Ka piko kaulana o ka 'aina (the famous summit of the land)" cultural significance brochure).

²³ Visitors are defined as individuals entering the UH Management Areas that are not working under the auspices of a CDUP or permit issued under the Maunakea Administrative Rules.

²⁴ This document is scheduled for updating during 2022.

- <u>Displays at the VIS</u> that educate the public about the prehistory and history of Maunakea, encourages the preservation of the cultural landscape and natural resources, and inform the public about the restrictions and precautions associated with the landscape and resources. Certain exhibits were mostly recently updated in July 2020. The exhibits will continue to be updated periodically by knowledgeable personnel, including 'Imiloa representatives.
- <u>Periodic CMS newsletters</u> that include new information or findings related to the cultural landscape, natural resources, and other important aspects of Maunakea.

CMS is, in cooperation with 'Imiloa, also developing more interactive web-based products that it believes will reach an even-broader audience. Examples of the items that it is developing and expects to deploy include the following:

- An augmented reality exhibit that uses GIS data to share different aspects of Maunakea and Hawai'i Island.
- Measures that feature greater ease of access to in-depth content and source material (cultural, historical, astronomical, management, and natural history).
- Content additions to the CMP website.
- CMS social media accounts, including Facebook and Instagram.

Physical signs are another important educational material medium. As discussed at length in Section 3.2.2.4 of the 2021 OAR, The *Maunakea Sign Plan* (Office of Mauna Kea Management, February 2017) was formally adopted in February 2017, and it has guided and will continue to guide the design, installation, and maintenance of all signage on the mountain. The plan will be modified, amended, and updated as warranted. Signs will be integrated into the overall educational program so that information on signs is consistent with information provided on brochures and displays and the various modes of education enhance each other. This is especially applicable to interpretive signs, but applies to all sign types.

Several of the specific recommendations in the *Maunakea Sign Plan* have not yet been implemented. Those items, as well as the steps that CMS is committed to taking to implement them, include the following:

- As a preliminary step to updating hazard and safety information signs, CMS completed a sign inventory in 2021. The inventory includes roadway and building signs within the UH Management Areas. The next step is to assess need, content, and siting for any new signage. Efforts will be made to consolidate messaging as much as possible and to eliminate unnecessary signs to keep the number of signs at a minimum.
- CMS will work with responsible agencies, including DLNR, and its advisory groups to explore creation and installation of wayside signs at appropriate locations on the summit region and in designated parking areas. Such signs may be modeled on existing DLNR waysigns at Pu'uhuluhulu and Kaulana Manu Nature Trail.
- CMS staff anticipates a redesigned VIS patio in 2022 showcasing the unique aspects of Maunakea. General visitor information will be displayed on posters mounted to a VIS wall. Mobile patio exhibits will showcase other aspects of importance.

- While CMS continues to consider areas appropriate for use as a future nature trail or heritage walk, the still-young Native Plant Restoration area near the VIS is presently too delicate for this purpose. Other options continue to be considered.
- Regulatory signage will be posted in appropriate areas with appropriate citations in order to provide proper notice to the public of applicable provisions of the Maunakea Administrative Rules. A copy of the rules is online and is available at the VIS for the public's reference.

As indicated in Section 3.2.2.5 of the 2021 OAR, thus far UH has made only limited progress with respect to the development of interpretive features and activities that would make information about, and interaction/experience with, cultural and natural resources more available to those visiting the UH Maunakea Lands. Specifically, because it has struggled to appropriately balance input from advisory groups, concerns related to health and safety, and the imperative to conserve the resources, UH has not yet implemented a number of the possibilities for interpretive features mentioned in the CMP. UH will continue to consider the integration of the following interpretive functions into its integrated education programs:

- A self-guided tour (using brochures or previously downloaded podcasts) of geological resources in the summit region.
- Development of one or more small pullout gardens along the Mauna Kea Access Road, between Halepōhaku and the summit region, planted with representative vegetation and accompanying interpretive signage, to illustrate change of vegetation communities with an increase in elevation.

5.4.3.3 Educational Partnerships with Schools

The OAR documents the many ways in which UH has interacted with the community over the years since the CMP was adopted. It has entered into partnerships with many schools by collaborating with local experts, teachers, and university researchers, and by working with 'Imiloa, which is a part of UH Hilo. CMS' partnerships with schools will contin⁰⁴¹ The following are examples of the programs that UH will continue, and expand on, to continue and strengthen its partnerships with schools:

- Hosting educational programs and school visits at UH Hilo and Halepōhaku, and community programs such as AstroDay and The Universe Tonight.
- Participating in the UH Hilo Pacific Internship Programs for Exploring Science.
- Maintaining the Akamai Internship Program, which mentors students and prepares them for careers.
- Expanding the Maunakea Scholars program, one component of which involves high school students being allocated telescope time.
- Summer HI STAR Program.
- Providing education opportunities to schools and students on a broad range of topics through the Multidisciplinary Field Station concept slated for Halepōhaku.

#041

Posted by Veronica Ohara on 03/26/2022 at 12:40pm [Comment ID: 598]

Type: Suggestion

Agree: 0, Disagree: 0

I support this educational partnership with schools, STEM and STEAM are critical to education of Hawaii's children. We must move beyond tourism.

5.4.3.4 Rangers

The Rangers will continue to be UH's primary means of ensuring public safety, protecting resources, encouraging appropriate behavior, and monitoring compliance with permit conditions and applicable rules. The Rangers will continue to play a lead role in educating the public about the cultural significance and environmental uniqueness of Maunakea and the ways in which visitors can remain safe and minimize their impact of the landscape. In addition, the Rangers have authority to issue citations under the Maunakea Administrative Rules and will do so when appropriate. Ensuring that the Rangers continue their primary interpretive and education roles on Maunakea will enable them to also continue their responsibilities related to other management actions, including:

- CR-14: Report Disturbance of Historic Shrine or Burial Site (Section 3.4.7). This management action involves the Rangers reporting observed disturbance of shrines or burial sites to CMS and other entities.
- ACT-3: Maintain Ranger Program (Section 7.4.3). This management action involves the continuation of the Maunakea Rangers for interpretive and compliance purposes. The interpretive portion of this responsibility is discussed in this section and the compliance aspect is detailed in Section 7.4.3.
- ACT-8: Monitor Hunting Activity and Adherence to Applicable DLNR Hunting Rules (Section 7.4.8). Rangers report suspected hunting violations observed on DLNR lands to DLNR, including DOCARE.
- P-1: Comply with Applicable Laws, Regulations, and Permit Conditions (Section 8.4.1) and P-7: Review Facility Compliance with CDUPs (Section 8.4.5). Related to these management actions, the Rangers monitor activities for compliance and will continue to conduct inspections of the summit observatories and Halepōhaku facilities for compliance with their CDUPs.
- P-4: Promote Manager and Permittee Awareness of Applicable Rules & Permit Requirements (Section 8.4.3). This management action involves the cumulative implementation of all the education activities outlined in this section.
- P-8: Enforce (Section 8.4.6). Rangers' responsibilities include monitoring compliance with the conditions of commercial tour operator permits and the conditions of special use permits issued by CMS.
- IM-5: Finalize & Implement Debris Removal, Monitoring, and Prevention Plan (Section 9.4.5). Rangers, as well as the CMS's VIS and natural resource staff routinely check for and pick up trash and debris in accordance with the approved *Debris Removal, Monitoring, and Prevention Plan* while on their daily patrols.
- OI-3: Coordinate Approach to Resource Management (Section 13.4.1). Rangers report unusual or suspicious behavior observed on DLNR lands to DLNR, including DOCARE.

#042

Posted by Veronica Ohara on 03/26/2022 at 12:41pm [Comment ID: 599]

Type: Suggestion Agree: 0, Disagree: 0

I support the Rangers and am relieved you plan to expand their areas of expertise.

6 ASTRONOMICAL RESOURCES

6.1 INTRODUCTION

Section 7.1.4 of the 2009 CMP (Ho'akea, LLC dba Ku'iwalu, April 2009) established two management actions intended to preserve the conditions that make the UH Management Areas so well-suited for astronomy research. Section 3.3.1 of the 2021 OAR (Center for Maunakea Stewardship, August 2021), discusses the status of the two management actions, AR-1 and AR-2. Information concerning the current status of the astronomical resources can be found in Section 3.3 of the 2021 OAR (Appendix A).

6.2 DESIRED OUTCOME

The "desired outcome" with respect to astronomy resources is:

Astronomical resources shall be protected by preventing the intrusion of activities and uses incompatible with astronomy facilities, such as those that generate nuisance light, dust, and radio frequencies.

This desired outcome has been adapted to focus on the scientific resources and eliminate terms that have or may become obsolete.

6.3 NEED

Astronomical resources are subject to actual and potential impact from incompatible uses or activities in the summit region. Without planned protections and a commitment to protect astronomical resources, adverse effects may occur. Measures to protect other resources in the UH Management Areas, such as the cultural landscape and natural resources (management actions CR-# and NR-#), will also protect astronomical resources, to a degree. A few additional measures are necessary to address specific concerns related to astronomical resources.

6.4 MANAGEMENT ACTIONS

As discussed in Section 3.3 of the 2021 OAR, both of the management actions in the CMP (AR-1 and AR-2) that are intended to preserve the conditions that make Maunakea so well-suited for astronomy research are ongoing. The actions are summarized in Table 6.1 and a discussion of each is presented below in Sections 6.4.1 and 6.4.2.

Mgmt.		
Action	Description	Discussion
AR-1	Manage activities and uses in the UH Management Areas to avoid, minimize, or	6.4.1
	mitigate adverse impacts to astronomical resources.	
AR-2	Prevent light pollution, radio frequency interference (RFI) and dust.	6.4.2
Note: The exact wording of the management actions listed in the table has been revised from the 2009 CMP and the 2021 OAR to reflect the progress made to date, adaptation made based on the lessons learned, information collected, and input received.		
Source: A	dapted from the 2021 OAR, Table 3.12.	

 Table 6.1 Ongoing Astronomy Resource Management Actions

6.4.1 AR-1: LIMIT THREATS THROUGH MANAGEMENT OF ACTIVITIES AND USES

The sublease terms between UH and the operators of the non-UH astronomy facilities and the conditions UH includes with permits issued under the Maunakea Administrative Rules have proven extremely effective in protecting the value of the summit area for astronomical research. UH will continue to incorporate similar and/or more restrictive clauses in all new agreements it enters. Additionally:

- Proposed land uses will be subject to the proposal review process outlined in the 2022 Master Plan and an astronomy resource specialists will participate in that review, as appropriate. Specific attention will be placed on adherence to the design guidelines related to dust, lighting, and radio frequency interference (RFI).
- CMS' administrators and astronomy resource specialists will continue to do their utmost to ensure that they perform the ACT-# coded management actions (Section 7.4), which focus on managing activities and uses, in such a way as to forestall negative impacts on astronomical resources.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time; however, this action now specifies that an astronomy resource specialist will participate in ACT-# coded actions to be consistent with components of the CR and NR management actions.

6.4.2 AR-2: PREVENT LIGHT POLLUTION, RADIO FREQUENCY INTERFERENCE, AND DUST

UH will enforce the provisions in the Maunakea Administrative Rules that authorize UH to continue to provide the astronomical resource protection called for in the CMP. The best examples of this, perhaps, may be found in HAR § 20-26-23, which prohibits radio transmissions, artificial illumination, and other activity that materially interferes with the scientific and educational operations of the astronomical facilities or research equipment within the UH Management Areas above Halepōhaku and in the restrictions on vehicular travel contained in HAR § 20-26-38. Regarding RFI, activities and uses will be required to comply with the Maunakea Observatories Summit Radio Frequency Transmitter Policy, which may be updated from time to time.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time.

7 ACTIVITIES AND USES

7.1 INTRODUCTION

Section 7.2.1 of the 2009 CMP (Ho'akea, LLC dba Ku'iwalu, April 2009) contains management actions related to scientific research work, cultural and religious activities, and recreational activities and uses within the UH Management Areas. While the original CMP notes that the best known and most prominent scientific activity on Maunakea at the time was astronomical research, other fields of scientific research, including archaeology, biology, geology, and meteorology, are also described. The CMP also refers to the cultural and religious practices associated with the mountain, including prayer, burial, construction of small shrines, and other rituals. Finally, the CMP acknowledges the value of the recreational activities that occur in the UH Management Areas, including sightseeing of the natural beauty and scenic areas, stargazing, snow play, hiking, biking, and hunting.

Information concerning the current status of activities and uses can be found in Section 3.4 of the 2021 OAR (Appendix A). Section 3.4.1 of the 2021 OAR reviews the "Permitted General Uses" and the "Permitted Public Uses" in the CMP. Importantly, it notes that many of those are the same as those that are included in the Maunakea Administrative Rules, which is consistent with the provisions of the CMP.

The *Revised Management Plan for the UH Management Areas on Mauna Kea* (University of Hawaii, March 1995), which the CMP refers to as the *1995 Management Plan*, is no longer referenced because it has been replaced by the Maunakea Administrative Rules, elements of this document (e.g., Section 7.4.2), and elements of the 2022 Master Plan.

7.2 DESIRED OUTCOME

The "desired outcome" with respect to activities and uses is:

To retain and enhance recreational and cultural activities, ensure regulation of commercial activities, and support scientific studies while maintaining adequate protection of resources, educating users regarding resource sensitivity, and ensuring the health and safety of those visiting or working at Maunakea.

7.3 NEED

Public access to Maunakea has become much easier since the construction of the Mauna Kea Access Road, and, more recently, improvement of Daniel K. Inouye Highway (aka Saddle Road). These developments have led to far greater numbers of people entering the UH Management Areas than was once the case. Managing activities and uses within the UH Management Areas involves managing (*i*) access to the UH Management Areas, and (*ii*) the facilities and uses that are developed and operated within the UH Management Areas. Such measures will help protect resources, enhance safety, and maintain the unique qualities of Maunakea.

Needs to manage activities and uses include:

• Developing education, citation, enforcement, and appeal procedures within CMS to implement the Maunakea Administrative Rules

- Implementing the 2022 Master Plan, which addresses new facilities and uses.
- Implementing CMP management actions that address public and commercial access and activities.
- Monitoring and documenting visitor activities, including numbers entering, times of day present, locations accessed, and their impacts to the resources.

7.4 MANAGEMENT ACTIONS

As discussed in Section 3.4 of the 2021 OAR and summarized in Chapter 2 of this document, 11 of the 12 CMP management actions related to activities and uses are ongoing.²⁵ Those actions are listed in Table 7.1, and the nature of the work that is continuing are summarized in Sections 7.4.1 through 7.4.11.

Mgmt. Action	Description	Discussion		
General Management				
ACT-1	Development and implement robust access management guidelines and procedures.	7.4.1		
ACT-2	Implement and enforce Maunakea Administrative Rules to reduce impacts of parking and traffic.	7.4.2		
ACT-3	Maintain the Ranger program to educate and encourage adherence to rules and guidelines and enforce Maunakea Administrative Rules.	7.4.3		
ACT-4	Maintain and strengthen infrastructure to educate and encourage adherence to rules and guidelines.	7.4.4		
Recreation	nal Activities			
ACT-5	Implement and enforce Maunakea Administrative Rules to reduce impacts of recreational hiking.	7.4.5		
ACT-6	Manage snow play activities in a manner that minimizes its impacts and maintains public safety and welfare.	7.4.6		
ACT-7	Confine UH and other sponsored (non-commercial) tours and stargazing activities to previously disturbed ground surfaces and established parking areas.	7.4.7		
ACT-8	Support DLNR conservation resource enforcement officers by monitoring and reporting hunting activity and adherence to applicable DLNR hunting rules.	7.4.8		
Commerc	ial Activity Permits			
ACT-9	Implement and enforce Maunakea Administrative Rules pertaining to commercial tour permitting.	7.4.9		
ACT-10	Provide input on permits for filming activities.	7.4.10		
Other Act	ivity Permits			
ACT-12	Vet all proposals for activities that require a research or special use permit under the Maunakea Administrative Rules.	7.4.11		
	he exact wording of the management actions listed in the table has been revised from the 2009 CMP and the the progress made to date, adaptation made based on the lessons learned, information collected, and inpud dapted from the 2021 OAR, Table 3.13.			

 Table 7.1
 Ongoing Activity and Use Management Actions

²⁵ Only ACT-11, which called for UH to obtain statutory authority to regulate commercial activities within the UH Management Areas has been completed, see Chapter 2.

7.4.1 <u>ACT-1: Develop and Implement Access Management Guidelines and</u> <u>Procedures</u>

Under the Maunakea Administrative Rules (HAR § 20-26-38), UH is authorized to implement the following specific access management measures, among others as reasonable:

- Install a gate or other control structure (with the approval of BLNR) to manage vehicular access to the UH Management Areas.
- Close or limit access to all or portions of the UH Management Areas when needed for protection from hazardous conditions, including but not limited to inclement weather, construction or maintenance activities on or near the roadway or at astronomy facility sites, transportation of wide, heavy, or otherwise hazardous loads, or roadway congestion.
- Limit access by private vehicles for public safety and welfare, for the protection of resources, and to reduce congestion. Restrictions may include, but are not limited to, setting a maximum number of private vehicles allowed within the UH Management Areas at any one time, restricting the areas in which private vehicles may operate, or requiring the use of shuttle vehicles in lieu of private vehicles.
- Limit public access hours for the UH Management Areas, provided that hunters have access to hunting areas pursuant to UH's land authorizations and DLNR's hunting rules.

UH understands that access management is one of the most sensitive (and desired) issues for the public. No access management proposals will be developed without substantial public outreach and input. Therefore, it will likely be a few years before an access management project is permitted and implemented. CMS is exploring implementing access management measures in phases; the phases include:

- An <u>initial phase</u> that may involve the installation of certain infrastructure that is outlined in the 2022 Master Plan (e.g., a manned kiosk, an optional gate, etc.). The establishment of procedures that are consistent with the rules that include such things as: (*i*) conducting spotchecks to ensure that occupants of vehicles proceeding above Halepōhaku have completed the orientation program; (*ii*) establishing a reservation and ticketing system that would allow UH to track and, at certain times of day, limit the number of vehicles proceeding above Halepōhaku; and (*iii*) requiring certain visitors pay fees prior to entrance.
- A <u>shuttle phase</u> that may involve such things as: (*i*) the construction of additional improvements and infrastructure as outlined in the 2022 Master Plan; (*ii*) the adoption and implementation of guidelines and procedures that are consistent with the Administrative Rules that result in most or all visitors entering the UH Management Areas doing so via a shuttle; and (*iii*) cooperating with the DHHL or another organization and/or concessionaire to operate the shuttle, especially if the shuttle base facility is on DHHL land.

CMS will continue to gather input on its contemplated managed access phases. Each phase will be developed into a proposal that involves infrastructure (e.g., land uses) and guidelines and procedures (e.g., management measures that are consistent with the Administrative Rules) that work together to contribute to the desired outcome (Section 7.2). During proposal development UH may test temporary access management measures to help assess and obtain public input on the location of the access management point, staffing requirements, measures that could be incorporated to help improve compliance with the Maunakea Administrative Rules, and 043

#043

Posted by wildernesswalker on 03/31/2022 at 9:52pm [Comment ID: 606]

Type: Correction

Agree: 0, Disagree: 0

The Mauna Kea access road is a state road and UH has a non-exclusive easement to utilize it. The public may be informed of road conditions and safety concerns, however the use of the road to access the NAR, Lake Waiau and the summit by native Hawaiian cultural practitioners should not be impeded, and public access should be accommodated. Access by residents of Hawai'i Island and other Hawaiian islands should have priority over commercial operations guidelines/technology (e.g., reservation system) related to how access is managed. Those proposals will be vetted and acted on through the proposal review and approval process outlined in the 2022 Master Plan. CMS anticipates that both phases are likely to borrow from similar access management systems that the State or Counties have already implemented (e.g., Hā'ena State Park, Hanauma Bay State Park, and Diamond Head State Monument).

When fully implemented, these measures (including the possible shuttle sy044n) have the potential to significantly reduce visitor-related vehicular traffic in the UH Management Areas, with the greatest reduction felt on the particularly sensitive stretch above Halepōhaku.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action has been extensively adapted based on progress UH has made on several components of this management action (e.g., studying an access fee structure), access to other state lands has successfully been managed, and voluminous input received from the community regarding access management. In addition, references to the 1995 Management Plan have been replaced by references to the Maunakea Administrative Rules.

7.4.2 ACT-2: IMPLEMENT RULES AND GUIDELINES TO REDUCE IMPACTS OF PARKING AND TRAFFIC

As discussed in Section 3.4.2.2 of the 2021 OAR, UH has used capital improvement funds to implement various ingress/egress upgrades and area improvements to address concerns of traffic flow and pedestrian safety. In addition, having the Maunakea Administrative Rules in place puts UH in a position to enforce those CMP management actions that have parallel provisions in the rules.

The need for and management of parking within the UH Management Areas will go hand in hand with UH's approach to managing access (ACT-1, Section 7.4.1). UH will also actively enforce the Maunakea Administrative Rules, including HAR § 20-26-28, which addresses several aspects of vehicles and transportation (e.g., it prohibits operating or parking vehicles on trails or roads not designated for vehicle use and parking in undesignated areas).

In furtherance of its effort to reduce the impacts of vehicle use and parking, CMS will continue to:

- Distribute maps, at both the VIS and online, delineating designated parking areas along with materials informing visitors about safety concerns.
- Maintain informational and interpretive traffic and parking signs.
- Have Rangers monitor access, traffic, and parking; educate visitors; and, when necessary, enforce the rules.

On high traffic days such as snow days and during special events (e.g., solstice, eclipse, or meteor showers), UH may manage parking and traffic as described in ACT-6 (Section 7.4.6) regarding snow play.

These measures will reduce the potential impacts of vehicular movements and parking in the UH Management Areas and maintain safety.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This

#044

Posted by Eric Johnsen on 03/20/2022 at 12:21pm [Comment ID: 570]

Type: Suggestion

Agree: 0, Disagree: 0

Consider a gondola system to service non professional visiting to the summit area. It would remove the vehicular traffic of visitors. See: many places elsewhere, ie. Switzerland.

management action has been adapted based on progress UH has made related to providing parking and managing ingress/egress and incorporates the Maunakea Administrative Rules.

7.4.3 ACT-3: MAINTAIN RANGER PROGRAM

The Ranger program has been active since roughly 2000. The 2009 CMP indicated that "The ranger program has been successful in providing a presence on the mountain for operational and visitor support," and "the program could support a mix of enforcement and interpretive rangers" that "deter violations and encourage adherence to restrictions." As discussed in the 2021 OAR (Section 3.1.7), the Ranger program continues to successfully provide those management needs.

UH will continue to maintain the Ranger program, which provide a presence of interpretive and compliance personnel on the mountain. An overview of the many management actions the Rangers play a role in is provided in Section 5.4.3.4. This management action is the core CMP management action for the Rangers, but the Chief Ranger and other managers should be cognizant of the many other management actions where the Rangers play a role.

The Ranger's primary role will continue to be educational and interpretive in nature. They will focus on deterring violations and encourage adherence with applicable rules using a relatively light-handed approach with positive public messaging and friendly in-person warnings to individuals and groups out of compliance. Among the many methods employed by the Rangers, their activities may include informal discussions with visitors as they enter the UH Management Areas to evaluate and encourage compliance with rules and guidelines, including access management and visitor orientation requirements.

The Ranger's secondary role will be to enforce the Maunakea Administrative Rules. Should the Ranger's education and interpretive efforts not result in the desired compliance, then they will issue administrative citations and/or take other appropriate actions, which may include contacting DOCARE and Hawai'i County Police Department officers for assistance in the event of violations of the Conservation District Rules, penal code, or other applicable rules. Rangers enforcement of the Maunakea Administrative Rules will consist of them issuing citations that can lead to penalties being imposed as provided for in HAR § 20-26-73 and § 20-26-74. To fully implement the Maunakea Administrative Rules, UH will:

- Develop citation, enforcement, and appeal procedures within CMS.
- Provide training, materials, and support to Rangers.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action has been adapted to clarify that the Rangers can enforce the Maunakea Administrative Rules within the UH Management Areas.

7.4.4 ACT-4: MAINTAIN AND STRENGTHEN INFRASTRUCTURE TO EDUCATE AND ENCOURAGE ADHERENCE TO RULES AND GUIDELINES

UH will continue to maintain infrastructure to educate and encourage adherence to rules and guidelines. Maintenance of infrastructure overall is more thoroughly discussed in the IM-# management actions (Section 9.4); this management action reinforces the need to maintain and strengthen infrastructure with the intent of encouraging adherence to rules and guidelines.

Infrastructure that encourages adherence to rules and requires periodic maintenance includes, but is not limited to, the following:

- <u>Roads and Parking Areas</u>. These will be maintained in good condition so that drivers are not tempted to leave the designated areas.
- <u>Restrooms and Trash Receptacles</u>. These will be maintained so that people have access to comfort stations and can easily/securely/appropriately dispose of their trash, which will discourage littering.
- <u>Guardrails and Boulder Barriers</u>. These visual and physical barriers to vehicles leaving designated areas (i.e., roads and designated parking areas) will be maintained, supervised, and in some cases constructed.
- <u>Signs</u>. Signage that directs and educates people will be installed and maintained, and periodically updated, replaced, or renewed.
- <u>Visitor Information Station</u>. The VIS will be maintained, staffed, and equipped in a fashion that allows it to adequately serve the needs of visitors.
- <u>CMS Website</u>. The CMS website is expected to be an ever-more-important means of educating those who use the mountain and encouraging them to adhere to the applicable rules and regulations.

UH will also seek to strengthen these examples and other types of infrastructure that educate and encourage adherence to rules and guidelines. To the extent that such strengthening requires a land use, proposals will be developed and vetted per the proposal review process outlined in the 2022 Master Plan prior to implementation. In some cases, land use approvals already exist that allow for the strengthening of infrastructure if it is found that existing infrastructure is insufficient to achieve the desired result (e.g., the placement of additional boulders to discourage off-road vehicle travel if it is found that people are circumventing the boulders originally placed, or replacing signs to improve messaging).

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). UH has expanded this management action from infrastructure to discourage off-road vehicle use to all types of infrastructure because UH has learned that a wide range of infrastructure is needed to encourage compliance with rules and guidelines.

7.4.5 ACT-5: IMPLEMENT RULES AND GUIDELINES TO REDUCE IMPACTS OF RECREATIONAL HIKING

As discussed in Section 3.4.2.5 of the 2021 OAR, UH is doing its best to keep a limited, wellmaintained, trail network within the UH Management Areas as a means of minimizing the development of new, unwanted trails by individuals and groups. Accordingly, UH is actively enforcing the provisions of HAR § 20-26-21(10), which specifically prohibits hiking, conducting nature study, or conducting any activity on pu'u unless on designated trails or roads, except by written permit. Similarly, HAR § 20-26-28 prohibits operating or parking vehicles on trails or roads not designated for vehicle use.

In furtherance of its effort to reduce the impacts of recreational hiking, CMS:

- Distributes maps, at both the VIS and online, delineating designated trails accessed from the UH Management Areas along with materials informing visitors about safety concerns. Hikers are informed that off-trail hiking is prohibited; and alerted of safety concerns, including the fact that hiking alone at high elevations is dangerous, particularly in bad weather and/or late in the day and that it is best if one hikes with one or more buddies.
- Maintains informational and interpretive traffic and trail signs.
- Has Rangers periodically monitor and patrol recreational trails.
- Highly encourages hikers to self-register at the VIS.

CMS has also established guidelines regarding any proposed new trail or substantial alteration of an existing route (both of which are considered land uses in the Conservation District). Proposals must comply with the 2022 Master Plan's proposal review process and be fully permitted prior to implementation. That planning and permitting process may include seeking input from community groups, advice from CMS advisory groups, and receiving SHPD approval.

Due to human health and safety concerns, as well as resource impact concerns, UH does not anticipate establishing any new trails in the MKSR. Designated trails in the MKSR are limited to (*i*) the summit or Kūkahau'ula trail, which extends from Astronomy Site 9 (former Hōkū Kea site) to Pu'uwēkiu, the true summit and the highest point on Maunakea, (*ii*) the trailhead near the Batch Plant for the Humu'ula Trail into the NAR that leads to Lake Wai'au and Halepōhaku, and (*iii*) the trailhead at Parking 2 for the trail that goes to the Lake Wai'au Trail in the NAR. People can also hike along the shoulders of the roadways. UH has posted signs discouraging use of the track from Astronomy Site 12 (SMA) to the summit of Pu'upoli'ahu, as this is not a designated footpath.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time, but this clarifies why UH does not intend to develop any new trails.

7.4.6 ACT-6: REGULATE SNOW PLAY

As discussed in Section 3.4.2.6 of the 2021 OAR, HAR § 20-26-39 specifically authorizes UH to restrict and/or prohibit skiing, snowboarding, sledding, and other similar winter or snow sports to maintain public safety and welfare, to prevent damage to resources, and to minimize conflicts among visitors. It also bans formally or informally organized contests, meets, or competitions, snow play tours, or other similar events for skiing, snowboarding, sledding or other forms of snow recreation or snow activities and the operation of snowmobiles, all-terrain vehicles, or other motorized vehicle used for snow recreation.

The regulation of snow play will generally be achieved by:

• Informing the public whether snow play is allowed or not each day.²⁶ Such information will be provided using means and methods that prove efficient and effective, which may evolve over time.

²⁶ Generally, snow play will only be allowed on days when: (*i*) the road is sufficiently clear of hazards to allow safe public access and (*ii*) there is sufficient snow coverage and depth that snow play will not pose a threat to resources.

#045

Posted by wildernesswalker on 03/31/2022 at 9:54pm [Comment ID: 607]

Type: Suggestion

Agree: 0, Disagree: 0

There are very few places in the summit region that one can experience the vast wilderness beauty of the view plane without the visual and sonic disturbance of enormous telescope facilities. Pu'u Wekiu and Pu'u Poliahu are two of those places where one can turn away from the industrial landscape to enjoy the unimpeded view. Closing the footpath (once an astronomy roadway) frequently used by recreational users makes no sense.

- Posting signs or using other methods to inform visitors of some of the risks inherently associated with snow play.
- Maintaining a Ranger presence in the summit region to monitor public safety and welfare, prevent damage to resources, and minimize conflicts among visitors.
- Maintaining a Ranger presence in the summit region when snow play is not allowed but visitors may be tempted to attempt snow play (e.g., days where snow is present, but not at sufficient depth or coverage) to enforce the prohibition.

During periods when snow play is particularly heavy and the Rangers feel it is appropriate, they will continue their practice of establishing one-way traffic flow on the summit area loop road so that vehicles are able to move safely when the designated parking areas are full and many cars are parked along the sides of the roadway.

At the end of each snow play period, CMS will conduct a trash inspection and removal in snow play areas in addition to areas the Rangers normally monitor for trash during their daily patrols.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Adaptations clarify aspects of the snow play guideline. They also eliminated the suggestion that Rangers will delineate snow play areas on a map; this was eliminated because the Rangers have found that (*i*) appropriate areas are different day-to-day, storm-to-storm, and (*ii*) snow play is largely a self-regulating activity, with people generally not venturing to areas where there is no snow or conditions are unsafe.

7.4.7 ACT-7: CONFINE SPONSORED TOURS TO PREVIOUSLY DISTURBED AREAS

UH will continue to confine UH and other sponsored (non-commercial) tours and stargazing activities to previously disturbed ground surfaces and designated parking areas within the UH Management Areas. This will be achieved through monitoring compliance with conditions applied to Research Permits and Special Use Permits issued per HAR § 20-26-61, 62, and 63.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time, but references to the Maunakea Administrative Rules were added to this management action, which had a one sentence description in the 2009 CMP.

7.4.8 ACT-8: MONITOR HUNTING ACTIVITY AND ADHERENCE TO APPLICABLE DLNR HUNTING RULES

Under the existing general lease, BLNR reserved "[a]ll hunting and recreation rights" subject to BLNR's rules. As discussed in Section 3.4.2.8 of the 2021 OAR, UH has worked with DLNR to ensure that recreational hunting within the UH Management Areas is consistent with applicable DLNR regulations. As codified in HAR § 20-26-3, where there is a conflict between the HAR Chapter 20-26 and DLNR rules, then the DLNR rules govern. HAR § 20-26-3(d) further states that UH's rules will be implemented in such a way as to allow hunting in accordance with DLNR's hunting rules. Complementary assurances regarding hunting are provided elsewhere in UH's rules as well [see, for example, HAR § 20-26-4; HAR § 20-26-21(8); HAR § 20-26-27; HAR § 20-26-32; and HAR § 20-26-38(c)].

In addition to adhering to the provisions related to hunting contained in the aforementioned rules, moving forward CMS will meet with Hawai'i Island DOFAW representatives to be sure that CMS is aware of issues that hunting may raise. If this coordination reveals outstanding issues, CMS will follow up with DOFAW staff and/or hunters to see if the problems can be resolved. Finally, CMS staff will continue to proactively inform DOFAW and/or the Big Island hunting community on a timely basis of any events and/or issues they believe may be of particular concern, including observations of parties engaged in hunting in a manner that is inconsistent with applicable hunting rules. These outreach efforts are part of the outreach management action (Section 5.4.2.1).

Hunters, like other visitors to the UH Management Areas, will be required to comply with the Maunakea Administrative Rules. The rules likely to be most applicable to hunters are those related to vehicles and parking, which are discussed in ACT-2 (Section 7.4.2).

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Clarify that UH and DLNR have agreed that DLNR hunting rules apply to the UH Management Areas and that, therefore, no additional policy regarding recreational hunting is required. Therefore, the primary UH action related to hunting will be to monitor hunting activity, which is why the title of this management action has changed.

7.4.9 ACT-9: OVERSEE COMMERCIAL TOUR PERMITTING PROCESS

As discussed in several sections of the 2021 OAR (see, for example, Sections 3.4.2.7 and 3.4.2.9), UH currently maintains close oversight and control of the commercial tour permitting process, and that will continue. Specific requirements are spelled out in HAR § 20-26-64, entitled "Commercial tour activity permits." UH will continue to attach conditions to commercial tour permits; those conditions are designed to minimize potential tour impacts on the cultural landscape and natural resources. Conditions may evolve over the years but UH will always require tour materials to be approved by CMS and confine commercial tours to limited areas that have previously been disturbed.

In collaboration with the UH Mānoa's Travel Industry Management program, UH initiated a study intended to assess the capacity for commercial tour operations in the UH Management Areas. Based on those findings and recommendations, CMS is exploring the contracting flexibility with respect to commercial tour operations that HAR § 20-26-64 provides. Specifically, it is considering whether to issue one or more concession agreements in lieu of, or in addition to, commercial tour activity permits. It is also evaluating the potential benefit of entering into an agreement with another public agency to manage commercial tour activities and transportation of passengers for hire within the UH Management Areas and allow such agreements to be in lieu of, or in addition to, written permits or concession agreements for such purposes. Finally, it is evaluating the desirability and implications of adjusting the fees that are paid to UH by commercial tour operators.

Thereafter, CMS will review the commercial tour permitting process at regular intervals to assess necessary or beneficial changes. Information including permit violations or commercial tour operations impacts to resources will be considered during the review process.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Reference

the Maunakea Administrative Rules and illustrate how the permitting process will be used to manage and oversee commercial tours.

7.4.10 ACT-10: PROVIDE INPUT ON FILM PERMITS

As discussed in Section 3.4.2.10 of the 2021 OAR, HAR § 20-26-65 requires a permit for commercial video, digital, film, still photography, or any other visual and audio recordings within the UH Management Areas. These permits are issued by the Hawai'i Film Office in the State of Hawai'i Department of Business, Economic Development & Tourism (DBEDT) following receipt of a CMS recommendation to approve (with applicable conditions) or deny the permit. UH does not promote Maunakea as a tourist destination. This sentiment is repeated by the Film Office, which also informs applicants that Maunakea is not open-access to all filming and that specific approval is required for commercial filming.

Since January 2020, when HAR § 20-26-65 took effect, CMS staff have been available to review applications for film permits that were received, continuing procedures that had formerly been handled by their predecessors at OMKM.²⁷ Depending on the nature, scope and potential impacts of a particular application, CMS seeks input from KKM and MKMB. Standard and specific conditions apply to approved film requests, among them the following: (*i*) filming activity must be adhered to as approved; (*ii*) a property representative must accompany film crew for the duration of filming on the premises; and (*iii*) filming after dark with the use of artificial illumination is prohibited.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Clarify that UH's input on film permits is now included in the Maunakea Administrative Rules and that UH has standard and specific conditions, which UH has developed in coordination with the astronomy facilities and resource specialists.

7.4.11 ACT-12: VET RESEARCH AND SPECIAL USE PROPOSALS & OVERSEE PERMITS

Section 3.4.2.12 of the 2021 OAR addresses UH's oversight of research permits.²⁸ Specifically, it notes that HAR § 20-26-62 fully implements the kinds of controls over research that the CMP calls for. HAR § 20-26-63 provides similar controls over other "special use" activities. These provisions:

- Allow UH to issue permits to parties wishing to engage in scientific, educational, management, or other activities otherwise prohibited by the rules.
- Require that applications for research or special use permits adequately describe the planned activity and submit the application well in advance of the date of the intended activity.
- Provide that applications for research or special use permits be carefully evaluated. UH will seek input from the advisory groups (e.g., KKM, EC, and MKMB), as appropriate, as part of their evaluation. Overall, all proposals will be evaluated for their consistency with the 2022 Master Plan, the CMP, and the Maunakea Administrative Rules.

²⁷ The travel and workplace restrictions that have been in place during that time due to the pandemic limited filming activity to the point where only eight (8) film application requests were received, a fraction of the number that were received in the preceding non-pandemic years.

²⁸ "Research" may or may not involve a "land use" in the Conservation District. See the 2022 Master Plan for more guidance concerning land uses. If it does involve a land use, then additional permits and approvals may be required.

#046

Posted by wildernesswalker on 03/31/2022 at 9:58pm [Comment ID: 608]

Type: Suggestion

Agree: 0, Disagree: 0

This statement, following the section on Commercial Tour management, belies the tourism promotion efforts made by the commercial tour operations that UH does oversee and manage. Regularly one can find ads on social media, print media, and airport flyers promoting the summit as a tourist destination. Governor Ige called upon UH to reduce the number of commercial tours and visitors to the summit region. This plan does not describe a specific intent to curtail the commercial activities. The plan should include a specific intent to curtail commercial activity and specific objectives for limiting the number of commercial visitors per year

In addition to the process discussed here and in the Maunakea Administrative Rules, those proposing research must consider the proposal review process in the 2022 Master Plan if their proposal involves a land use per the Conservation District rules.

Generally, in its review of research proposals, UH: (*i*) encourages proposers to utilize remotesensing whenever feasible; (*ii*) restricts projects (excluding mitigation projects) that disturb natural habitat to non-sensitive areas whenever possible; (*iii*) requires that disturbed habitat be returned to original (or improved) condition upon project completion based on an approved restoration plan for sites and access routes; (*iv*) implements best management practices and not emit (or, at minimum, control) light, dust, and radio emissions; (*v*) requires that research projects provide, at no cost to UH, their raw data, "grey literature" products, and/or published papers; and (*vi*) encourages researchers to carry out their work in a way that eliminates or reduces any impacts to resources.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Expanded this action to include both research and special use permits for consistency with the Maunakea Administrative Rules.

8 PERMITTING AND ENFORCEMENT

8.1 INTRODUCTION

Section 7.2.2 of the 2009 CMP (Ho'akea, LLC dba Ku'iwalu, April 2009) addresses the permitting and enforcement that is needed to be proper stewards of Maunakea. UH took a key step forward in implementing these provisions with the adoption the UH Maunakea Rules (HAR Chapter 20-26). This chapter focuses on ensuring there is knowledge of, compliance with, and enforcement of applicable rules, regulations, and permit conditions. Information concerning the current status of permitting and enforcement can be found in Section 3.5 of the 2021 OAR (Appendix A).

8.2 DESIRED OUTCOME

The "desired outcome" with respect to permitting and enforcement is to:

Achieve compliance with existing and any new guidelines and regulations designed to manage and minimize human impacts, to preserve and protect Maunakea's resources.

8.3 NEED

Permitting and enforcement are essential tools for regulating activities and reducing their impacts on the resources. Compliance with all federal, state, and local laws (not the least of which is the Maunakea Administrative Rules) must be monitored and enforced by appropriate entities with jurisdiction. Likewise, compliance with the terms and conditions of commercial tour permits, research permits, special use permits, film permits, Conservation District Use Permits, and other permits or approvals must be monitored and enforced. Personnel knowledgeable in these subjects must be retained to work in UH Management Areas to monitor, enforce, and ensure adequate protection of resources.

8.4 MANAGEMENT ACTIONS

As discussed in Section 3.5 of the 2021 OAR, six of the eight CMP management actions related to permitting and enforcement are ongoing. Only management actions P-3 and P-6, which were related to rule-making, are complete (Chapter 2 of this document). The ongoing management actions are listed in Table 8.1, and the nature of the work that is continuing is summarized in Sections 8.4.1 through 8.4.6.

Mgmt. Action	LAWS AND REGULATIONS	Discussion
	ND REGULATIONS	Discussion
P-1	Comply with all applicable federal, state, and local laws, regulations, and permit conditions related to activities in the UH Management Areas.	8.4.1
P-2	Strengthen CMP implementation by recommending that compliance with the CMP be a condition of permits and agreements.	8.4.2
P-4	Educate management staff and those working on the mountain about applicable rules, CMP management actions, and permit requirements.	8.4.3
ENFOR	CEMENT	
P-5	Continue coordinating with other agencies on enforcement needs.	8.4.4
P-7	Periodically review facility compliance with Conservation District Use Permits.	8.4.5
P-8	Enforce conditions contained in permits issued under the Maunakea Administrative Rules.	8.4.6
	The exact wording of the management actions listed in the table has been revised from the 2009 CMP and the 2009 the progress made to date, adaptation made based on the lessons learned, information collected, and input adapted from the 2021 OAR, Table 3.14.	

Table 8.1 Ongoing Management Actions Related to Permitting and Enforcement

8.4.1 P-1: COMPLY WITH APPLICABLE LAWS, REGULATIONS, AND PERMIT CONDITIONS

As discussed in Section 3.5.2.1 of the 2021 OAR, responsibility for complying with applicable statutes and regulations continues to be the responsibility of everyone who enters the UH Maunakea Lands. On the Federal level these include, but are not limited to, such things as the Clean Air Act (42 U.S.C. 7401 et seq.), the Clean Water Act (33 U.S.C. 1251 et seq.), the Coastal Zone Management Act (16 USC §145 et seq.), the Endangered Species Act (16 USC §1531 et seq.), the National Environmental Policy Act (42 USC §4321 et seq.), and Section 106 of the National Historic Preservation Act, Public Law 89-665, as amended. On the State level, they include, but are not limited to, HRS 183C, Conservation District (HAR Chapter 13-5, "Conservation District Rules"), HRS Chapter 205A, Hawai'i's Coastal Zone Management Program, HAR Chapter 20-26, "Public and Commercial Activities on Mauna Kea Lands," HAR Chapter 13-209, "Natural Area Reserves System," and HRS Chapter 6E, "Historic Preservation."

As discussed in P-7 (Section 8.4.5), CMS will periodically review facility compliance with CDUP terms to assist DLNR-OCCL. As discussed in ACT-3 (Section 7.4.3), UH will implement and enforce the Maunakea Administrative Rules. As discussed in P-8 (Section 8.4.6), CMS will monitor compliance with permits issued under the Maunakea Administrative Rules.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time. References to the Maunakea Administrative Rules were added.

8.4.2 P-2: STRENGTHEN CMP IMPLEMENTATION THROUGH PERMIT AND AGREEMENT CONDITIONS

UH will implement this management action by: (*i*) requiring project proposals to include a summary description and/or plan showing how the proposer would comply with CMP management actions relevant to the proposal,²⁹ and (*ii*) advocating that compliance with the CMP

²⁹ Per the 2022 Master Plan, this is also a criteria when UH considers if proposed land uses are appropriate for the UH Maunakea Lands.

be a condition of approval permits issued (e.g., CDUPs issued by BLNR, and permits issued by UH under the Maunakea Administrative Rules). Additionally, UH will advocate for similar conditions to be incorporated in future subleases and other agreements it enters, as appropriate.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This action has been expanded to specify that CMP compliance should also be a condition of permits issued under the Maunakea Administrative Rules.

8.4.3 P-4: PROMOTE MANAGER AND PERMITTEE AWARENESS OF APPLICABLE RULES & <u>PERMIT REQUIREMENTS</u>

As discussed in Section 3.5.2.4 of the 2021 OAR, all UH personnel with the authority to make significant decisions concerning activities on Maunakea are informed of the rules and permit requirements applicable to their areas of responsibility when they assume their positions and are kept current through periodic communiques from CMS. Similarly, UH provides an overview and detailed information regarding the Maunakea Administrative Rules and applicable permit conditions to sublessees, permittees, and their staff at new-project start-up meetings, during periodic orientations (Section 5.4.3.1), and other events. CMS will continue to implement these procedures.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time.

8.4.4 P-5: COORDINATE ENFORCEMENT EFFORTS WITH OTHER AGENCIES

As discussed in Section 3.5.2.5 of the 2021 OAR, UH actively coordinates with other agencies regarding enforcement of the rules and regulations that are applicable within the UH Management Areas and on immediately adjacent lands. This is part of the larger coordination effort discussed in Section 5.4.2. UH will continue to work with other agencies to achieve coordinated and consistent guidelines for access, activities, and use. Importantly, this coordination includes having entered into a formal "Cooperative Agreement" for efforts in the Mauna Kea Ice Age NAR with DLNR. Finally, UH will continue to coordinate its enforcement activities and share Ranger reports with other entities (e.g., NAR, DOFAW, and USFWS) on a timely basis in accordance with agreements and their requests.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Recognize that UH has entered an agreement with the NAR and established relationships with enforcement entities. Refer to other important management actions related to coordination.

8.4.5 P-7: REVIEW FACILITY COMPLIANCE WITH CDUPS

As discussed in Section 3.5.2.7 of the 2021 OAR, UH has developed a protocol for the Rangers to conduct biennial inspections of all the facilities within the UH Management Areas for which CDUP conditions exist. These twice-yearly inspections will continue. The Rangers will confirm that permit conditions and sublease terms are being met during their inspections. CMS will submit Ranger reports summarizing the inspections to DLNR as part of its annual reporting; however,

CMS will inform DLNR within 30 days if known or suspected non-compliance or violations are encountered by the Rangers during the inspections and they cannot be corrected promptly. This monitoring promotes responsible stewardship, helps minimize the potential for damage to Maunakea, and allows UH to detect and report infractions to DLNR.

During these inspections the Rangers will also ask the operators to confirm that the facilities are complying with applicable laws and regulations, including those listed in Section 8.4.1, and other provisions of the CMP. This assessment will cover a wide range of topics, including, but not limited to, evaluating if the facilities are:

- Properly storing hazardous materials, not storing unnecessary quantities of hazardous materials, and maintaining appropriate spill response equipment and materials.
- Adhering to manufacturer's maintenance and clean-out schedules and permit conditions related to their individual wastewater systems.
- Maintaining all exterior trash cans and dumpsters, if any, with effective lid closure mechanisms designed to withstand high winds.

The Rangers will also ask facility operators about other compliance issues. If any are identified, the Rangers will note this in their reports and request that the operators provide information directly to CMS. If there are still-unresolved compliance issues, CMS will follow up with the operators as appropriate to ensure that compliance issues are resolved in a timely fashion in accordance with applicable CMP management actions, permit conditions, and/or sublease terms.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action has been broadened to include items beyond CDUP conditions because CMS advisory groups and the public have indicated that they are concerned about facility compliance with other requirements and CMP management actions.

8.4.6 P-8: ENFORCE CONDITIONS CONTAINED IN UH-ISSUED PERMITS

As discussed in Section 3.5.2.8 of the 2021 OAR, the Rangers monitor activities within the UH Management Areas daily, recording pertinent data regarding commercial tour activity and providing real-time feedback to operators when activity is observed that appears to be inappropriate or inconsistent with tour permit conditions. The Rangers will continue to do this.

The Rangers will also continue to monitor other permitted activities, such as research, special use, commercial tour, and filming. Should the Rangers observe permit violations, they will document it and provide real-time feedback to permit holders so that violations can be corrected immediately. Should permitted activities continue to be conducted in a manner inconsistent with permit conditions following Ranger warnings, UH may implement one or more sanctions pursuant to the Maunakea Administrative Rules, including expelling and barring the violator from the UH Management Areas; fining the violator; and revoking the permit.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Discussion has been expanded to include all permits issued under the Maunakea Administrative Rules.

INFRASTRUCTURE AND MAINTENANCE

DRAFT CMP 2022 SUPPLEMENT

9 INFRASTRUCTURE AND MAINTENANCE

9.1 INTRODUCTION

Section 7.3.1 of the 2009 CMP (Ho'akea, LLC dba Ku'iwalu, April 2009) provided guidance concerning infrastructure and maintenance within the UH Maunakea Lands, ranging from basic painting buildings) to more complex and involved tasks (e.g., tasks (e.g., installing/operating/maintaining septic tanks and keeping the roadways in serviceable condition). Activities to maintain the built environment continue and implementing the infrastructure and maintenance (IM) management actions are important to minimize the impact of these activities. Information concerning the current status of infrastructure and maintenance can be found in Section 3.6 of the 2021 OAR (Appendix A).

9.2 DESIRED OUTCOME

The "desired outcome" with respect to managing the built environment is to:

Manage the built environment by implementing an Operations, Monitoring and Maintenance Plan (OMMP) containing specific maintenance strategies and guidelines that will result in minimal disruptions to activities and uses, minimize impacts to the resources, and ensure that permittees remain compliant with their CDUP requirements.

9.3 NEED

The land uses and infrastructure within the UH Maunakea Lands (e.g., astronomy facilities, roads, utilities, signs, etc.) exist within the sensitive cultural landscape and subalpine and alpine ecosystems of Maunakea. UH needs to work closely with the astronomy facility operators and other maintenance personnel to continue existing practices and identify improved strategies to reduce impacts to resources associated with infrastructure and maintenance practices.

Furthermore, the astronomy facilities and UH are required to maintain their facilities and infrastructure in a manner that complies with the terms of their CDUPs, land authorizations, other approvals, and applicable rules and regulations. These agreements and approvals include conditions and provisions to protect the environment. For example, activities must be compliant with applicable historic preservation requirements, permits regarding the operation on individual wastewater systems, and the management of hazardous materials.

9.4 MANAGEMENT ACTIONS

As discussed in Section 3.6 of the 2021 OAR, none of the 14 CMP management actions related to infrastructure and maintenance have been entirely completed. Hence, all are ongoing and are listed in Table 9.1 and detailed in Sections 9.4.1 through 9.4.14.

Mgmt. Action	Description	Discussion			
Routine M	Iaintenance				
IM-1	Implement the Operations, Monitoring, and Maintenance Plan (OMMP) (Office of Mauna Kea Management, February 2017) and update it as appropriate.9.4.1				
IM-2	Require maintenance personnel to complete the worker orientation (EO-2).	9.4.2			
IM-3	Ensure maintenance activities that involve ground disturb disturbance complete a historic preservation review.	9.4.3			
IM-4	Ensure that maintenance personnel, equipment, and vehicles comply with the <i>Maunakea Invasive Species Management Plan</i> (C. Vanderwoude, February 2015).	9.4.4			
IM-5	Finalize and implement a Debris Removal, Monitoring and Prevention Plan.	9.4.5			
IM-6	Finalize and implement an Erosion Inventory and Assessment Plan.	9.4.6			
IM-7	Collaborate with the Department of Defense to remove military wreckage.	9.4.7			
Infrastru	cture				
IM-8	Assess improvements to the Mauna Kea Access Road consistent with the 2022 Master Plan.	9.4.8			
IM-9	Assess improvements to parking facilities consistent with the 2022 Master Plan.	9.4.9			
IM-10	Assess improvements to restroom and wastewater facilities consistent with the 2022 Master Plan.	9.4.10			
Sustainab	le Technologies				
IM-11	Encourage existing facilities and new development to incorporate sustainable and energy-efficient technologies, whenever possible.	9.4.11			
IM-12	Conduct periodic energy audits and implement recommendations.	9.4.12			
IM-13	Install locally-based alternative energy sources as opportunities arise.	9.4.13			
IM-14	Conduct periodic waste minimization audits and implement recommendations.	9.4.14			
	he exact wording of the management actions listed in the table has been revised from the 2009 CMP and the 2009 the progress made to date, adaptation made based on the lessons learned, information collected, and input r dapted from the 2021 OAR, Table 3.15.				

 Table 9.1 Ongoing Infrastructure and Maintenance Management Actions

9.4.1 IM-1: IMPLEMENT THE OMMP

As discussed in Section 3.6.2.1 of the 2021 OAR, UH completed its *Operations, Monitoring, and Maintenance Plan* (OMMP) (Office of Mauna Kea Management, February 2017) for Maunakea in 2017 and has been implementing it since that time. Consistent with the adopted OMMP and in accordance with its provisions, each astronomy facility and UH will continue to annually submit descriptions of projects and activities it anticipates undertaking over the coming five years (often referred to as "Five-Year Outlooks"). Monitoring of those projects and activities is then accomplished through the CMS' proposal review process (see 2022 Master Plan) and subsequent tracking, daily Ranger activity reporting, state permitting, and comparison of detailed project proposals with existing 5-year outlooks. The guidelines in the OMMP will be updated periodically as needed to remain consistent with the 2022 Master Plan, changes in the number and type of facilities present in the UH Management Areas, and to reflect the lessons learned during implementation.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action now recognizes that an OMMP has been adopted and is being implemented. In addition, it indicates that, as with other plans, it will be updated using adaptive management protocols into the future.

9.4.2 IM-2: REQUIRE MAINTENANCE WORKER ORIENTATION

As discussed in Section 3.6.2.2 of the 2021 OAR, UH has developed, and requires all persons who are going to work in the UH Maunakea Lands to complete, an educational orientation that informs them of the unique nature of the resources and the kinds of behavior that they need to engage in to protect them. UH will continue to require maintenance workers, whether employed by UH or another entity, comply with management action EO-2 and receive the worker orientation as outlined in Section 5.4.3.1.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time.

9.4.3 IM-3: Ensure Historic Preservation Review for O&M Activities

As discussed in Section 3.6.2.3 of the 2021 OAR, the ordinary daily activities and routine maintenance operations that take place within the UH Management Areas do not affect historic properties and are not subject to historic preservation review. At the same time, certain types of maintenance activities – those that result in ground disturbance where none has occurred previously – do require historic preservation review. UH has, in coordination with DLNR, developed a list that distinguishes between maintenance actions that require no further historic review and those that do require historic review. That list may be updated from time to time in coordination with DLNR. All operations and maintenance (O&M) activities that are not routine in nature and are not on the list of activities that do not require historic preservation review will be identified in the Five-Year Outlooks. The project-specific historic preservation review will occur as part of the proposal review process outlined in the 2022 Master Plan and downstream permitting and approval steps. UH and its sublessees will continue to follow the agreed-upon review and outreach procedures for all their O&M activities.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). The discussion has been expanded to highlight that, as the 2009 CMP suggested and in coordination with DLNR, a list of activities not requiring historic preservation review has been generated. O&M activities not on that list continue to require project-specific historic preservation review.

9.4.4 IM-4: Ensure O&M ACTIVITIES COMPLY WITH THE ISMP

As described in Section 3.6.2.4 of the 2021 OAR, based on the results of scientific studies that it commissioned, UH developed a set of standard operating procedures (SOPs) regarding the cleaning of vehicles and personal belongings that apply to the passengers, vehicle operators, immediate personal possessions, and any vehicle operating under a permit within the UH Management Areas. These SOPs are part of the *Maunakea Invasive Species Management Plan* (ISMP) (Section 4.4.2). This management action requires that O&M activities fully comply with the ISMP just as new construction activities do.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This action has been adapted to specify that O&M activities comply with the ISMP, which is a more stringent requirement than establishing and using a wash station near Halepōhaku as the 2009 CMP did.

Establishing a wash station near Halepōhaku was considered but it was decided that using a lower elevation wash station was the best approach to ISMP compliance.

9.4.5 <u>IM-5: Finalize & Implement Debris Removal, Monitoring, and Prevention</u> <u>Plan</u>

As detailed in Section 3.6.2.5 of the 2021 OAR, OMKM/CMS developed a draft *Debris Removal, Monitoring and Prevention Plan* that contains numerous procedures aimed at maintaining the UH Management Areas in a clean and orderly condition for resource protection. It has been following those procedures since 2001, UH believes the procedures have been effective in achieving the enumerated goals, and UH expects to finalize the plan by the end of 2022. Once finalized, UH will continue to implement the plan and update it as warranted based on lessons learned, monitoring results, changes in the characteristics of debris encountered, or other factors.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action now recognizes that the plan called for has been developed, is being implemented, and will soon be officially adopted. In addition, it indicates that, as with other plans, it will be updated using adaptive management protocols into the future.

9.4.6 IM-6: FINALIZE AND IMPLEMENT EROSION CONTROL PLAN

As discussed in Section 3.6.2.6 of the 2021 OAR, OMKM partnered with the UH Hilo Geography Department to initiate a study of surficial geology and cinder cone erosion issues. The purpose of the work was to quantify topographic changes over time relating to natural and anthropogenic disturbance and erosion and to: (*i*) identify locations of greatest concern for erosion and disturbance; (*ii*) determine how erosion rates in disturbed areas compare to erosion rates on undisturbed cones; and (*iii*) determine how these rates compare to other cinder cones globally. In carrying out the work the author assembled baseline high-resolution (< 1 m spatial resolution) imagery and topographic datasets.³⁰ The study results are detailed in the *Maunakea Summit Surficial Geomorphology & Erosion Monitoring Final Report*, which was published on February 8, 2021.

In discussing the conclusions and recommended approaches to addressing erosion issues within the summit area, the report noted the following:

- Erosion at the Maunakea summit is an active and ongoing concern.
- Early road construction activities in the 1960s and 1970s significantly altered natural surface runoff pathways and caused extensive gullying along the summit access road, particularly along the Pu'uwēkiu switchback.
- Those large historic gully features have now largely stabilized because of regular maintenance and road improvements that occurred in 1989-1990, but the culverts that were installed now direct excess surface flow into new locations, causing gullying and deposition in areas that were previously undisturbed.

³⁰ Those datasets have been used by others for other research activities and objectives, including producing spatially explicit habitat suitability maps across the summit area for the wēkiu bug and other arthropod species (Stephenson et al. 2017), documenting site stability and change at known archaeological sites, and contributing to other ongoing and new research efforts within the MKSR (Kirkpatrick, 2018; Schorghofer et al. 2018).

- New gullies continue to develop along roadways from large precipitation events, undermining existing infrastructure and presenting challenges. Without continued attention to road maintenance and cinder replenishment efforts, these gullies have the potential for dramatic growth and roadway damage in future storms.
- Continuing these maintenance efforts, which include periodic excavation from zones of cinder accumulation and re-deposition into actively eroding areas, is critical for limiting the growth of incipient gullies and stabilizing undercut surfaces. Without excavation, accumulated cinder eroded from over-steepened slopes will eventually overtop the retaining walls along the Pu'uwēkiu switchback and deposit onto the road surface. Similarly, without replenishment, undercut road infrastructure will eventually fail.

The Maunakea Summit Surficial Geomorphology & Erosion Monitoring Final Report concludes that:

- Additional improvements to the roadways and surface runoff infrastructure to minimize and redirect flow accumulation pathways would help reduce new gully formation and starve existing gullies of the concentrated runoff needed to do further geomorphic work.
- Existing culvert outflow locations will continue to receive surface runoff and sediment, and will remain areas of active geomorphic change and increasing visibility on the landscape.
- Erosion control infrastructure should continue to be maintained and cleared, particularly prior to large storm systems that may generate significant storm runoff.
- It is desirable to establish a regular erosion monitoring program, including an annual inventory report documenting changes, to identify and track areas of concern and help bettermanage summit resources.³¹

As it finalizes the Erosion Control Plan CMS will identify operation, maintenance, repair, and/or improvement work to address the recommendations and conclusions in the report.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action recognizes that a plan is being developed and will be finalized. In addition, it indicates that, as with other plans, it will be updated using adaptive management protocols into the future.

9.4.7 IM-7: COLLABORATE WITH DOD TO REMOVE MILITARY WRECKAGE

Section 3.6.2.7 of the 2021 OAR notes that OMKM has submitted an inventory of all known military aircraft wreckage within the UH Management Areas to the U.S. Department of Defense (DoD) and in collaboration with DoD, OMKM/CMS has prepared a Draft *Military Wreckage Removal Plan*. UH will work with DoD and encourage DoD to finalize the plan, present it as a proposal to UH, have the proposal go through the 2022 Master Plan's proposal review process, obtain required permits and approvals (including historic preservation review), and then implement the plan.

³¹ The report notes that the data generated as a result of such a monitoring program would also have utility for other subjects, including wēkiu bug habitat analysis and monitoring, invasive plant species detection, permafrost studies, and decommissioning.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action recognizes preliminary steps have been taken, but it is up to DoD to finalize a plan, obtain approvals, and then implement the plan.

9.4.8 IM-8: Assess Road Improvements Consistent with 2022 Master Plan

Section 3.6.2.8 of the 2021 OAR notes that the road paving issues discussed in the 2009 CMP have been considered since the CMP was adopted, and the outcomes of those considerations have been incorporated into UH's 2022 Master Plan. It confirms that after consulting with engineers, archaeologists, and other professionals, UH has determined that it will not pursue paving the <u>entire</u> unpaved portion of the Mauna Kea Access Road at this time.

UH will continue to assess the need for roadway improvements on a regular basis. The assessment will consider several variables, including access management, the types of vehicles using the road, the O&M effort that is required to keep the existing roadway functional, and the cost of making capital improvements. The types of improvements that it will continue to consider include those related to drainage, safety, and traffic flow. If improvements are deemed appropriate, they will be proposed as projects and approvals will be sought in accordance with the processes outlined in the 2022 Master Plan.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action now recognizes that "land uses," as defined in the Conservation District Rules, including improvements to a road, are correctly addressed in the Master Plan. The action now indicates UH will continue to assess potential improvements; implementation of resulting proposals will follow the 2022 Master Plan.

9.4.9 IM-9: Assess Parking Improvements Consistent with 2022 Master Plan

As discussed in detail in Section 4.5.1.9 of the 2021 OAR, the parking and pullout issues discussed in the 2009 CMP have been considered since CMP adoption and the outcomes of those considerations have either been implemented or incorporated into UH's 2022 Master Plan. Going forward, UH will continue to assess the need for parking improvements based on several variables, including access management, vehicle types, and capital improvement costs. Improvements that will continue to be considered include signage and parking infrastructure at locations within the MKSR as astronomy facilities are decommissioned. If improvements are deemed appropriate, they will be proposed as land uses and requests for approval will be handled in accordance with the processes outlined in the 2022 Master Plan.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action now recognizes that "land uses," as defined in the Conservation District Rules, including parking improvements, are correctly addressed in the Master Plan. The action now indicates UH will continue to assess potential improvements; implementation of resulting proposals will follow the 2022 Master Plan.

INFRASTRUCTURE AND MAINTENANCE

9.4.10 IM-10: Assess Restroom and Wastewater Improvements Consistent with 2022 Master Plan

As stated in Section 3.6.2.10 of the 2021 OAR, because the extent to which additional public restroom facilities are needed in the MKSR and Halepōhaku is primarily a facility issue (and is strongly influenced by the measures that are implemented to manage access), it is properly being dealt with in the 2022 Master Plan. However, it can be said that the results of the analyses of this topic that have been done to date indicate that the number of likely visitors to the summit area will remain at a level where improved restroom facilities in the MKSR are appropriate. CMS is currently studying the most appropriate technologies and locations for these facilities. While not entirely the responsibility of UH, it is worth noting that all the astronomy facilities that continue operation beyond 2033 will use zero-discharge wastewater systems.

Improvements that are deemed appropriate and the zero-discharge conversions will be proposed as land uses and comply with the processes outlined in the 2022 Master Plan.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action now recognizes that "land uses," as defined in the Conservation District Rules, including restrooms and wastewater improvements, are correctly addressed in the 2022 Master Plan. The action now indicates UH will continue to assess potential improvements; implementation of resulting proposals will follow the 2022 Master Plan.

9.4.11 IM-11: ENCOURAGE SUSTAINABLE AND ENERGY-EFFICIENT TECHNOLOGIES

As described in detail in Section 3.6.2.11 of the 2021 OAR, UH is doing its utmost to encourage existing and new facilities within the UH Management Areas to maximize their use of sustainable, energy-efficient technologies. Prime examples of this include its formal "Sustainability Policy," which aims to achieve carbon neutrality, zero waste, and local food self-sufficiency, and Executive Policy 4.202 concerning "System Sustainability."

UH will continue to encourage designers to use sustainable and energy-efficient technologies for both existing and new facilities. Principal goals for this effort include:

- Reducing potable water use (e.g., at Halepōhaku separate gray wastewater from sewage waste and use gray water for habitat restoration irrigation).
- Reducing energy use (e.g., increase efficiency of HVAC systems, solar water heaters).
- Reducing the need for human operation and maintenance through programs for remote viewing and robotic operation.

Consideration of sustainable and energy-efficient technologies shall be encouraged through the Five-Year Outlook process for existing facilities and the proposal review process for all new facilities.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This action has been adapted to provide a specific goal and identify the process by which these technologies will be encouraged.

#047

Posted by Mark Tomomitsu on 03/04/2022 at 12:40pm [Comment ID: 567]

Type: Suggestion

Agree: 0, Disagree: 0

Ref. 9.4.10, IM-10: Assess Restroom and Wastewater Improvements

All wastewater systems shall comply with Hawaii Administrative Rules (HAR), Chapter 11-62, entitled Wastewater Systems. The Hawaii State Department of Health, Wastewater Branch supports the use of zero discharge wastewater systems that complies with HAR, Chapter 11-62.

9.4.12 IM-12: CONDUCT ENERGY AUDITS AND IMPLEMENT RECOMMENDATIONS

As discussed in Section 3.6.2.12 of the 2021 OAR, UH has already completed energy audits for all its facilities on Maunakea and it has used the information obtained through these audits to develop measures that reduce energy usage at its facilities on Maunakea. CMS will continue to explore the potential for additional changes to UH facilities and encourage others to conduct audits to identify measures that would further reduce energy consumption. Similar to IM-11, this will continue to be done and encouraged for both existing and new facilities through the Five-Year Outlook process for existing facilities and the proposal review process for all facilities.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This action has been adapted to identify the process by which energy audits will be encouraged.

9.4.13 IM-13: INSTALL LOCALLY-BASED ALTERNATIVE ENERGY SOURCES AS OPPORTUNITIES ARISE

As outlined in Section 3.6.2.13 of the 2021 OAR, electricity produced by alternative energy sources is being substituted for electricity from fossil fuel-fired generators when opportunities arise. This will continue and additional sustainable generation possibilities will be identified and evaluated. When analyses indicate that they are beneficial, such equipment will be installed by UH, the astronomy facility operators, and others. In exploring the potential for additional sustainable energy use, UH will continue to consider both on-site sources and participation in renewable energy generation elsewhere equivalent to the amount used on Maunakea. Similar to IM-11, this will continue to be done and encouraged for both existing and new facilities through the Five-Year Outlook process for existing facilities and the proposal review process for all facilities.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This action has been adapted to identify the process by which the installation of alternative energy sources will be encouraged.

9.4.14 IM-14: CONDUCT WASTE AUDITS AND IMPLEMENT RECOMMENDATIONS

As discussed in Section 3.6.2.14 of the 2021 OAR, CMS is continuing to encourage the managers of its sublessees' facilities to conduct waste minimization studies and implement audit recommendations, when feasible. The information it receives from regular inspection reports and informal discussions that CMS staff members have had with users indicate a downward trend in the use of hazardous materials on Maunakea. Similar to IM-11, this will continue to be done and encouraged for both existing and new facilities through the Five-Year Outlook process for existing facilities and the proposal review process for all facilities.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This action has been adapted to identify the process by which waste audits will be encouraged.

10 CONSTRUCTION GUIDELINES

10.1 INTRODUCTION

Section 7.3.2 of the 2009 CMP (Ho'akea, LLC dba Ku'iwalu, April 2009) provides information and management actions focused on minimizing the direct and indirect impacts that construction activities related to large projects, including new buildings, site recycling, demolition, and site restoration, have on resources. The CMP construction guidelines supplement and complement, rather than replace, guidelines and mandates in other governing approvals and requirements so that these issues are considered early in the planning and development process. Information concerning the current status of the construction guidelines can be found in Section 3.7 of the 2021 OAR (Appendix A).

10.2 DESIRED OUTCOME

The "desired outcome" with respect to construction is to:

Minimize adverse impacts to resources during all phases of construction through use of innovative best management practices.

10.3 NEED

There is a need to implement best management practices (BMPs), which can consist of specifying the use of certain types of products at select location or identifying guidelines and procedures to be followed, to avoid or minimize adverse effects to resources during construction activities. Other important needs include: (*i*) gathering information needed to ascertain which BMPs are working and which are not; (*ii*) ensuring information obtained about Maunakea's resources during construction projects (e.g., subsurface conditions) is shared with UH and entered into databases; (*iii*) having an independent construction monitor present during construction activities; and (*iv*) monitoring construction work to ensure that contractors comply with permit conditions.

10.4 MANAGEMENT ACTIONS

As shown in Table 10.1, all nine of the CMP management actions related to construction guidelines are "ongoing", meaning that guidelines and procedures are in place and are being implemented. The nature of the work that is continuing is summarized in Sections 10.4.1 through 10.4.9.

Mgmt.		
Action	Description	Discussion
GENERA	AL REQUIREMENTS	
C-1	Require an independent construction monitor who has oversight and authority to ensure that all aspects of construction comply with guidelines and permit requirements.	10.4.1
BEST M	ANAGEMENT PRACTICES	
C-2	Require implementation of a UH-approved Best Management Practices Plan.	10.4.2
C-3	Require implementation of a UH-approved Rock Movement Plan, when appropriate.	10.4.3
C-4	Require contractors to provide information from construction activities to UH for input	10.4.4
	into databases.	
C-5	Require on-site monitors (e.g., archaeologist, cultural resources specialist, invasive	10.4.5
	species specialist) during construction, as determined by the appropriate agencies.	
C-6	Implement a SHPD-approved Archaeological Monitoring Plan, when appropriate.	10.4.6
C-7	Educate construction personnel regarding the cultural landscape.	10.4.7
C-8	Educate construction personnel regarding natural resources.	10.4.8
C-9	Inspect construction equipment and materials for invasive species.	10.4.9
 Note: The exact wording of the management actions listed in the table has been revised from the 2009 CMP and the 2021 OAR to reflect the progress made to date, adaptation made based on the lessons learned, information collected, and input received. Source: Adapted from the 2021 OAR, Table 3.17. 		

Table 10.1 Ongoing Management Actions Related to Construction Guidelines

<u>10.4.1</u> C-1: REQUIRE AN INDEPENDENT CONSTRUCTION MONITOR

As discussed in Section 3.7.2.1 of the 2021 OAR, most of the construction projects that have been undertaken since the CMP was adopted have been small and did not involve the kind of ground-disturbing work that would require an independent construction monitor. However, such monitors have been present for two larger undertakings: (*i*) the improvements made to VIS parking and other facilities at Halepōhaku and (*ii*) the initial sitework for the TMT project.

UH will continue to require an Independent Construction Monitor (ICM) for projects considered Type B and Type C proposals per the process outlined in the 2022 Master Plan. The ICM will:

- Be selected by UH, with the concurrence of DLNR.³²
- Have experience and be knowledgeable in construction management and Maunakea's conditions and resources.
- Be funded by the project owner.
- Be present during all periods of construction (or deconstruction and restoration in the case of decommissioning projects), including, but not limited to: (*i*) delivery of construction materials to the project site or staging areas within the UH Management Areas; (*ii*) establishment of BMPs; and (*iii*) ground-disturbing activities.
- Monitor compliance with plans and specifications approved by UH (e.g., the BMP Plan), applicable rules and regulations, issued permits, and sublease and other agreement terms.
- Prepare weekly reports that are shared with UH and the project owner; the reports may also be shared with others, as deemed appropriate to the project.

³² The ICM may be a UH employee, an independent contractor or consultant, or other agreeable party. The ICM cannot be an employee of the project owner or the employee of a firm contracted by the owner to perform the work.

The ICM will have the authority to order that any or all construction activity within the UH Management Areas cease if and when, in the ICM's judgment, (*i*) there has been a violation of the terms or conditions of a permit that warrants cessation of construction activities or (*ii*) that continued construction activity will unduly harm natural or cultural resources (provided that the ICM's order to cease construction activities shall be for a period not to exceed seventy-two (72) hours for each incident). All orders to cease construction issued by the ICM shall be immediately reported to the Chairperson of BLNR and a designated UH representative. The Chairperson may issue a cease-and-desist order to extend the period of time that construction activity is prohibited, or such other order as the Chairperson deems appropriate.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Clarifications regarding the qualifications and responsibilities of the ICM were added to address uncertainties identified during recent projects.

10.4.2 C-2: REQUIRE A BEST MANAGEMENT PRACTICES PLAN FOR CONSTRUCTION

As outlined in Section 3.7.2.2 of the 2021 OAR, UH requires a BMP Plan for all construction projects. UH will continue to require that all projects prepare a BMP Plan, provide it to UH for review, and receive UH's acceptance of the plan prior to proceeding with construction activities within the UH Management Areas.

Project proposers bear all costs of preparing and implementing their BMP Plans. BMPs must:

- Incorporate applicable plans, guidelines, and SOPs that emanate from other CMP management actions (e.g., Maunakea Invasive Species Management Plan).
- Address all applicable C-# management actions.
- Capture all measures outlined in disclosure documents (e.g., EA or EIS) and permit applications.
- Where appropriate, include measures to minimize: (*i*) construction time (for example, by scheduling construction work so that, to the extent possible, the activity schedule includes concurrent work); (*ii*) water use; (*iii*) traffic; (*iv*) use and transport of toxic materials, including petrochemicals; (*v*) ground disturbance, graded area, and dust generation; (*vi*) noise; and (*vii*) threats related to invasive species.

UH will continue to assess the effectiveness of BMPs, based on ICM reports and other construction documentation.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time. Nevertheless, references to plans and guidelines developed since 2009 that should be considered in preparation of a BMP Plan were added.

<u>10.4.3</u> C-3: REQUIRE A ROCK MANAGEMENT PLAN, WHEN APPROPRIATE

As described in Section 3.7.2.3 of the 2021 OAR, UH has and will continue to require a Rock Management Plan for all construction (including new development, maintenance activities, or site decommissioning) that involves excavation, grading, or other movement of rock material. The

implementation of these plans has and should: (*i*) continue to minimize displacement of cinder during construction; (*ii*) result in cinder being stockpiled (so that it can be used for future restoration projects) in a predetermined location rather than simply pushed out of the way, down-slope; and (*iii*) eliminate side-casting of cinder or other materials into wēkiu bug habitat.

Rock Management Plans must be prepared by the project owner and reviewed and approved by UH prior to the project proceeding. The plans are required to:

- Document the location, type, and volume of source material and include separate discussions of native material (divided into cinder and other rock types) and imported material.
- Detail the extraction and movement process.
- Describe where excess native rock (cinder or otherwise) will be placed within the UH Management Areas. The designated location(s) must be included in the project area designated in permit applications and considered in the project's impact analysis. The location should also be accessible and previously disturbed.
- Address how the handling and storage of native rock will aid future site restoration, if applicable.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time. Nevertheless, clarifications regarding the intent and contents of a Rock Management Plan were added to address uncertainty identified during recent projects.

10.4.4 C-4: Require Contractors to Provide Information/Documentation for <u>Activities</u>

As discussed in Section 3.7.2.4 of the 2021 OAR, UH has been requiring contractors who perform work within the UH Management Areas to submit the required information, and it has maintained hard copy and/or electronic versions of that information in its files. It will continue to require that contractors submit: (*i*) BMP inspection forms; (*ii*) field logs and photographs; (*iii*) laboratory analysis, and (*iv*) other construction documentation that contain information on the biotic and abiotic environmental variables at the project site. Each project's BMP Plan (Section 10.4.2) must include a reporting section that provides a list of information likely to be produced and specify the method and format in which it will be provided to UH.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time. Nevertheless, references to a reporting section in a project's BMP Plan was added to avoid delays in management action compliance.

10.4.5 C-5: REQUIRE ON-SITE MONITORING DURING CONSTRUCTION

As reported in Section 3.7.2.5 of the 2021 OAR, the need for on-site construction monitors is determined by regulatory agencies (e.g., SHPD, DLNR, etc.) and the monitoring is focused primarily on those activities involving earth movement or disturbance. UH will continue to ensure that experts approved by the appropriate agency will monitor project activities as outlined in

agency-approved monitoring plans. CMS anticipates that the following types of monitoring plans may be appropriate, depending on the project's scope and characteristics:

- Archaeological monitor who follows a project-specific Archaeological Monitoring Plan (AMP) that has been prepared by the project and approved by SHPD (see Section 10.4.6 for additional details). The archaeological monitor must work for a firm or be a scholar or organization that is identified by SHPD to be permitted to provide archaeological services in the State of Hawai'i.
- Cultural monitor who follows a project-specific Cultural Monitoring Plan that has been prepared by the project and approved by UH. The individual or firm providing cultural monitoring services will also be approved by UH.
- Invasive species monitor who follows a project-specific Invasive Species Monitoring Plan, prepared by the project, reviewed by UH and DLNR, and approved by UH.

These project-specific monitoring plans will be part of each project's BMP Plan (Section 10.4.2). The entities that implement these plans are identified and funded by the project proponents but are subject to the approvals outlined above, and, where applicable, must meet the qualification requirements of the appropriate agency (e.g., SHPD) as identified above.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Greater specificity has been added to address uncertainty regarding the types of monitors, the plans they will follow, and the approval of the monitor and plan.

10.4.6 C-6: REQUIRE AN ARCHAEOLOGICAL MONITORING PLAN

As stated in Section 3.7.2.6 of the 2021 OAR, archaeological monitoring has been conducted in accordance with SHPD guidance for all projects involving ground disturbance that have been initiated since the 2009 CMP was adopted. The project proponent will, in consultation with SHPD, establish whether archaeological monitoring is required during the project. If it is required, the project proponent will prepare an AMP and obtain SHPD approval of the plan prior to the start of any ground-disturbing work. Should any resources be encountered, the project proponent will strictly follow the provisions of the AMP.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time.

10.4.7 <u>C-7: Educate Construction Workers Regarding Historical and Cultural</u> <u>Significance</u>

Prior to entering the UH Management Areas, all construction personnel are informed of Maunakea's historical and cultural significance. That is done by: (*i*) successfully completing the same worker orientation program as astronomy facility employees, as outlined in CMP management action EO-2 (Section 5.4.3.1) and (*ii*) participating in a project kickoff meeting, or similar event, at which project-specific information, including information about the resources and cultural practices in the project area, are shared. Each BMP Plan (see Section 10.4.2) will include a section regarding how this education will be accomplished.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This action has been adapted to specify the process that has been used since the CMP was approved to educate construction staff regarding historic and cultural aspects of their project area. It also now incorporates references to the orientation developed for workers on Maunakea.

10.4.8 <u>C-8: Educate Construction Workers Regarding Environment, Ecology, and</u> <u>Natural Resources</u>

Prior to entering the UH Management Areas, all construction personnel are informed of Maunakea's environment, ecology, and natural resources. That is done by: (*i*) successfully completing the same worker orientation program as astronomy facility employees, as outlined in CMP management action EO-2 (Section 5.4.3.1) and (*ii*) participating in a project kickoff meeting, or similar event, at which project-specific information, including information about the resources and cultural practices in the project area, are shared. Each BMP Plan (see Section 10.4.2) will include a section regarding how this education will be accomplished.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This action has been adapted to specify the process that has been used since the CMP was approved to educate construction staff regarding natural resources in their project area. It also now incorporates references to the orientation developed for workers on Maunakea.

10.4.9 C-9: INSPECT CONSTRUCTION EQUIPMENT AND MATERIALS

As discussed in Section 3.7.2.9 of the 2021 OAR, UH is fully implementing inspections and controls called for in this measure. This will continue and be part of the required project-specific Invasive Species Management Plan referenced in Section 4.4.2 and will be consistent with the Maunakea Invasive Species Management Plan (C. Vanderwoude, February 2015), including the inspection of construction equipment and materials. The person or firm conducting the monitoring and inspections will be a trained biologist, selected and funded by the project, and approved by UH and DLNR, as outlined in Section 10.4.5.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This action has been adapted to specify the process that has successfully been employed since the Maunakea Invasive Species Management Plan was approved and implemented.

11 SITE RECYCLING, DECOMMISSIONING, DEMOLITION, & RESTORATION

11.1 INTRODUCTION

Section 7.3.3 of the 2009 CMP (Ho'akea, LLC dba Ku'iwalu, April 2009) provides general guidance on-site recycling, decommissioning, demolition, and restoration for astronomy facilities in the UH Management Areas. Additional procedural guidance for demolition and site restoration is detailed in the *Site Decommissioning Plan Decommissioning Plan for Mauna Kea Observatories* (Sustainable Resources Group International, Inc., January 2010b). Information concerning the current status of site recycling and decommissioning can be found in Section 3.8 of the 2021 OAR (Appendix A).

11.2 DESIRED OUTCOME

The "desired outcome" with respect to site recycling, decommissioning, demolition, and restoration is:

To the extent possible, reduce the area disturbed by physical structures within the UH Management Areas by upgrading and reusing buildings and equipment at existing locations, removing obsolete facilities, and restoring impacted sites to predisturbed condition.

11.3 NEED

Each astronomy facility must identify what course of action they will pursue when the life expectancy of their facility is reached or when their lease/sublease expires. While UH will be responsible for overseeing compliance with the CMP, compliance with this section requires a collaborative effort between UH, DLNR, and the astronomy facility operators.

11.4 MANAGEMENT ACTIONS

As discussed in Section 3.8 of the 2021 OAR, the three CMP management actions related to site recycling, demolition, & restoration are "ongoing," meaning that guidelines and procedures are in place and are being implemented. The management actions are listed in Table 11.1 and discussed in Sections 11.4.1 and 11.4.2.

Table 11.1 Ongoing	Site	Recycling,	Decommissioning,	Demolition,	and	Restoration
Management Actions						

Mgmt.			
Action	Description	Discussion	
SR-1	Require astronomy facilities to develop plans for reuse or removal in accordance with	11.4.1	
	the Decommissioning Plan for the Mauna Kea Observatories (Sustainable Resources		
	Group International, Inc., January 2010b).		
SR-2	Require astronomy facilities to develop plans for site restoration in accordance with the	11.4.1	
	Decommissioning Plan for the Mauna Kea Observatories (Sustainable Resources		
	Group International, Inc., January 2010b).		
SR-3	Require future astronomy facilities to consider decommissioning during project	11.4.2	
	planning.		
Note: The exact wording of the management actions listed in the table has been revised from the 2009 CMP and the 2021 OAR to reflect			
the progress made to date, adaptation made based on the lessons learned, information collected, and input received.			
Source: Adapted from the 2021 OAR, Table 3.18.			

11.4.1 SR-1 AND SR-2: REQUIRE DECOMMISSIONING PLANNING

As discussed in detail in Section 3.8.2.1 of the 2021 OAR, UH is fully implementing the *Decommissioning Plan for the Mauna Kea Observatories* (Decommissioning Plan) (Sustainable Resources Group International, Inc., January 2010b). As detailed in Section 4.1.2 of the 2022 Master Plan, UH has committed to there being no more than nine operating astronomy facilities in the MKSR by the end of 2033.

As of the first quarter of 2022, there are 13 astronomy facilities present and a 14th astronomy facility permitted in the MKSR. Two of the 13 existing astronomical facilities (Hōkū Kea and CSO) have substantially completed the planning process specified in the Decommissioning Plan but have not obtained all the approvals needed to begin physically removing their facilities and restoring their sites. In addition, for reasons specified in the 2022 Master Plan, UH has notified the operator of the Very Long Baseline Array (VLBA) that its sublease will not be renewed and it will need to complete the decommissioning process before the end of 2033. Depending upon what transpires on Astronomy Site 13 (the permitted site for the TMT project), UH is committed to decommissioning either one or two additional astronomy facilities by the end of 2033 so that there will be no more than nine operating astronomy facilities in the MKSR by that time.

UH will continue to implement the procedures in outlined in the Decommissioning Plan, updating them as appropriate based on lessons learned during the decommissioning of Hōkū Kea and CSO, the first two astronomy facilities to decommission. CMS anticipates that they will update the Decommissioning Plan no later than mid-2024, soon after Hōkū Kea and CSO complete their decommissioning. The updated Decommissioning Plan will be in effect before operators of other facilities (e.g., VLBA and at least one other) need to begin preparing their decommissioning plans.³³

The preparation of the Decommissioning Plan was a condition of BLNR's approval of the CMP in 2009 and BLNR confirmed that UH successfully complied with that condition in 2010. As a result, the Decommission Plan has been referred to as a "subplan" of the CMP. Going forward the Decommissioning Plan, which provides detailed guidance regarding the SR-# management actions, will have the same standing as other plans that provide detailed guidance on the implementation of other management actions (e.g., the ISMP, MEOP, OMMP, etc.). The process

³³ Updating of the Decommissioning Plan may commence prior to Hōkū Kea and CSO receiving all their approvals if those approvals are delayed by contested case requests or other challenges.

SITE RECYCLING, DECOMMISSIONING, DEMOLITION, & RESTORATION

that CMS will follow in updating the Decommissioning Plan will be like the process UH follows when it updates other plans/guidelines identified in this document. UH anticipates that this will entail the following steps: (*i*) preparing an updated document that reflects the lessons learned from the two decommissioning projects that are now underway in coordination with relevant agencies (e.g., OCCL, NAR, DLNR Land Division, SHPD, etc.); (*ii*) seeking input from the community, its advisory groups (e.g., MKMB, KKM, EC), and the Native Hawaiian community; (*iii*) revising its decommissioning procedures in response to the input and advice it receives; (*iv*) requesting that the UH Hilo Chancellor approve the revised plan; and (*v*) implementing the updated plan once approved. The decommissioning procedures will be updated periodically following the same process if experience indicates updates would be beneficial.

UH anticipates that when the Decommissioning Plan is updated, it will retain the four fundamental components that are currently in place. Specifically, there will continue to be a requirement that facility operators: (*i*) submit a Notice of Intent to UH and DLNR; (*ii*) conduct Environmental Due Diligence; (*iii*) prepare and obtain approval of a Site Deconstruction and Removal Plan; and (*iv*) prepare and obtain approval of a Site Restoration Plan. The baseline for each decommissioning project will continue to be complete removal and full restoration.

It is envisioned that Decommissioning Plan updates will address such things as definitions, submittal content requirements and/or the level of detail required in certain decommissioning plan components, the planning process that is followed (to better align with the then-current proposal review process), and other details as informed by the lessons learned from previous decommissioning projects. UH envisions that it may be possible to streamline the approval process for projects that involve complete removal and full restoration.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Recognize that the Decommissioning Plan was developed, is being successfully implemented, and that the plan should be updated by the people most familiar with its implementation to date and have learned the most about decommissioning astronomy facilities on Maunakea: CMS.

11.4.2 SR-3: REQUIRE FUTURE FACILITIES TO CONSIDER DECOMMISSIONING DURING PLANNING

As outlined in Section 3.8.8.2 of the 2021 OAR, for many years UH has required the developers of new projects to address decommissioning during project planning and has included provisions for decommissioning funding in all subleases it has entered since the CMP was adopted. Accordingly, Item 10 in the "Sublease and Non-Exclusive Easement Agreement" between TMT International Observatory LLC and UH (which is the only new sublease that UH has issued since the CMP was adopted) deals specifically with what must be done as part of the decommissioning of that permitted facility. It specifies that upon termination the sublessee TMT must (at UH's sole option and at sublessee's sole cost and expense) either: (*i*) surrender the subleased area with all improvements existing or constructed thereon, or (*ii*) decommissioning Plan. UH will require entities seeking its approval for projects within the UH Management Areas to address decommissioning as part of their overall project planning and will require projects to commit to specific decommissioning terms in their subleases and/or other agreements.

SITE RECYCLING, DECOMMISSIONING, DEMOLITION, & RESTORATION

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Reference the decommissioning provisions in the only sublease UH has entered since the CMP was approved and reinforce commitment that such provisions will continue to be a part of future agreements.

DRAFT CMP 2022 SUPPLEMENT CONSIDERING FUTURE LAND USE

12 CONSIDERING FUTURE LAND USE

12.1 INTRODUCTION

Section 7.3.4 of the 2009 CMP (Ho'akea, LLC dba Ku'iwalu, April 2009) provided information and management actions related to future land use. Emphasizing that the CMP does not advocate or promote new telescope development but instead is aimed at managing resources, these recommended management actions are intended to proactively address issues related to the potential impacts that new land uses or activities could have on the resources. The term "future land use" is not confined solely to astronomy facility development but also encompasses such things as roadway improvements, additions to the Halepōhaku facilities, or a cultural facility such as a *hale* for Hawaiian navigation or astronomy. Information concerning the current status of future land use can be found in Section 3.9 of the 2021 OAR (Appendix A).

The CMP does not address development plan issues related to future astronomy facilities. Those, and other land use issues, are addressed in the 2022 Master Plan. The 2022 Master Plan also includes a proposal review process and design guidelines that are relevant to all land use proposals. Hence, the focus of this portion of the CMP is to guide the evaluation of proposed projects from the standpoint of potential impacts to the cultural landscape and natural resources, and to provide management actions that can be adopted by BLNR as special conditions in CDUPs that it may issue.

12.2 DESIRED OUTCOME RELATED TO FUTURE LAND USE

The "desired outcome" with respect to future land use is:

To protect the cultural landscape and natural resources in the assessment of future projects.

12.3 NEED

There is a need, during the project review process, for project proponents and UH to address siting and design considerations, so that proposed facilities have minimal impacts on the cultural landscape, natural resources, and on the astronomical value of the UH Management Areas. There is a concomitant need to ensure that the CMP and 2022 Master Plan are consistent and complementary when it comes to future land use scope, siting, design, review, and other considerations. The 2022 Master Plan takes the lead on setting land use guidance and the CMP management actions reflect provisions of the 2022 Master Plan and provide direction for entities that are developing land use proposals and direction for the UH management entity charged with reviewing and making recommendations and/or decisions related to land use proposals. Together, the CMP and 2022 Master Plan provisions are meant to ensure that new land uses result in minimal impacts to the cultural landscape, natural resources, and the astronomical qualities of the UH Management Areas.

12.4 MANAGEMENT ACTIONS

As discussed in Section 3.9 of the 2021 OAR and summarized in Chapter 2 of this document, six (6) of the seven (7) CMP management actions related to future land use are ongoing and one (1)

has been completed. ³⁴ The six (6) ongoing management actions are listed in Table 12.1 and the nature of the work that is continuing is summarized in Sections 12.4.1 through 12.4.5.

Mgmt.			
Action	Description	Discussion	
FLU-1	Address design guidelines presented in the 2022 Master Plan.	12.4.1	
FLU-3	To facilitate future site restoration planning, require cataloging of site conditions prior	12.4.2	
	to ground disturbance by the proposing entity.		
FLU-4	To facilitate assessment of potential visual impacts, require proposal-specific	12.4.4	
	rendering.		
FLU-5	To facilitate assessment of potential impacts to the aeolian ecosystem, require airflow	12.4.4	
	analysis on the design of structures proposed within or near wekiu bug habitat.		
FLU-6	Incorporate habitat mitigation plans into project planning process.	12.4.5	
FLU-7	To minimize adverse impacts to the cultural landscape, require the use of zero-	12.4.1	
	discharge waste systems for any future development and those facilities selected to		
	continue operating beyond 2033 in the MKSR.		
Note: The exact wording of the management actions listed in the table has been revised from the 2009 CMP and the 2021 OAR to reflect			
the progress made to date, adaptation made based on the lessons learned, information collected, and input received.			
Source: Adapted from the 2021 OAR, Table 3.19.			

 Table 12.1 Ongoing Future Land Use Management Actions

12.4.1 FLU-1 AND FLU-7: 2022 MASTER PLAN DESIGN GUIDELINES

As described in Section 3.9.2.1 of the 2021 OAR, UH followed the design guidelines and proposal review process it established in the 2000 Master Plan in reviewing all the proposals that it has received to date. This includes the very detailed review of the TMT project.

The design guidelines and proposal review process have been updated and are found in Chapter 7 of the 2022 Master Plan (Planning Solutions, Inc., January 2022). FLU-1 provides that UH will convey the design guidelines and the CMP to entities preparing proposals for land uses within the UH Management Areas and that UH and other entities proposing land uses there must address the 2022 Master Plan design guidelines in their proposals. They are also advised to carefully consider and address CMP management actions IM-11, IM-13, FLU-3, FLU-4, FLU-5, and FLU-6. Furthermore, FLU-7 specifically requires that UH and other entities proposing new facilities or continuing to operate existing facilities in the MKSR beyond 2033 follow the 2022 Master Plan design guideline concerning the use of zero-discharge waste facilities. The extent to which proposals address the design guidelines and are consistent with the CMP is a major factor in UH's evaluation of all proposals.

Overall, UH will continue to implement the 2022 Master Plan framework to minimize unnecessary habitat alteration and disturbance as new facilities and land uses are proposed (FLU-1). When it comes to astronomical facilities, UH will do this by: (*i*) limiting astronomy facilities within the MKSR to sites on which such facilities have already been developed and/or approved, and (*ii*) participating in each facility's site decommissioning process (SR-1 and SR-2), which addresses the restoration of previously disturbed areas.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). To maintain compatibility and consistency between the CMP and current Master Plan, this management action

³⁴ Only FLU-2, which called for UH to develop a map with land use zones in the Astronomy Precinct based on updated inventories of cultural and natural resources, has been completed, see Chapter 2.

now references the 2022 Master Plan and its design guidelines. Because the 2022 Master Plan design guidelines include the provision to use a zero-discharge waste system, FLU-1 and FLU-7 are now complementary and are discussed together.

12.4.2 FLU-3: CATALOGING SITE CONDITIONS

As discussed in Section 3.9.2.3 of the 2021 OAR, CMS maintains file copies of reports, permit applications, permit approvals, construction plans, and other documents related to the facilities that have been constructed within the UH Management Areas. Those constitute the best information available for use in establishing the original site conditions and provide a baseline for use during site restoration as called for in the site decommissioning process (SR-1 and SR-2).

As scientific and data recording techniques and methodologies have improved over the decades since the first astronomical facilities were constructed on Maunakea, pre-development site conditions are better known for the more recently developed sites than for the ones that were developed long ago. For example, in the case of the TMT project, which is the only astronomy facility permitted after the CMP was approved, its owner conducted high-resolution surface and aerial photography to document conditions prior to development and has also collected detailed geotechnical information for use in design. That information will be available when it is time to prepare a decommissioning plan for that project.

Because UH has, through the adoption of the 2022 Master Plan, committed to limiting astronomy facilities to sites that have already been developed and/or approved for astronomy use, the kinds of additional "baseline" information that can be gathered will be different from that available from locations that have never been disturbed. Nevertheless, UH will continue to require that entities proposing to develop new facilities or expand existing ones collect information regarding topography, substrate composition, surface features, and the presence/absence and densities of species present on the work area that may be relevant to decommissioning decisions and work. The entities submitting proposals are required to collect this information prior to conducting any ground-disturbing activity, to the extent possible. Such information must be generated by the proposing entity, submitted to UH, and retained by UH and the proposing entity for use when preparing site restoration plans.

Furthermore, UH will require all proposals that the 2022 Master Plan categorizes as "Type C" to conduct baseline surveys that consider the entire area of disturbance, including access and staging areas if they have not been utilized previously. It will recommend these inventories include a buffer area extending 500 meters (1,640 feet) away from all areas anticipated to be disturbed during construction.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time; however, greater specificity and examples have been added to the discussion and those measures in the NRMP that have been found to be effective/implementable have been incorporated.

12.4.3 FLU-4: REQUIRE VISUAL RENDERING

As described in Section 3.9.2.4 of the 2021 OAR, acting through the proposal review and approval process that has been in place since the 2009 CMP was adopted, UH has required visual renderings

to be prepared for all new land use proposals that had the potential to affect view planes or other aesthetics. It has then used this information in: (i) seeking input from advisory groups and the public and (ii) making project-related decisions as to the best means of minimizing adverse visual effects.

UH will continue to require parties submitting new land use proposals that have the potential to affect view planes or other aesthetics to provide with- and without-project visual renderings and analyses. It will also require that proposal proponents minimize adverse impacts to viewplanes and other aesthetics by using architectural designs, color schemes, and materials that address the 2022 Master Plan design guidelines and are sensitive to the surrounding landscape. Visual renderings are a required element of any Type C proposal and are included as part of the proposal review process for proposed land uses. Proposal-specific visual rendering and photographs of the existing view are required and will be used to facilitate analysis of potential impacts to the view-shed, including minimizing impacts to views from cultural areas and avoiding or minimizing views of facilities from down-slope communities (e.g., Waimea and Hilo). Thus, renderings should be prepared showing the proposal as it would be seen from, for example, (*i*) down-slope communities, (*ii*) the summit of Maunakea, (*iii*) the top of nearby pu'u, (*iv*) nearby areas of public gatherings, and (*v*) other locations identified by UH or the community as important viewpoints.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time.

12.4.4 FLU-5: REQUIRE AIRFLOW ANALYSIS

UH will continue to require that entities proposing to construct or substantially modify structures within or near wēkiu bug habitat analyze the effect that the proposed structure or earth modification would have on airflow and evaluate the effect (if any) that this is likely to have on aeolian ecosystems. Generally, such an analysis will be necessary when substantial new facilities or substantial modifications to existing facilities are proposed within or near cinder cone habitat within the MKSR, which is the preferred habitat of the wēkiu bug that feeds on insects that fallout of the aeolian winds. Thus, it is directed principally at proposals associated with Astronomy Sites 1 through 9.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time, but which proposals the requirement applies to is clarified.

12.4.5 FLU-6: INCORPORATE HABITAT MITIGATION PLANS INTO PROJECT PLANNING PROCESS

As discussed in Section 3.9.2.6 of the 2021 OAR, UH has incorporated a requirement for habitat conservation into its project planning process. This will continue and generally requires that areas disturbed during construction be restored to the extent possible.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Information

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obtained during preparation of the 2021 OAR indicated that no changes to this management action are needed at this time.

13 OPERATIONS AND IMPLEMENTATION

13.1 INTRODUCTION

Section 7.4.2 of the 2009 CMP (Ho'akea, LLC dba Ku'iwalu, April 2009) provides information and formulated management actions relating to operations and implementation of the CMP. While it recognizes that the CMP does not apply to other state lands on Maunakea, it notes that coordination with other entities will be required to implement the full range of management actions that it calls for, including emergency procedures. Information concerning the current status of operations and implementation can be found in Section 3.10 of the 2021 OAR (Appendix A).

13.2 DESIRED OUTCOME

The "desired outcome" with respect to operations and implementation is to:

Conduct effective operations to support management that is focused on resource protection, education, and public safety.

13.3 NEED

A strong operational foundation is needed to achieve management goals, including having sufficient funding, staffing, and facilities to implement the CMP management actions. Operations must comply with the various federal, state, and county laws and regulations that apply to the UH Management Areas and to the various activities and uses of the mountain. The importance of having a greater staff presence in the UH Maunakea Lands, as enforcers and resource managers, cannot be over emphasized. Day-to-day operations and implementation of the CMP will require that UH personnel and volunteers receive proper training in safety, emergency response, visitor orientation, and cultural landscape and natural resource protection.

13.4 MANAGEMENT ACTIONS

As outlined in Section 3.10 of the 2021 OAR and summarized in Chapter 2 of this document, work on two (2) operations and implementation management actions has been completed: OI-1, which called for maintaining local management, and OI-2, which called for a training plan to be developed. The three (3) other management actions are ongoing and listed in Table 13.1; the nature of the work that is continuing is summarized in Sections 13.4.1 through 13.4.3.

Mgmt.			
Action	Description	Discussion	
OI-3	Maintain and expand regular interaction and dialogue with community members,	13.4.1	
	surrounding landowners, and overseeing agencies to provide a coordinated approach		
	to resource management.		
OI-4	Address grievances through the established procedures.	13.4.2	
OI-5	Update and implement emergency response plan.	13.4.3	
Note: The exact wording of the management actions listed in the table has been revised from the 2009 CMP and the 2021 OAR to reflect			
the progress made to date, adaptation made based on the lessons learned, information collected, and input received. Source: Adapted from the 2021 OAR, Table 3.20.			

 Table 13.1 Ongoing Operations and Implementation Management Actions

13.4.1 OI-3: COORDINATE APPROACH TO RESOURCE MANAGEMENT

As discussed in Section 3.10.2.3 of the 2021 OAR, UH has worked and continues to work closely with neighboring landowners to coordinate its actions within the UH Management Areas with their activities. Specifically, it has: (*i*) formalized an agreement with DLNR-DOFAW and DLNR-NARS; (*ii*) coordinated closely with the Department of Hawaiian Home Lands; (*iii*) attempted to make its trail management efforts supportive of the Na Ala Hele Trail system's goals and objectives'; and (*iv*) coordinated with the Mauna Kea Watershed Alliance, whose members include the major adjacent landowners. These efforts will continue. This management action is a component of the "Outreach/Coordination Cluster" that is discussed in detail in Section 5.4.2 of this document.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action now recognizes that it is a component of the "Outreach/Coordination Cluster" which details coordination with the community, agencies, and non-government organizations, including any of those that are managing resources above 6,200 feet on Maunakea.

13.4.2 OI-4: ADDRESS GRIEVANCES

As outlined in Section 3.10.2.4 of the 2021 OAR, UH has established procedures that it believes allow everyone who is concerned with management of the mountain to air grievances and for UH to work constructively to resolve them. In addition to CMS' willingness to receiving written communications at any time, members of the public can inform UH of their grievances at the public MKMB meetings held monthly; those meetings are attended by the CMS Executive Director and the UH Hilo Chancellor, when they are available.

At the present time, the formal grievance procedure consists of the following:

- An individual or group makes their grievance known through written correspondence with CMS or through testimony at a public MKMB meeting.
- If the grievance concerns management issues or items within the jurisdiction of UH, the CMS Executive Director researches the issue; consults with UH leadership, staff, and advisory groups; and coordinates with the individual or group to bring the grievance to a resolution. If the grievance is not within UH's jurisdiction, UH informs the individual or group bringing the grievance and suggest they forward their grievance to the appropriate entity.
- If the grievance cannot be resolved within a month, updates are provided at subsequent MKMB meetings and CMS continues to seek input from MKMB until a decision/resolution is reached.
- The grievance and its resolution are documented in MKMB meeting minutes.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This action now specifies the process that has been used since the CMP was approved.

13.4.3 OI-5: UPDATE AND IMPLEMENT EMERGENCY RESPONSE PLAN

As outlined in Section 3.10.2.5 of the 2021 OAR, in cooperation with the various organizations that have facilities, activities, or responsibilities within the UH Management Areas, UH has established the *Maunakea Emergency Procedures* (OMKM, July 2019), a comprehensive set of emergency response procedures for Maunakea and will continue to implement those in its day-to-day management of the area. It will also continue to provide support for implementation of DLNR's 2011 *Wildfire Management Plan for Maunakea* (Beavers, June 2011).

The feedback received during preparation of the 2021 OAR did not indicate any dissatisfaction with the existing emergency response procedures. Accordingly, CMS will continue to follow them for the foreseeable future. As with other plans and guidelines, they may be updated from time to time based on lessons learned and new developments among the various organizations that have roles in the Maunakea Emergency Procedures.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). This management action now references the plans that have been developed since the CMP was adopted.

DRAFT CMP 2022 SUPPLEMENT MONITORING, EVALUATION, AND UPDATES

14 MONITORING, EVALUATION, AND UPDATES

14.1 INTRODUCTION

Section 7.4.2 of the 2009 CMP (Ho'akea, LLC dba Ku'iwalu, April 2009) provided information and formulated management actions relevant to it monitoring, evaluation, and updates. The 2009 CMP was based on the state of knowledge as of December 2008 regarding the status of the resources, activity levels, and the most appropriate management actions. Recognizing that new information would become available, lessons would be learned during implementation, and that environmental conditions would likely evolve over time, it calls for the application of adaptive management principles that would allow resource managers to improve strategies and plans periodically. Information concerning the current status of monitoring, evaluation, and updates can be found in Section 3.11 of the 2021 OAR (Appendix A).

This document was prepared in part to fulfill the management actions in this chapter. As outlined below, it incorporates information learned, including information obtained through coordination with federal and state agencies and the local community in a way that is fully consistent with the adaptive management provisions of the CMP.

14.2 DESIRED OUTCOME

The "desired outcome" with respect to monitoring, evaluation, and updates is to:

Determine whether management actions are achieving the goals [desired outcomes] of the CMP and provide a process for improving and updating management strategies through evaluation and revisions of the CMP.

14.3 NEED

The CMP, like all management plans, needs to undergo regular review and update to reduce uncertainty and take advantage of (*i*) lessons learned during CMP implementation; (*ii*) new data and information from monitoring, ecosystem science, surveys, and traditional knowledge; and (*iii*) input from resource experts, Native Hawaiian cultural practitioners, agencies, and others familiar with particular resources. This is necessary to ensure that Maunakea's resources are afforded the best possible protection.

14.4 MANAGEMENT ACTIONS

As described in Section 3.11 of the 2021 OAR, all three of the CMP management actions related to monitoring, evaluation, and updates are "ongoing", meaning that guidelines and procedures are in place and are being implemented. The three management actions are list in Table 14.1 and the work that is continuing is summarized in Sections 14.4.1 and 14.4.2.

MONITORING, EVALUATION, AND UPDATES

Mgmt.		
Action	Description	Discussion
MEU-1	Post tracking and assessment metrics and provide annual Progress Reports to	14.4.1
	DLNR regarding management activities.	
MEU-2	Conduct regular evaluations and updates of the CMP utilizing adaptive	
	management means that address public input, incorporate lessons learned, and take	
	advantage of new data and information.	
MEU-3	Revise and update planning documents, including the master plan, leases, and	14.4.2
	subleases, to maintain compatibility and consistency between them and reflect	
	stewardship matters resolved with DLNR.	
Note: The exact wording of the management actions listed in the table has been revised from the 2009 CMP and the 2021 OAR to reflect		
the progress made to date, adaptation made based on the lessons learned, information collected, and input received.		
Source: Adapted from the 2021 OAR, Table 3.21.		

Table 14.1 Ongoing Monitoring, Evaluation, & Updates Management Action

14.4.1 MEU-1 AND MEU-2: CONDUCT CMP REPORTING AND UPDATING

As described in Section 3.11.2.1 of the 2021 OAR, UH has established and is implementing a comprehensive reporting system that provides the information needed to internally track and report to others the status of its efforts to fully implement the measures called for in the CMP. UH will continue this practice by:

- Developing, posting, and regularly updating tracking and assessment metrics (MEU-1). The following applies to these metrics:
 - Purpose: Keep those interested informed of UH's ongoing stewardship efforts.
 - Frequency: Information regarding each metric will be updated as warranted. Updates to each metric will occur at least every 6 months; however, it is envisioned that certain metrics will be updated nearly in real time.
 - Format: A "dashboard" will be developed and posted on the CMS website where each metric will be accessible.
 - Metrics: The metrics will be developed and refined based on the ability of the metric to (*i*) meaningfully illustrate stewardship progress or effort, (*ii*) relate to multiple aspects of CMP implementation, (*iii*) be readily measurable or otherwise scalable, (*iv*) address community input and interest, and (*v*) inform adaptations to management actions.

Examples of possible metrics include:

- The number of orientation video views.
- The number of vehicles entering the UH Management Areas.
- Number of facility, tours, and project inspections conducted that did/did not identify permit condition or sublease term violations.
- Pounds of invasive species and trash removed.
- Number of native species out planted.
- Number of vehicle and facility inspections conducted that did/did not identify the presence of invasive species.
- Number of stewardship events held that the community could participate in.
- Days since last incident that required emergency response.

- Preparing and submitting Progress Reports (MEU-1). The following applies to Progress Reports:
 - Purpose: Keep oversight agency (DLNR) informed of progress and future direction of the management program.
 - Frequency: Annually, submitted to DLNR by June 30 of each year, except on years that an OAR is prepared (the OAR will serve as the Progress Report the year it is prepared).
 - Content: Regarding the last calendar year, describe the management goals, objectives, and actions that go beyond UH's baseline/ongoing management actions and what progress was made toward meeting them. Describe the management goals, objectives, and actions for the coming year that go beyond UH's baseline/ongoing management actions; this will include a description of the goals, objectives, and actions carried forward from the previous year and the improvements planned to increase the likelihood of achieving/completing them over the following years. Report on the tracking and assessment metrics. The Progress Report is not intended to be a status report on the resources in the UH Management Areas nor is it meant to provide a detailed status update on every CMP management action.
 - Process: Prepared by UH with an opportunity for advisory groups to provide input, then UH submits to DLNR.
- Preparing, circulating, and submitting an Outcome Analysis Report (OAR) (MEU-2, evaluation step). The following applies to OARs:
 - Purpose: Same as the annual Progress Report but it is more comprehensive and is intended to objectively examine all aspects of the ongoing stewardship in a manner that informs adaptive management decisions related to the management actions.
 - Frequency: Roughly every five (5) years.
 - Content:
 - Part 1: Describe the state of the cultural landscape, natural resources, and astronomical resources by summarizing data collected and new information accumulated since the previous OAR was prepared; report on the tracking and assessment metrics and identify trends, if any, in the metrics and other data or information gathered; and summarize the apparent effects (positive, negative, neutral) that the management actions are having on the resources.
 - Part 2: Summarize the status of each management action (tabular summary acceptable).
 - Part 3: Summarize the progress toward meeting each of the desired outcomes; the UH management entity's strengths and weaknesses; relevant new laws, rules, regulations, and guidance documents that have come into effect since the last OAR; and concepts for how existing management actions may be adapted and new management action may be added to make greater strides toward achieving the desired outcomes in the future.

- Process: UH prepare a Draft OAR; UH provide Draft OAR to advisory groups, DLNR, and neighboring landowners for review and comment; UH prepare a final OAR that addresses input received; and UH submit final OAR to DLNR.
- Preparing, circulating, and submitting a CMP Management Action Update (MEU-2, updating step). The following applies to CMP updates/supplements:
 - Purpose: Implement an adaptive management approach to updating the CMP's management actions as informed by the OAR.
 - Frequency: Immediately following the completion of an OAR.
 - Content: Similar to this supplement, update the CMP management actions as informed by the information and analysis in the OAR. Include the OAR as an attachment.
 - Process: UH prepare a Draft CMP Management Action Update; UH announce the availability of the update for review to every entity on its mailing list; UH prepare a Final CMP Management Action Update that addresses input received; UH submits Final CMP Management Action Update to DLNR; and BLNR approves CMP Management Action Update.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Added a tracking and assessment metric program to address public and agency input. Also, provide a greater level of specificity regarding the various reports and the process for document development, review, and, when necessary, approval.

14.4.2 MEU-3: REVISE AND UPDATE PLANNING DOCUMENTS

As discussed in Section 4.10.1.2 of the 2021 OAR, UH has endeavored to keep the planning documents that govern land use within UH's Maunakea Lands consistent with the goals and objectives of the CMP, thereby promoting the responsible stewardship and use of UH Management Areas on Maunakea. Specifically:

- Provisions of the CMP have been a key element in formulating the 2022 Master Plan³⁵ and in negotiating terms of subleases.³⁶ These documents are consistent with, incorporate, and reference the CMP. If they are amended or updated, they should continue to be consistent with, incorporate, and reference the CMP.
- Because UH and the other astronomy facility owners wish to continue astronomical activities on Maunakea beyond the end date of its current master lease, the BOR has informed the BLNR that it intends to seek a new land authorization. It anticipates that should a new land authorization be granted to UH, then all subsequent agreements between UH and the astronomy facilities will be consistent with, incorporate, and reference the CMP.

<u>Summary of adaptations</u> (this paragraph summarizes the adaptations to this management action since 2009; it is provided to inform readers, it is not part of the management action). Specify the process that has been used since the CMP was approved and will continue.

³⁵ UH released the public review draft of the 2022 Master Plan on September 12, 2021, and the BOR approved the 2022 Master Plan on January 20, 2022; it will guide land use within the UH Maunakea Lands for 20 years.

³⁶ The only sublease approved since the adoption of the 2009 CMP has been the TMT sublease.

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- Sustainable Resources Group International, Inc. (January 2010b). *Decommissioning Plan for the Mauna Kea Observatories*. OMKM.
- Sustainable Resources Group International, Inc. (September 2009). Natural Resources Management Plan for the UH Management Aras on Mauna Kea. OMKM.
- University of Hawaii. (December 2019). Maunakea Education & Outreach Plan. CMS.
- University of Hawaii. (March 1995). *Revised Management Plan for the UH Management Areas* on Mauna Kea. University of Hawaii.

8 INPUT RECEIVED VIA KONVEIO COMMENT FORM

Submittal Number: 1 Date Submitted: 3/10/2022 Name: Hannah Morrigan Organization:

City, State, Zip: Honolulu, HI 96826

Topic(s) Selected:

Ch. 1-Introduction: X
Ch. 2-Completed Management Actions:
Ch. 3-Cultural Landscape:
Ch. 4-Natural Resource:
Ch. 5-Education and Outreach:
Ch. 6-Astronomical Resources:
Ch. 7-Activities and Uses:
Ch. 8-Permitting and Enforcement:
Ch. 9-Infrastructure and Maintenance:
Ch. 10-Construction Guidelines:
Ch. 11-Site Recycling Decommissioning:
Ch. 13-Operations and Implementation:
Ch. 14-Monitoring, Evaluation, and Updates:
Ch. 15-References:

Appendix A:

Comment: The Native Hawaiian population has overwhelmingly disapproved of this plan on religious, cultural grounds. Going forward with this plan is another slap in the face to an already underserved, oppressed, occupied population.

Submittal Number: 2 Date Submitted: 3/14/2022 Name: Dana Keawe Organization:

City, State, Zip: Keaau, HI 96749

Topic(s) Selected:

Ch. 1-Introduction: **X** Ch. 2-Completed Management Actions: X Ch. 3-Cultural Landscape: X Ch. 4-Natural Resource: X Ch. 5-Education and Outreach: X Ch. 6-Astronomical Resources: X Ch. 7-Activities and Uses: X Ch. 8-Permitting and Enforcement: X Ch. 9-Infrastructure and Maintenance: X Ch. 10-Construction Guidelines: X Ch. 11-Site Recycling Decommissioning: X Ch. 12-Considering Future Land Use: X Ch. 13-Operations and Implementation: X Ch. 14-Monitoring, Evaluation, and Updates: X Ch. 15-References: X Appendix A: X

Comment: UHH has mismanaged their lease agreements on Mauna a Wakea since its inception and should have their lease revoked immediately. I DO NOT support the CMP.

Submittal Number: 3 Date Submitted: 3/14/2022 Name: Kristen Luning Organization:

City, State, Zip: Hilo, HI 96720

Topic(s) Selected:

Ch. 1-Introduction:
Ch. 2-Completed Management Actions:
Ch. 3-Cultural Landscape:
Ch. 4-Natural Resource:
Ch. 5-Education and Outreach:
Ch. 6-Astronomical Resources:
Ch. 7-Activities and Uses:
Ch. 8-Permitting and Enforcement:
Ch. 9-Infrastructure and Maintenance:
Ch. 10-Construction Guidelines:
Ch. 11-Site Recycling Decommissioning:
Ch. 12-Considering Future Land Use: X
Ch. 13-Operations and Implementation: X
Ch. 14-Monitoring, Evaluation, and Updates: X
Ch. 15-References:

Appendix A:

Comment: Keep Mauna Kea management with UH.

Submittal Number: 4 Date Submitted: 3/17/2022 Name: Jessica Kuzmier Organization:

City, State, Zip:

Topic(s) Selected:

Ch. 1-Introduction: Ch. 2-Completed Management Actions: Ch. 3-Cultural Landscape: Ch. 4-Natural Resource: X Ch. 5-Education and Outreach: Ch. 6-Astronomical Resources: Ch. 7-Activities and Uses: X Ch. 8-Permitting and Enforcement: Ch. 9-Infrastructure and Maintenance: Ch. 10-Construction Guidelines: X Ch. 11-Site Recycling Decommissioning: X Ch. 12-Considering Future Land Use: X Ch. 13-Operations and Implementation: X Ch. 14-Monitoring, Evaluation, and Updates: Ch. 15-References: Appendix A:

Comment: I believe UH has started a good comprehensive strategy in making their work on the mauna more inclusive and holistic. Focus on biodiversity, more focus on other disciplines such as meterology, climate change, biology, biochemistry, and geochemistry as well as traditional Hawaiian inclusive focus on the mauna is key. I would like to see the UH be a leader in recycle, reuse, and reduce, as one major challenge going forward includes sustainability. I would like to see more studies in hydrology and soil health, so that those in industries more makai can start focusing on sustainable and healthy ways to incorporate regenerative tourism and regenerative agriculture. I appreciate the UH's work on invasive species and would like to see more of this going forward. I am a proponent of TMT but not at the expense of other disciplines and/or at the expense of sustainability on the mauna. Mahalo.

Submittal Number: 5 Date Submitted: 3/30/2022 Name: Anonymous Organization:

City, State, Zip:

Topic(s) Selected:

Ch. 1-Introduction:

Ch. 2-Completed Management Actions:

- Ch. 3-Cultural Landscape:
- Ch. 4-Natural Resource:
- Ch. 5-Education and Outreach:
- Ch. 6-Astronomical Resources:
- Ch. 7-Activities and Uses: X
- Ch. 8-Permitting and Enforcement: X
- Ch. 9-Infrastructure and Maintenance:
- Ch. 10-Construction Guidelines:
- Ch. 11-Site Recycling Decommissioning:
- Ch. 12-Considering Future Land Use:
- Ch. 13-Operations and Implementation:
- Ch. 14-Monitoring, Evaluation, and Updates:
- Ch. 15-References:

Appendix A:

Comment: With over 30 years experience providing both Commercial Tours of Mauna Kea and free uplift for Cultural practice we have seen a major slice of the evolution of Mauna Kea as it is today.

One of the things that we advise great caution on is the idea of a "Shuttle" to convey visitors to the summit.

Neither Telescope vehicles, Rangers nor anyone else has the daily experience of what it takes to keep ONE full van per day going on the mountain with 3000lbs of people and gear onboard, let alone two full vans. The idea of maintaining a small fleet of Vans for multiple trips per day to provide a reliable service would require a skilled mechanic at the mid Level, a large stock of spare parts, and driver training way beyond anything we see outside Commercial Operators at this time.

It would also require Supervision with "Instant" power to make expensive decisions on both availability at any moment and need to go to Hilo or Kona for expensive repairs...we recommend that before such a service is even contemplated that current Operators and whoever proposes this operation hold a meeting so that HARD questions can be asked.

We also would like to see some urgency applied to RAISING PRICES and setting up a reservation system for Tourists visiting the Visitor Center and beyond.

The National Park, Haunama Bay and Haleakala all have entrance fees and both Haunama Bay and Haleakala require reservations....certainly any Operator can assist CMS to set up these systems...in our opinion the per visitor fee should be AT LEAST \$20 so that services can be

provided by professionals in a professional manner possibly a concession instead of the VIS being run by Volunteers that probably contravenes Labor Laws.

Submittal Number: 6 Date Submitted: 3/30/2022 Name: N Pershing Organization:

City, State, Zip:

Topic(s) Selected:

Ch. 1-Introduction: X Ch. 2-Completed Management Actions: X Ch. 3-Cultural Landscape: X Ch. 4-Natural Resource: X Ch. 5-Education and Outreach: X Ch. 6-Astronomical Resources: X Ch. 7-Activities and Uses: X Ch. 8-Permitting and Enforcement: X Ch. 9-Infrastructure and Maintenance: X Ch. 10-Construction Guidelines: Ch. 11-Site Recycling Decommissioning: X Ch. 12-Considering Future Land Use: X Ch. 13-Operations and Implementation: X Ch. 14-Monitoring, Evaluation, and Updates: X Ch. 15-References: Appendix A:

Comment: It would be a shame to take the stewardship out of the hands of UH and make it into a committee with a lot of differing people; nothing would get done! The more the government tries to "fix" something, it gets worse. TMT and the telescopes are VITAL to Hawaii and all of the USA; there's nowhere else to put these telescopes unless it's in a foreign country and that's bad news because foreign countries may go to war, the government may be unstable or people may riot and destroy US telescopes, although ironically, if the fringe group here had their way, they would do it. Do we really want China and Russia to be the world powers in space? I'm part-Hawaiian and I really do feel for Hawaiians who feel their culture is being violated but we have to "Imua" and look forward; this is not the past anymore, this is the future and our society as a whole needs TMT and the telescopes for research/education and the well-being of our country.

Submittal Number: 7 Date Submitted: 3/30/2022 Name: Renee Hoomanawanui Organization:

City, State, Zip: Pahoa, HI 96778

Topic(s) Selected:

Ch. 1-Introduction:

Ch. 2-Completed Management Actions:

- Ch. 3-Cultural Landscape:
- Ch. 4-Natural Resource:
- Ch. 5-Education and Outreach:
- Ch. 6-Astronomical Resources:
- Ch. 7-Activities and Uses:
- Ch. 8-Permitting and Enforcement:
- Ch. 9-Infrastructure and Maintenance:
- Ch. 10-Construction Guidelines: X
- Ch. 11-Site Recycling Decommissioning:
- Ch. 12-Considering Future Land Use:
- Ch. 13-Operations and Implementation:
- Ch. 14-Monitoring, Evaluation, and Updates:
- Ch. 15-References:

Appendix A:

Comment: Anything that includes the construction of TNT is not okay. Maunakea is a sacred Mountain

Submittal Number: 8 Date Submitted: 3/30/2022 Name: Mary Begier Organization: Mary Begier Realty

City, State, Zip: Hilo, HI 96720

Topic(s) Selected:

Ch. 1-Introduction:
Ch. 2-Completed Management Actions: X
Ch. 3-Cultural Landscape: X
Ch. 4-Natural Resource:
Ch. 5-Education and Outreach:
Ch. 6-Astronomical Resources:
Ch. 7-Activities and Uses: X
Ch. 8-Permitting and Enforcement: X
Ch. 9-Infrastructure and Maintenance:
Ch. 10-Construction Guidelines:
Ch. 11-Site Recycling Decommissioning:
Ch. 12-Considering Future Land Use: X
Ch. 13-Operations and Implementation: X
Ch. 14-Monitoring, Evaluation, and Updates: X

Appendix A:

Comment: I have participated in everything from hearings, sign waving, research and weed pulling on Mauna Kea actively since 1996. I think we have all learned a great deal but especially the University. I testified before BLNR in early 2000 promising that the business community was disappointed in past behavior of the University, encouraged by improvements made at that time especially in awareness and now I come before you to say this plan is a quality step forward. We have a long way to go in earning trust but the key to doing that is to be the ones at the table. There should be no major shakeup in leadership of the special district of Mauna Kea. I believe this updated stewardship plan speaks to the University's commitment to keep learning, growing, moving forward for the good of our Mauna Kea and all the peoples who utilize her gracious lands. Please approve this updated CMP. Thank you for this opportunity. With sincere Aloha, Mary Begier

Submittal Number: 9 Date Submitted: 3/30/2022 Name: Ali Bairos Organization:

City, State, Zip:

Topic(s) Selected:

Ch. 1-Introduction: X
Ch. 2-Completed Management Actions:
Ch. 3-Cultural Landscape: X
Ch. 4-Natural Resource: X
Ch. 5-Education and Outreach: X
Ch. 6-Astronomical Resources: X
Ch. 7-Activities and Uses: X
Ch. 8-Permitting and Enforcement: X
Ch. 9-Infrastructure and Maintenance:
Ch. 10-Construction Guidelines:
Ch. 11-Site Recycling Decommissioning:
Ch. 12-Considering Future Land Use:
Ch. 13-Operations and Implementation:
Ch. 14-Monitoring, Evaluation, and Updates:

Appendix A:

Comment: Mauna Kea is a revered resource for ALL the citizens of Hawai'i-nei; there is space - physically and spiritually - for all anticipated activities, including cultural and religious practices, recreational activities and, most of all, studying of the universal heavens....astronomy. By far, the greatest good will accrue to the greatest number of Hawai'i's [and the world's!] citizens by pursuing and advancing astronomical activities on the mauna - all within agreed parameters, of course, but any thought of drastically limiting astronomy on Mauna Kea robs the future, denies the past. Time to put an end to bickering.

Submittal Number: 10 Date Submitted: 3/30/2022 Name: Tamara Swift Organization:

City, State, Zip: Aiea, HI 96701

Topic(s) Selected:

Ch. 1-Introduction:
Ch. 2-Completed Management Actions:
Ch. 3-Cultural Landscape: X
Ch. 4-Natural Resource:
Ch. 5-Education and Outreach:
Ch. 6-Astronomical Resources:
Ch. 7-Activities and Uses:
Ch. 8-Permitting and Enforcement:
Ch. 9-Infrastructure and Maintenance:
Ch. 10-Construction Guidelines:
Ch. 11-Site Recycling Decommissioning:
Ch. 12-Considering Future Land Use:
Ch. 13-Operations and Implementation:
Ch. 14-Monitoring, Evaluation, and Updates:
Ch. 15-References:

Appendix A:

Comment: I'm against TMT, I'm not against astronomy. Continue to decommission and remove old telescopes and listen to the Hawaiian cultural leaders.

Submittal Number: 11 Date Submitted: 3/30/2022 Name: John Tam Organization:

City, State, Zip: Kihei, Hawaii 96753

Topic(s) Selected:

Ch. 1-Introduction:
Ch. 2-Completed Management Actions:
Ch. 3-Cultural Landscape:
Ch. 4-Natural Resource:
Ch. 5-Education and Outreach:
Ch. 6-Astronomical Resources: X
Ch. 7-Activities and Uses: X
Ch. 8-Permitting and Enforcement:
Ch. 9-Infrastructure and Maintenance:
Ch. 10-Construction Guidelines:
Ch. 11-Site Recycling Decommissioning:
Ch. 12-Considering Future Land Use:
Ch. 13-Operations and Implementation:
Ch. 14-Monitoring, Evaluation, and Updates:
Ch. 15-References:

Appendix A:

Comment: I am very much in favor of advanced observation and research facilities, such as the Thirty Meter Telescope, to be constructed and maintained at the summit of Mauna Kea. I am part-Hawaiian. I believe that the study and knowledge of the stars was and continues to be critical to the perpetuation and advancement of our culture and way of life, just as much as 'olelo, mele, oli, and hula.

Submittal Number: 12 Date Submitted: 3/31/2022 Name: David Boboltz Organization: National Science Foundation

City, State, Zip: Alexandria, Virginia 22314

Topic(s) Selected:

Ch. 1-Introduction: X Ch. 2-Completed Management Actions: X Ch. 3-Cultural Landscape: X Ch. 4-Natural Resource: X Ch. 5-Education and Outreach: X Ch. 6-Astronomical Resources: X Ch. 7-Activities and Uses: X Ch. 8-Permitting and Enforcement: X Ch. 9-Infrastructure and Maintenance: X Ch. 10-Construction Guidelines: X Ch. 11-Site Recycling Decommissioning: X Ch. 12-Considering Future Land Use: X Ch. 13-Operations and Implementation: X Ch. 14-Monitoring, Evaluation, and Updates: X Ch. 15-References: Appendix A:

Comment: The National Science Foundation (NSF) appreciates the opportunity to provide written comments to the University of Hawai`i at Hilo (UH Hilo) on the draft Comprehensive Management Plan 2022 Supplement: Management Action Updates (CMP Supplement) for the lands managed by UH on Maunakea. As the owner of two major astronomical facilities on Maunakea - Gemini North Observatory and the Maunakea Very Long Baseline Array (VLBA) antenna - both of which are operated on our behalf by non-profit science management organizations and are the subject of subleases with the University of Hawai`i (UH), NSF has a strong interest in the effective management of the Science Reserve on the Maunakea summit. The draft CMP Supplement is a lengthy document that has consequences to the astronomy community; NSF, however, only learned of the release of the draft CMP Supplement and accompanying public comment period on March 14, 2022, which did not leave sufficient time for NSF to prepare detailed comments by the March 31, 2022 deadline. Therefore, NSF provides the following general comments for consideration:

1. NSF supports the inclusion of the Native Hawaiian community in the management of Maunakea. While the draft CMP Supplement mentions UH's plans to involve the Native Hawaiian community in future activities, the document does not specify what that involvement entails. Moreover, the document does not include a discussion identifying the positive and/or negative impacts of UH Hilo's management of Maunakea on the Native Hawaiian community or how those impacts will be addressed. NSF further notes that UH Hilo has not yet completed its cultural assessment related to its Master Lease application. Therefore, NSF believes that the content of the CMP Supplement would benefit from awaiting the results of the cultural

assessment and then including a clear and meaningful discussion in the CMP Supplement that identifies the positive and/or negative impacts of UH Hilo's proposed management of Maunakea to the Native Hawaiian community and how UH Hilo's management of Maunakea will meet the needs and interests of the Native Hawaiian community.

2. The draft CMP Supplement and Master Plan were issued prior to the preparation of both a Draft Environmental Impact Statement and a Final Environmental Impact Statement that evaluates the environmental and cultural resource impacts anticipated from implementation of these management documents. Without completing the environmental impact statement process, NSF is unable to evaluate or determine whether UH Hilo's proposed management scheme is appropriate from an environmental and cultural resource impact perspective.

3. NSF notes that there does not seem to be a specific reference in the draft CMP Supplement to the 10-15% observing time that observatories on Maunakea provide to UH as a condition of their subleases. This observing time translates to millions of dollars in direct benefits to UH, and this contribution should be acknowledged, discussed, and evaluated to determine whether it should be redirected (in part or in whole) to provide a more equitable distribution of the benefits to the community, especially to Native Hawaiians. If appropriate, the share of observing time should be renegotiated.

NSF strongly opposes any reference to the decommissioning of the VLBA antenna on 4. Maunakea in the draft CMP Supplement (see, e.g., page 88). NSF was not consulted prior to this decision being made. On numerous occasions, NSF has communicated to UH, both formally and informally, its position that the VLBA antenna on Maunakea should not be decommissioned because it is a valuable astronomy asset for the nation, and, by virtue of its use in maintaining the International Celestial Reference Frame and measuring daily Earth Orientation Parameters, it plays a vital role in maintaining the integrity of Global Navigation Satellite Systems, including the Global Positioning System. Additionally, this VLBA station, which is located below the summit of Maunakea, is afforded special regulatory protections for portions of the radio spectrum at its present location (i.e., footnotes 113, 131, 161 of the United States Table of Frequency Allocations; 47 C.F.R. § 2.106). Moreover, contrary to what is asserted on page 88 of the draft CMP Supplement, neither NSF nor its operator of the VLBA (the National Radio Astronomy Observatory) has been formally notified by UH that the sublease for the VLBA antenna will not be renewed after the current sublease expires. (Noteworthy, formal notice to the operator of the VLBA would not constitute formal notice to NSF as the owner of the facility.) NSF requests that the CMP Supplement reflect that renewal of the sublease of the VLBA antenna be considered alongside other astronomical facilities.

5. The specific process and criteria for determining which facilities must be decommissioned is not described in the draft CMP Supplement. NSF continues to maintain that any decommissioning plans should be determined through a documented, open, and transparent process, including consideration of input from both the science and local communities. NSF also notes that the Master Lessee should be cognizant of potential conflicts of interest it may have when making determinations about which facilities to decommission.

Thank you, again, for the opportunity to provide comments on the draft CMP Supplement. We look forward to seeing how NSF's comments are incorporated into the final CMP Supplement. We also would like to reiterate and reinforce the importance of listening to all voices regarding the future of Maunakea. If further clarity on our comments is needed, please feel free to reach out to David Boboltz, Ph.D. at dboboltz@nsf.gov. Sincerely,

/s/ Linnea Avallone, Ph.D. Chief Officer for Research Facilities Office of the Director

/s/ Sean L. Jones, Ph.D. Assistant Director Mathematical & Physical Sciences Submittal Number: 13 Date Submitted: 3/31/2022 Name: Rene Kimura Organization: Retired educator

City, State, Zip:

Topic(s) Selected:

Ch. 1-Introduction: X
Ch. 2-Completed Management Actions:
Ch. 2-Completed Management Actions:
Ch. 3-Cultural Landscape:
Ch. 4-Natural Resource:
Ch. 5-Education and Outreach: X
Ch. 6-Astronomical Resources:
Ch. 7-Activities and Uses:
Ch. 8-Permitting and Enforcement:
Ch. 9-Infrastructure and Maintenance:
Ch. 10-Construction Guidelines:
Ch. 11-Site Recycling Decommissioning:
Ch. 12-Considering Future Land Use:
Ch. 13-Operations and Implementation:
Ch. 14-Monitoring, Evaluation, and Updates:

Appendix A:

Comment: Long involved in Science and social science outreach, including local and global perspectives of our Aina, I am in agreement with recent Star-Advertiser editorial statements and dismayed with recent Legislative bill passing, by those NOT long involved in coordinating Education and Student opportunities, for their and our future.

Submittal Number: 14 Date Submitted: 3/31/2022 Name: Karin Lynn Organization:

City, State, Zip: Honolulu, HI 96826

Topic(s) Selected:

Ch. 1-Introduction: X
Ch. 2-Completed Management Actions:
Ch. 3-Cultural Landscape:
Ch. 4-Natural Resource:
Ch. 5-Education and Outreach:
Ch. 6-Astronomical Resources:
Ch. 7-Activities and Uses:
Ch. 8-Permitting and Enforcement:
Ch. 9-Infrastructure and Maintenance:
Ch. 10-Construction Guidelines:
Ch. 11-Site Recycling Decommissioning:
Ch. 12-Considering Future Land Use:
Ch. 13-Operations and Implementation:
Ch. 14-Monitoring, Evaluation, and Updates:

Appendix A:

Comment: This comment is about the CMP and Supplement in general:

"Hawaii is privileged to be endowed with Mauna Kea, a unique and special landmark with natural, cultural and scientific resources that benefit everyone - from the youngest child on Hawaii Island, to the to the Native Hawaiian with his unique, personal ties, to the average resident of the State, to the most scholarly scientist probing the universe.

The University of Hawaii has a long history on the mauna, complete with many successes - and significant blemishes - all of which have been made abundantly clear in the past year. In my opinion, it is more than certain that the University has "gotten the message" about past transgressions, and their considerable effort to create a new plan has resulted in a totally new way of looking at – everything. The updated Comprehensive Management Plan deserves a chance to be put into effect before even considering throwing it all out with the bathwater as the Legislature is currently considering doing.

I'm an advocate for science, telescopes, astronomy, the Big Island, Native Hawaiians, history, historic preservation, nature, the environment, Hawai'i, the US, international space exploration and ... all of it. I think (I know!) that all of that can co-exist.

The Plan with its well-thought-out supplement needs to be put in motion and let to play out for a couple of years; the University and all who are beneficiaries of the mountain deserve no less.

Submittal Number: 15 Date Submitted: 3/31/2022 Name: Patricia Ako Organization:

City, State, Zip: Kapaau, Hawaii 96755

Topic(s) Selected:

Ch. 1-Introduction:
Ch. 2-Completed Management Actions:
Ch. 3-Cultural Landscape:
Ch. 4-Natural Resource:
Ch. 5-Education and Outreach:
Ch. 6-Astronomical Resources:
Ch. 7-Activities and Uses:
Ch. 8-Permitting and Enforcement:
Ch. 9-Infrastructure and Maintenance:
Ch. 10-Construction Guidelines:
Ch. 11-Site Recycling Decommissioning:
Ch. 12-Considering Future Land Use:
Ch. 13-Operations and Implementation:
Ch. 14-Monitoring, Evaluation, and Updates: X
Ch. 15-References:

Appendix A:

Comment: I believe the Center for Maunakea Stewardship has significantly improved the stewardship of the Mauna with community outreach and input. The newly adopted Master Plan and Maunakea Administrative Rules which many in the community have had a share in developing has helped to insure that the needs, concerns, challenges and priorities of the entire community are considered and respected. Mauna Kea is a magnificent resource and should be cared for by all including those who construct gigantic telescopes near the summit. My strong beliefs are centered on education for our island children as well as all others who believe in science/astronomy and the benefits we are able to share with the world.

Submittal Number: 16 Date Submitted: 3/31/2022 Name: Laurie Avilla Organization:

City, State, Zip: Anahola, Hawaii 96703

Topic(s) Selected:

Ch. 1-Introduction: X Ch. 2-Completed Management Actions: X Ch. 3-Cultural Landscape: X Ch. 4-Natural Resource: X Ch. 5-Education and Outreach: X Ch. 6-Astronomical Resources: X Ch. 7-Activities and Uses: X Ch. 8-Permitting and Enforcement: X Ch. 9-Infrastructure and Maintenance: X Ch. 10-Construction Guidelines: X Ch. 11-Site Recycling Decommissioning: X Ch. 12-Considering Future Land Use: X Ch. 13-Operations and Implementation: X Ch. 14-Monitoring, Evaluation, and Updates: X Ch. 15-References: X Appendix A: X

Comment: Aloha,

Hope I'm commenting on the right site! Here I am again, writing my comments about Mauna Kea, No matter what changes you all do, we still Not Pono with what you all are trying to accomplish. It's not even Pono if Uh is part of this management, they had thirty years being"stewards" of Maunakea! They did not and still not managing it properly for the "People" of Hawaii. What they are trying to do now... the Kanaka of Hawaii was doing way back when. The Practioners you all see now, was and still are the stewards of our Mauna, handed down from generations to generations. You know and I know none of you belong up there! We, the People of Hawaii know Astronomy will not die, we've had it all along and still going strong! Hoku'lea proved it every time!

By the way, what happened to reuse and recycle, we live on an island! Most of all WE CANNOT LET THIS HAPPEN ON OUR AQUIFERS, We don't want another Red Hill happening! UA MAU KE EA O KA AINA I KA PONO! KA WAI OLA! Mahalo for taking the time to read my testimony! Sincerely

Laurie Avilla and Ohana Anahola,Hawaii Submittal Number: 17 Date Submitted: 3/31/2022 Name: Patti Cook Organization: Individual - not representing an organization

City, State, Zip: Kamuela, Hawaii 96743

Topic(s) Selected:

Ch. 1-Introduction: X
Ch. 2-Completed Management Actions: X
Ch. 3-Cultural Landscape:
Ch. 3-Cultural Resource:
Ch. 5-Education and Outreach: X
Ch. 6-Astronomical Resources:
Ch. 7-Activities and Uses:
Ch. 8-Permitting and Enforcement:
Ch. 9-Infrastructure and Maintenance:
Ch. 10-Construction Guidelines:
Ch. 11-Site Recycling Decommissioning:
Ch. 12-Considering Future Land Use:
Ch. 13-Operations and Implementation:
Ch. 14-Monitoring, Evaluation, and Updates:
Ch. 15-References:

Appendix A:

Comment: I have attempted to read and understand this entire update to the 2009 Maunakea Comprehensive Management Plan (CMP) and am impressed by the scope, attention to detail, clarity and forthright detailing of the status of the work in progress, and where more is needed. While I am most interested in the educational opportunities related to astronomy and wideranging stewardship of the diverse environmental and cultural aspects of the mauna, I am in awe over the expressed willingness of the University, supported by multiple layers of community input and expertise, to address wide-ranging issues, with timelines and an array of accountability requirements, to listen and learn, and continue to seek out diverse voices, perspectives and practices. The CMP 2022 Supplement is overwhelmingly comprehensive, and it gives me confidence that management of the mauna is in thoughtful hands who are guiding what is an evolving plan and program.

Given this, I am compelled to say that there is no possible way for the original HB2024, or hastily revised HB2024 SD1 to responsibly address such wide-ranging issues and priorities. I do want to add one comment re: Issues and Concerns Beyond the Scope of the CMP: I am convinced many in our community are not aware of the comprehensive nature of this management plan and the people, strategies and technologies employed today to protect the mauna. Further, the angst of many toward astronomy is in my opinion, misplaced; that the heart of the issue involves legitimate grievances related to the lack of hope and opportunity that too many in our Hawaiian community feel. We as a state - our elected leaders and the rest of us - must seriously address the critical issues that our Hawaiian community contends with - ranging from housing to education to healthcare, and more, and unless or until we begin to make progress

in these areas, astronomy will be viewed as an undesirable activity on the mauna, no matter how well it is being managed.

Thank you for the opportunity to review and comment. I also thank the many community volunteers involved in helping shape and guide management decisions and operations. Patti Cook - Waimea, Island of Hawai'i

Submittal Number: 18 Date Submitted: 3/31/2022 Name: Sara Saastamoinen Organization:

City, State, Zip:

Topic(s) Selected:

Ch. 1-Introduction: X
Ch. 2-Completed Management Actions: X
Ch. 3-Cultural Landscape: X
Ch. 4-Natural Resource:
Ch. 5-Education and Outreach:
Ch. 6-Astronomical Resources:
Ch. 7-Activities and Uses:
Ch. 8-Permitting and Enforcement:
Ch. 9-Infrastructure and Maintenance:
Ch. 10-Construction Guidelines:
Ch. 11-Site Recycling Decommissioning:
Ch. 12-Considering Future Land Use:
Ch. 13-Operations and Implementation:
Ch. 14-Monitoring, Evaluation, and Updates:

Appendix A:

Comment: My name is Sara Maaria Saastamoinen, and I am a graduate student at the University of Hawai'i at Mānoa (UHM). I provided written and oral testimony during the January 2022 meeting of the Board of Regents in opposition of the draft Master Plan. I reiterate today that I echo KAHEA's comments that UH must honor traditional kānāwai by prohibiting any further construction, including the Thirty-Meter Telescope, on Mauna Kea. I am disillusioned about the ability of the University to "steward" Mauna Kea as UH has not heeded the Native Hawaiian community members' calls to mālama 'Āina for decades. With this document, the UH does not articulate a compelling argument that it is prepared to do so in the future, and so, it should not be entrusted with this responsibility.

9 INPUT RECEIVED VIA U.S. MAIL

Submissions were received from the following and are reproduced below:

- State of Hawai'i, Department of Accounting & General Services
- County of Hawai'i Police Department
- National Science Foundation
- Sierra Club, Hawai'i Island Group
- State of Hawai'i, Department of Land and Natural Resources Land Division

Maunakea CMP 2022 Supplement

DAVID Y. IGE GOVERNOR

66

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CURT T. OTAGURO COMPTROLLER

AUDREY HIDANO DEPUTY COMPTROLLER

(P)22.032

STATE OF HAWAII DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES P.O. BOX 119, HONOLULU, HAWAII 96810-0119

MAR - 8 2022

University of Hawaii Government Relations Office Administrative Services Building 1, Room 101 2442 Campus Road Honolulu, Hawaii 96822

Dear Sir or Madam:

Subject: Comprehensive Management Plan 2022 Supplement: Management Action Updates Lands Managed by University of Hawaii on Maunakea

Thank you for the opportunity to comment on the subject project. We have no comments to offer at this time as the proposed project does not impact any of the Department of Accounting and General Services' projects or existing facilities.

If you have any questions, your staff may call Ms. Gayle Takasaki of the Planning Branch at 586-0584.

Sincerely,

CARISTINE L. KINHAKA Public Works Administrator

GT:mo c: HDO Volume 2

Mitchell D. Roth Mayor



Volume 2

Paul K. Ferreira Police Chief

Kenneth Bugado Jr. Deputy Police Chief

County of Hawai'i

 POLICE
 DEPARTMENT

 349 Kapi`olani Street
 Hilo, Hawai`i 96720-3998

 (808) 935-3311
 Fax (808) 961-2389

March 21, 2022

Mr. Gregory Chun, Ph.D. Executive Director UH Hilo Center for Maunakea Stewardship University of Hawaii, Government Relations Office, Administrative Services Building 1, Room 101 2442 Campus Road Honolulu, Hawaii 96822

Dear Mr. Chun:

Thank you for allowing us to review and provide comments on the public draft of the Comprehensive Management Plan 2022 Supplement: Management Action Updates.

Your collaborative effort in seeking community input, to include consideration on public safety, is much appreciated. Upon review of the posted document, our staff does not anticipate any significant impact to traffic and/or public safety concerns at this time.

Should you have any questions, please contact Captain Regino Saludares of our Administrative Services Division at (808) 961-2265 or Regino.Saludares@hawaiicounty.gov.

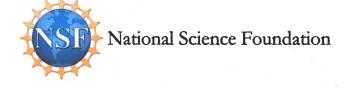
Sincerely,

PAUL K. FERREIRA POLICE CHIEF

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March 31, 2022

National Science Foundation Comments to the University of Hawai'i at Hilo on the Draft Comprehensive Management Plan 2022 Supplement: Management Action Updates

The National Science Foundation (NSF) appreciates the opportunity to provide written comments to the University of Hawai'i at Hilo (UH Hilo) on the draft Comprehensive Management Plan 2022 Supplement: Management Action Updates (CMP Supplement) for the lands managed by UH on Maunakea. As the owner of two major astronomical facilities on Maunakea - Gemini North Observatory and the Maunakea Very Long Baseline Array (VLBA) antenna - both of which are operated on our behalf by non-profit science management organizations and are the subject of subleases with the University of Hawai'i (UH), NSF has a strong interest in the effective management of the Science Reserve on the Maunakea summit. The draft CMP Supplement is a lengthy document that has consequences to the astronomy community; NSF, however, only learned of the release of the draft CMP Supplement and accompanying public comment period on March 14, 2022, which did not leave sufficient time for NSF to prepare detailed comments by the March 31, 2022 deadline. Therefore, NSF provides the following general comments for consideration:

- NSF supports the inclusion of the Native Hawaiian community in the management of Maunakea. While the draft CMP Supplement mentions UH's plans to involve the Native Hawaiian community in future activities, the document does not specify what that involvement entails. Moreover, the document does not include a discussion identifying the positive and/or negative impacts of UH Hilo's management of Maunakea on the Native Hawaiian community or how those impacts will be addressed. NSF further notes that UH Hilo has not yet completed its cultural assessment related to its Master Lease application. Therefore, NSF believes that the content of the CMP Supplement would benefit from awaiting the results of the cultural assessment and then including a clear and meaningful discussion in the CMP Supplement that identifies the positive and/or negative impacts of UH Hilo's proposed management of Maunakea to the Native Hawaiian community and how UH Hilo's management of Maunakea will meet the needs and interests of the Native Hawaiian community.
- 2. The draft CMP Supplement and Master Plan were issued prior to the preparation of both a Draft Environmental Impact Statement and a Final Environmental Impact Statement that evaluates the environmental and cultural resource impacts anticipated from implementation of these management documents. Without completing the environmental impact statement process, NSF is unable to evaluate or determine whether UH Hilo's proposed management scheme is appropriate from an environmental and cultural resource impact perspective.
- 3. NSF notes that there does not seem to be a specific reference in the draft CMP Supplement to the 10-15% observing time that observatories on Maunakea provide to UH as a condition of their subleases. This observing time translates to millions of dollars in direct benefits to UH,

2415 Eisenhower Avenue | Alexandria, VA 22314

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and this contribution should be acknowledged, discussed, and evaluated to determine whether it should be redirected (in part or in whole) to provide a more equitable distribution of the benefits to the community, especially to Native Hawaiians. If appropriate, the share of observing time should be renegotiated.

- 4. NSF strongly opposes any reference to the decommissioning of the VLBA antenna on Maunakea in the draft CMP Supplement (see, e.g., page 88). NSF was not consulted prior to this decision being made. On numerous occasions, NSF has communicated to UH, both formally and informally, its position that the VLBA antenna on Maunakea should not be decommissioned because it is a valuable astronomy asset for the nation, and, by virtue of its use in maintaining the International Celestial Reference Frame and measuring daily Earth Orientation Parameters, it plays a vital role in maintaining the integrity of Global Navigation Satellite Systems, including the Global Positioning System. Additionally, this VLBA station, which is located below the summit of Maunakea, is afforded special regulatory protections for portions of the radio spectrum at its present location (i.e., footnotes 113, 131, 161 of the United States Table of Frequency Allocations; 47 C.F.R. § 2.106). Moreover, contrary to what is asserted on page 88 of the draft CMP Supplement, neither NSF nor its operator of the VLBA (the National Radio Astronomy Observatory) has been formally notified by UH that the sublease for the VLBA antenna will not be renewed after the current sublease expires. (Noteworthy, formal notice to the operator of the VLBA would not constitute formal notice to NSF as the owner of the facility.) NSF requests that the CMP Supplement reflect that renewal of the sublease of the VLBA antenna be considered alongside other astronomical facilities.
- 5. The specific process and criteria for determining which facilities must be decommissioned is not described in the draft CMP Supplement. NSF continues to maintain that any decommissioning plans should be determined through a documented, open, and transparent process, including consideration of input from both the science and local communities. NSF also notes that the Master Lessee should be cognizant of potential conflicts of interest it may have when making determinations about which facilities to decommission.

Thank you, again, for the opportunity to provide comments on the draft CMP Supplement. We look forward to seeing how NSF's comments are incorporated into the final CMP Supplement. We also would like to reiterate and reinforce the importance of listening to all voices regarding the future of Maunakea. If further clarity on our comments is needed, please feel free to reach out to David Boboltz, Ph.D. at dboboltz@nsf.gov.

Sincerely,

Jinnea M. Avallone

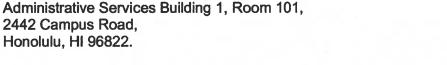
Linnea Avallone, Ph.D. Chief Officer for Research Facilities Office of the Director

Sean G. Jon-

Sean L. Jones, Ph.D. Assistant Director Mathematical & Physical Sciences

March 31,2022

TO:



FROM: Hawai'i Island Group, Sierra Club P.O. Box 1137 Hilo, HI 96720 Hawaiiislandsierraclub@gmail.com

University of Hawai'i, Government Relations Office,

Thank you for the opportunity to comment on the proposed supplement to the 2009 Comprehensive Management Plan.

Notes on the CMP supplement: Page 1-2

Over the life of the UH's tenancy on Maunakea the specific area that falls within UH Maunakea Lands, and thus the UH Management Areas, may change. This CMP is only binding on the UH Maunakea Lands.³ If UH Maunakea Lands are modified as the extent of land that UH has control or jurisdiction changes, this CMP will govern only those lands still authorized for use by UH, without the need to amend the CMP.

SIERRA CLUB

HAWAI'I ISLAND GROUP

Comment: The use of the description "UH Maunakea lands" does not make clear that the lands are kingdom and government lands held in trust for the Native Hawaiian beneficiaries, and the lands are currently being leased by UH for a Mauna Kea Science Reserve, until the lease expires in 2033.

Page 1-8

Environmental Committee (EC) advises MKMB, CMS, and the UH Hilo Chancellor on environmental issues, protection and enhancement of the natural environment, and resource management practices to advance the stewardship of Maunakea's natural resources. The EC members serve as subject matter experts on environmental matters to support evidence- based, holistically evaluated planning, project management, and policy development by UH.

Comment: The Environment Committee does not currently have a member from the scientific community that reports to the MKMB, CMS, or UH Chancellor. At one time there was a specific member from the EC on the MKMB, but that practice seems to have been abandoned. A specific representative from DLNR was also a member of the MKMB at one time. Designation of these members to the MKMB could improve communication.

Page 2-1

OI-1 Maintain OMKM, MKMB, and KKM in current roles, with OMKM providing local management of

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the UH Management Areas, and MKSS providing operational and maintenance services. Since these 14 management actions (Table 2.1) are completed, they are not discussed further in this document and will not be discussed in future annual reports or future updates.

Comment: Since OMKM no longer provides local management, and it has been merged with CMS, this management action should be clarified and reworded.

Page 3-2

Footnote: ... access for families to gather water from Lake Waiau for religious and spiritual purposes.

Comment: As affirmed in the TMT contested case hearings, testimony given by cultural practitioners described the collection of water from snow from areas in the summit region for healing and spiritual practices. Gathering of water is not confined to Lake Waiau.

Testimony regarding cultural practices could be appended or referenced at the end of this document.

Page 3-2

Environment Committee (EC). The EC was one of several special advisory committees created by the MKMB at its meeting on October 10, 2000. The MKMB appoints volunteers to the EC. Members have included persons with environmental expertise from state and federal agencies, staff and faculty within UH, past and current MKMB and Kahu Kū Mauna Council members, and other persons from the community with subject area expertise. The EC provides its recommendations to the MKMB regarding environmental impacts of proposed uses on UH Management Areas and has taken the lead on issues related to environmental issues as assigned by MKMB. The EC meets as needed.

Comment: see comments provided for page 1-8 regarding representation of EC on the MKMB. A member of the EC notes that assignments of tasks by MKMB is rare to non-existent.

Page 4-9

Make the full implementation of mitigation plans the responsibility of the proposal proponent.

For example, if an unplanned disturbance occurs during a permitted construction project, that project, not UH, will be responsible for rectifying the unplanned disturbance, under UH's supervision.

Comment: IF UHH is the applicant (CDUA) for a proposed use is UHH the responsible party for the mitigation in the proposal? Is the taxpayer the ultimate party fiscally responsible?

Page 4-13

UH will continue to conduct regular long-term monitoring within the UH Management Areas. The authors of the 2009 CMP anticipated that the long-term monitoring would be conducted in accordance with an "inventory, monitoring, and research plan." For a variety of reasons, CMS has concluded that a single formal inventory, monitoring, and research plan would not be useful as there are multiple, coordinated programs that are already in place which serve this purpose. Comment: problems with data collection, data management and long term record storage have been discussed on numerous occasions in the Environment Committee (EC). Use of standardized metrics, detailed collection techniques and notes, standardization of reporting and more have been discussed.

In section 2-41, there is reference to standardization of data collection:

CMS is using the experience gained to begin to develop additional guidance that will lead to greater standardization of observations and reporting in the future.

Where else in this document has this issue been addressed?

The OAR refers to data collection and storage without sufficient detail. Additionally, while the OAR details the library it has established, it does not provide a way for members of the MKMB/ EC to access the materials in the library. Public resources have been expended to create the library, and there should be a mechanism for accessing the files therein.

Page 7-1

The Revised Management Plan for the UH Management Areas on Mauna Kea (University of Hawaii, March 1995), which the CMP refers to as the 1995 Management Plan, is no longer referenced because it has been replaced by the Maunakea Administrative Rules, elements of this document (e.g., Section 7.4.2), and elements of the 2022 Master Plan.

Comment: The 1995 Revised Management Plan for the UH Management Areas on Mauna Kea related to the public and commercial use of the Mauna. Elements of earlier DLNR approved plans were not incorporated into the newer plans referenced here and remain in force.

Page 7-3

Under the Maunakea Administrative Rules (HAR § 20-26-38), UH is authorized to implement the following specific access management measures, among others as reasonable:

Install a gate or other control structure (with the approval of BLNR) to manage vehicular access to the UH Management Areas.

Comment: The Mauna Kea access road is a state road and UH has a non-exclusive easement to utilize it. The public may be informed of road conditions and safety concerns, however the use of the road to access the NAR, Lake Waiau and the summit by native Hawaiian cultural practitioners should not be impeded, and public access should be accommodated.

Page 7-7

UH has posted signs discouraging use of the track from Astronomy Site 12 (SMA) to the summit of Pu'upoli'ahu, as this is not a designated footpath.

Comment: There are very few places in the summit region that one can experience the vast wilderness beauty of the view plane without the visual and sonic disturbance of enormous telescope facilities. Pu'u Wekiu and Pu'u Poliahu are two of those places where one can turn away from the industrial landscape to enjoy the unimpeded view. Closing the footpath (once an astronomy roadway) frequently used by recreational users makes no sense.

Page 7-10

UH does not promote Maunakea as a tourist destination.

Comment: This statement, following the section on Commercial Tour management, belies the tourism promotion efforts made by the commercial <u>tour operations that UH does oversee and manage</u>. Regularly one can find ads on social media, print media, and airport flyers promoting the summit as a tourist destination. Governor Ige called upon UH to reduce the number of commercial tours and visitors to the summit region. This plan does not describe a specific intent to curtail the commercial activities.

Thank you for the opportunity to comment.





SUZANNE D. CASE CHAIRPERSON BOARD OF LAND AND NATURAL RESOURCES COMMISSION ON WATER RESOURCE MANAGEMENT

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Volume 2

1.

STATE OF HAWAII DEPARTMENT OF LAND AND NATURAL RESOURCES LAND DIVISION

POST OFFICE BOX 621 HONOLULU, HAWAII 96809

March 30, 2022

University of Hawaii Government Relations Office Administrative Services Building 1, Room 101 2442 Campus Road Honolulu, HI 96822

Gentlemen:

SUBJECT: Draft Comprehensive Management Plan – 2022 Supplement: Management Action Updates located on the Island of Hawaii; TMK: (3) 4-4-015:009 via General Lease No. S-4191, TMK: (3) 4-4-015:012 via General Lease No. S-5529 including a non-exclusive roadway easement on behalf of UH Hilo Center for Maunakea Stewardship

Thank you for the opportunity to review and comment on the subject matter. The Land Division of the Department of Land and Natural Resources (DLNR) distributed or made available a copy of your request pertaining to the subject matter to DLNR's Divisions for their review and comments.

At this time, enclosed are comments from the (a) Engineering Division and (b) Land Division-Hawaii District on the subject matter. Should you have any questions, please feel free to contact Darlene Nakamura at (808) 587-0417 or email: <u>darlene.k.nakamura@hawaii.gov</u>. Thank you.

Sincerely,

Russell Tsuji

Russell Y. Tsuji Land Administrator

Enclosures cc: Central Files DAVID Y. IGE GOVERNOR OF HAWAII





SUZANNE D. CASE CHAIRPERSON BOARD OF LAND AND NATURAL RESOURCES COMMISSION ON WATER RESOURCE MANAGEMENT

Volume 2

STATE OF HAWAII DEPARTMENT OF LAND AND NATURAL RESOURCES LAND DIVISION

> POST OFFICE BOX 621 HONOLULU, HAWAII 96809

> > Mar 2, 2022

MEMORANDUM

DLNR Agencies: FROM: TO: Div. of Aquatic Resources Div. of Boating & Ocean Recreation X Engineering Division (DLNR.ENGR@hawaii.gov) X Div. of Forestry & Wildlife (rubyrosa.t.terrago@hawaii.gov) **Div. of State Parks** X Commission on Water Resource Management (DLNR.CWRM@hawaii.gov) Office of Conservation & Coastal Lands X Land Division – Hawaii District (gordon.c.heit@hawaii.gov) Russell Y. Tsuji, Land Administrator Russell Tsuji TO: FROM: SUBJECT: Draft Comprehensive Management Plan - 2022 Supplement: Management Action Updates LOCATION: Island of Hawaii; TMK: (3) 4-4-015:009 via General Lease No. S-4191 TMK: (3) 4-4-015:012 via General Lease No. S-5529 including a nonexclusive roadway easement

APPLICANT: UH Hilo Center for Maunakea Stewardship

Transmitted for your review and comment is information on the above-referenced subject matter. Please submit comments by **March 29, 2022**.

If no response is received by the above date, we will assume your agency has no comments. Should you have any questions about this request, please contact Darlene Nakamura at <u>darlene.k.nakamura@hawaii.gov</u>. Thank you.

(

BRIEF COMMENTS:

) We have no objections.

 (\checkmark) We have no comments.

) We have no additional comments.

() Comments are included/attached.

Signed:

Mar 29, 2022

Carty S. Chang, Chief Engineer

Engineering Division

Print Name:

Division:

Date:

Attachments cc: Central Files

DAVID Y. IGE GOVERNOR OF HAWAII





SUZANNE D. CASE CHAIRPERSON BOARD OF LAND AND NATURAL RESOURCES COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII DEPARTMENT OF LAND AND NATURAL RESOURCES LAND DIVISION

> POST OFFICE BOX 621 HONOLULU, HAWAII 96809

Mar 2, 2022

MEMORANDUM

TO:

FROM:

DLNR Agencies:

Div. of Aquatic Resources Div. of Boating & Ocean Recreation X Engineering Division (DLNR.ENGR@hawaii.gov) X Div. of Forestry & Wildlife (rubyrosa.t.terrago@hawaii.gov) Div. of State Parks X Commission on Water Resource Management (DLNR.CWRM@hawaii.gov) Office of Conservation & Coastal Lands X Land Division – Hawaii District (gordon.c.heit@hawaii.gov) Russell Y. Tsuji, Land Administrator Russell Tsuji SUBJECT: Draft Comprehensive Management Plan - 2022 Supplement: Management Action Updates

LOCATION: Island of Hawaii; TMK: (3) 4-4-015:009 via General Lease No. S-4191 TMK: (3) 4-4-015:012 via General Lease No. S-5529 including a nonexclusive roadway easement

APPLICANT: UH Hilo Center for Maunakea Stewardship

Transmitted for your review and comment is information on the above-referenced subject matter. Please submit comments by March 29, 2022.

If no response is received by the above date, we will assume your agency has no comments. Should you have any questions about this request, please contact Darlene Nakamura at darlene.k.nakamura@hawaii.gov. Thank you.

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BRIEF COMMENTS:

- We have no objections.)
- We have no comments.

We have no additional comments.

Comments are included/attached.

Signed: Print Name: Division: Date:

ON C.

Attachments **Central Files** CC:

DAVID Y. IGE GOVERNOR OF HAWAII





SUZANNE D. CASE CHAIRPERSON BOARD OF LAND AND NATURAL RESOURCES COMMISSION ON WATER RESOURCE MANAGEMENT

Volume 2

STATE OF HAWAII DEPARTMENT OF LAND AND NATURAL RESOURCES LAND DIVISION

75 Aupuni Street, Room 204 Hilo, Hawaii 96720 PHONE: (808) 961-9590 FAX: (808) 961-9599

March 21, 2022

MEMORANDUM

TO: Russell Y. Tsuji, Land Division Administrator

FROM: Gordon C. Heit, Hawaii District Land Agent-

- SUBJECT: Request for Comments, Draft Comprehensive Management Plan 2022 Supplement: Management Action Updates - University of Hawaii , Lessee
- LOCATION: General Lease No. S-4191, TMK (3) 4-4-015:009 and General Lease No. S-5529, TMK (3) 4-4-015:012 Ka'ohe, Hamakua, Island of Hawaii,

APPLICANT: University of Hawaii at Hilo Center for Mauna Kea Management

Pursuant to your request for comments on the above matter, we offer the following:

The above-described properties are under the management of the Department of Land and Natural Resources, Land Division and are leased to the University of Hawaii at Hilo under General Lease Nos. S-4191 for scientific reserve and observatory purposes, and S-5529 for permanent mid-level facilities, and information station purposes. The description of the actions proposed in the Draft Comprehensive Management Plan – 2022 Supplement: Management Action Updates are consistent with the lease terms and conditions of both leases. The Hawaii District Land Office has no objections to the project.

Please contact me should you have any questions. Thank you.

10 INPUT RECEIVED VIA EMAIL

Submissions were received from the following and are reproduced below:

- National Science Foundation
- E. Kalani Flores representing the Flores-Case 'Ohana



March 31, 2022

National Science Foundation Comments to the University of Hawai'i at Hilo on the Draft Comprehensive Management Plan 2022 Supplement: Management Action Updates

The National Science Foundation (NSF) appreciates the opportunity to provide written comments to the University of Hawai'i at Hilo (UH Hilo) on the draft Comprehensive Management Plan 2022 Supplement: Management Action Updates (CMP Supplement) for the lands managed by UH on Maunakea. As the owner of two major astronomical facilities on Maunakea - Gemini North Observatory and the Maunakea Very Long Baseline Array (VLBA) antenna - both of which are operated on our behalf by non-profit science management organizations and are the subject of subleases with the University of Hawai'i (UH), NSF has a strong interest in the effective management of the Science Reserve on the Maunakea summit. The draft CMP Supplement is a lengthy document that has consequences to the astronomy community; NSF, however, only learned of the release of the draft CMP Supplement and accompanying public comment period on March 14, 2022, which did not leave sufficient time for NSF to prepare detailed comments by the March 31, 2022 deadline. Therefore, NSF provides the following general comments for consideration:

- NSF supports the inclusion of the Native Hawaiian community in the management of Maunakea. While the draft CMP Supplement mentions UH's plans to involve the Native Hawaiian community in future activities, the document does not specify what that involvement entails. Moreover, the document does not include a discussion identifying the positive and/or negative impacts of UH Hilo's management of Maunakea on the Native Hawaiian community or how those impacts will be addressed. NSF further notes that UH Hilo has not yet completed its cultural assessment related to its Master Lease application. Therefore, NSF believes that the content of the CMP Supplement would benefit from awaiting the results of the cultural assessment and then including a clear and meaningful discussion in the CMP Supplement that identifies the positive and/or negative impacts of UH Hilo's proposed management of Maunakea to the Native Hawaiian community and how UH Hilo's management of Maunakea will meet the needs and interests of the Native Hawaiian community.
- 2. The draft CMP Supplement and Master Plan were issued prior to the preparation of both a Draft Environmental Impact Statement and a Final Environmental Impact Statement that evaluates the environmental and cultural resource impacts anticipated from implementation of these management documents. Without completing the environmental impact statement process, NSF is unable to evaluate or determine whether UH Hilo's proposed management scheme is appropriate from an environmental and cultural resource impact perspective.
- 3. NSF notes that there does not seem to be a specific reference in the draft CMP Supplement to the 10-15% observing time that observatories on Maunakea provide to UH as a condition of their subleases. This observing time translates to millions of dollars in direct benefits to UH,

and this contribution should be acknowledged, discussed, and evaluated to determine whether it should be redirected (in part or in whole) to provide a more equitable distribution of the benefits to the community, especially to Native Hawaiians. If appropriate, the share of observing time should be renegotiated.

- 4. NSF strongly opposes any reference to the decommissioning of the VLBA antenna on Maunakea in the draft CMP Supplement (see, e.g., page 88). NSF was not consulted prior to this decision being made. On numerous occasions, NSF has communicated to UH, both formally and informally, its position that the VLBA antenna on Maunakea should not be decommissioned because it is a valuable astronomy asset for the nation, and, by virtue of its use in maintaining the International Celestial Reference Frame and measuring daily Earth Orientation Parameters, it plays a vital role in maintaining the integrity of Global Navigation Satellite Systems, including the Global Positioning System. Additionally, this VLBA station, which is located below the summit of Maunakea, is afforded special regulatory protections for portions of the radio spectrum at its present location (i.e., footnotes 113, 131, 161 of the United States Table of Frequency Allocations; 47 C.F.R. § 2.106). Moreover, contrary to what is asserted on page 88 of the draft CMP Supplement, neither NSF nor its operator of the VLBA (the National Radio Astronomy Observatory) has been formally notified by UH that the sublease for the VLBA antenna will not be renewed after the current sublease expires. (Noteworthy, formal notice to the operator of the VLBA would not constitute formal notice to NSF as the owner of the facility.) NSF requests that the CMP Supplement reflect that renewal of the sublease of the VLBA antenna be considered alongside other astronomical facilities.
- 5. The specific process and criteria for determining which facilities must be decommissioned is not described in the draft CMP Supplement. NSF continues to maintain that any decommissioning plans should be determined through a documented, open, and transparent process, including consideration of input from both the science and local communities. NSF also notes that the Master Lessee should be cognizant of potential conflicts of interest it may have when making determinations about which facilities to decommission.

Thank you, again, for the opportunity to provide comments on the draft CMP Supplement. We look forward to seeing how NSF's comments are incorporated into the final CMP Supplement. We also would like to reiterate and reinforce the importance of listening to all voices regarding the future of Maunakea. If further clarity on our comments is needed, please feel free to reach out to David Boboltz, Ph.D. at dboboltz@nsf.gov.

Sincerely,

Tinnea M. Avallone

Linnea Avallone, Ph.D. Chief Officer for Research Facilities Office of the Director

Sean G. Jon-

Sean L. Jones, Ph.D. Assistant Director Mathematical & Physical Sciences



E ala ē me ke aloha a me ka 'oia'i'o. Awaken with *aloha* and truth.

March 31, 2022

FR: E. Kalani Flores, representing the Flores-Case 'Ohana

RE: Written Comments for Comprehensive Management Plan 2022 Supplement: Management Action Updates

NOTICE

Due to insufficient time to respond with comments to both the *Cultural Impact Assessment* for an Environmental Impact Statement (EIS) and the *Comprehensive Management Plan 2022 Supplement: Management Action Updates* with public reviews that were scheduled at the same time, the Flores-Case 'Ohana reserves the right to submit comments pertaining to this plan in the future.

Note: The Flores-Case 'Ohana has previously submitted comments to the University of Hawai'i (UH) Board of Regents (BOR), Maunakea Management Board (MKMB), Office of Mauna Kea Management (OMKM), and Center for Maunakea Stewardship (CMS) on several occasions pertaining to Mauna a Wākea as well being a petitioner in two contested case hearings pertaining to the Thirty Meter Telescope (TMT).

Based upon our experiences in engaging in these review processes, UH systematically ignores community and Native Hawaiian concerns and comments regarding the issues surrounding the mismanagement of Mauna a Wākea. So why does the UH ask the public for input and comments/feedback, but is not going to apply any constructive critique and relevant suggestions to draft plans as such?

11 SUMMARY OF INPUT RECEIVED VIA TOLL-FREE HOTLINE

The following are not transcripts of the messages recorded on the toll-free hotline voicemail. They are summaries of the messages left and may not capture word-for-word what the commentor spoke due to recording quality, background noise, and other factors.

Submittal Number: 1

Date submitted: 3/30/2022

Comment: Alice J. Rogers. I appreciate the University of Hawaii and their use of Maunakea and I believe it has been successful. I believe that it has been important. I believe that they have done a good job. I also do not believe that the University of Hawaii should be involved with the Hawaiian OHA or DHL or any of those they have fouled up everything that the that the Hawaiian agencies were supposed to do. They have fouled everything up. They are on able to do anything positive. So frankly I don't want any of them on the University of Hawaii thing. I think University of Hawaii has done a good job and of course everything can always be improved. But continue doing what you are doing. It is successful. I fully believe in what you are doing up there and also one comment I have tried and tried and tried to online comment and it is impossible to do. I mean perhaps maybe a genius can figure it out but I certainly can't. Anyway keep up the good work. Thank you. Alice Rogers.

Submittal Number: 2

Date submitted: 3/30/2022

Comment: Hey this is Phil. I just support the University of Hawaii management of the mountain and I don't believe there's been a Hawaiian thats actually walked up there since that mountain has been there. I would like to know how many Hawaiians actually walk up there without the road. So why would they have anything to do with it. Just my opinion. Aloha.

Submittal Number: 3

Date submitted: 3/31/2022

Comment: Hello. No one is going to go back to how they lived 100 years ago. However the old ways must be respected and there must be also room for new advancements. So the approach to Maunakea by the University needs to be one of balance. You must take into account the concerns and feelings of the Native Hawaiians and you must also take into account the feelings of many local Hawaiian that want to see some progress in terms of opportunities that are created by proper

12 WRITTEN TESTIMONY RECEIVED FOR MAY 19, 2022, BOARD OF REGENTS MEETING

13 WRITTEN TESTIMONY RECEIVED FOR JUNE NN, 2022, BOARD OF REGENTS MEETING

14 WRITTEN TESTIMONY RECEIVED FOR <mark>JULY NN</mark>, 2022, BOARD OF LAND AND NATURAL RESOURCES MEETING

University of Hawai'i at Hilo Administration Office of the Chancellor

UNIVERSITY OF HAWAH BOARD OF REGENTS DTS 22472

22 MAY 12 P3:41

May 19, 2022

MEMORANDUM

UNIVERSITY

of HAWALL

TO: Randolph G. Moore Chairperson, Board of Regents

VIA:	David Lassner, Ph.D.	David Kase
	President, University of Hawai'i	

- FROM: Bonnie D. Irwin, Ph.D. Chancellor, University of Hawai'i at Hilo
- SUBJECT: APPROVAL OF THE 2022 COMPREHENSIVE MANAGEMENT PLAN SUPPLEMENT AMENDING THE 2009 COMPREHENSIVE MANAGEMENT PLAN, FOR SUBMISSION TO THE BOARD OF LAND AND NATURAL RESOURCES FOR APPROVAL

A. SPECIFIC ACTION REQUESTED

On behalf of the Center for Maunakea Stewardship ("CMS"), we request that the Board of Regents ("Board") consider and approve the *Comprehensive Management Plan 2022* Supplement ("2022 CMP Supplement"), which amends and updates the *Mauna Kea* Comprehensive Management Plan, April 2009 ("2009 CMP"), for submission to the Board of Land and Natural Resources ("BLNR") for approval.

Our request is consistent with the *Final Report of the Maunakea Plan Review Permitted Interaction Group* submitted to the Board for its meeting on April 21, 2022. Since the submission of the *Final Report* to the Board on April 21, 2022, CMS has received additional input from the State Historic Preservation Division ("SHPD") of the Department of Land and Natural Resources ("DLNR"). Accordingly, CMS recommends the Board approve the 2022 CMP Supplement with the changes attached to this Memorandum as **Exhibit A**.

B. RECOMMENDED EFFECTIVE DATE

The 2022 CMP Supplement will be effective upon BLNR approval.

C. PURPOSE

In accordance with best management practices, the University has engaged in extensive outreach and analysis, at significant expense, to review and update the 2009 CMP. In

consultation with DLNR, this work is part of a larger planning effort that includes updating the University's master plan, and preparing an environmental impact statement ("EIS") before requesting a new general lease for astronomy facilities on Maunakea.¹ The master plan update was completed when the Board adopted the *Master Plan for the University of Hawai'i Maunakea* Lands: $E \ O I \ Na \ Leo$ (Listen to the Voices) on January 20, 2022. The EIS process included the preparation and posting of an EIS preparation notice, and the preparation of a cultural impact assessment is undergoing outreach and interviews.² The CMP update is the matter currently before the Board.

We recognize that if House Bill 2024 Conference Draft 1 ("**HB 2024**") becomes law, the existing conservation district use permits ("**CDUP**") held by the University for astronomy facilities on Maunakea must be canceled or transferred to another entity; accordingly, the University will not be tasked with implementing a comprehensive management plan ("**CMP**") as required by BLNR's conservation district rules.³ However, until those CDUPs are canceled or transferred, the University is required to update its CMP and present it to BLNR for approval as part of the University's CDUP obligations imposed by BLNR. BLNR may or may not approve the 2022 CMP Supplement, and the new authority created under HB 2024 may or may not choose to adopt the 2022 CMP Supplement as its own (in consultation with BLNR). The University will continue to honor its responsibilities and pursue best management practices while the University is managing Maunakea.

D. AUTHORIZATION

The University was first required to prepare a CMP in 2007, in accordance with the Third Circuit Court's Decision and Order (Civ. No 04-1-397) in the Keck Outrigger Telescopes Appeal. Subsequently, the University prepared the *Mauna Kea Comprehensive Management Plan, UH Management Areas*, which BLNR approved on April 9, 2009 ("**2009 CMP**"). The 2009 CMP, requires the University to periodically review and update the CMP.

¹ See Hawai'i Administrative Rules ("HAR") § 13-5-24 (requires a CDUP issued by BLNR for "astronomy facilities" located within the conservation district; all lands on Maunakea leased to the University are within the conservation district).

² In light of HB 2024, the University has ceased negotiations of observatory subleases and further preparation of the EIS for a new general lease. However, the University intends to complete its cultural impact assessment, which will inform future permits and leases for University owned astronomy facilities from the new authority.

³ See HAR §§ 13-5-30 and 13-5-39.

E. BACKGROUND INFORMATION

1. <u>CMP Update Process and Procedure</u>

The update process and procedure is prescribed by the 2009 CMP, which has 103 management actions that the University is responsible for implementing. These management actions include three management acts related to CMP monitoring, evaluation, and updates, as follows:

- MEU-1. Reporting system. CMS must produce an annual progress report ("Progress Report") describing in detail the management goals, objectives, and actions for the year and what progress was made towards meeting them. On June 30 of each year, CMS must submit to BLNR a written report detailing its activities generally, along with the Progress Report. In addition, CMS must prepare a Five-Year Outcome Analysis Report. In preparation for the CMP five-year revision (MEU-2), CMS must prepare a Five-Year Progress Report that describes the state of the resources, the status of the various management programs, progress towards meeting CMP goals, and other relevant information.
- MEU-2. Update and revision process. The CMP should be updated every five years, based on data collected during various program management activities (e.g., natural or cultural resources monitoring, research projects), analysis of program strengths and weaknesses, and relevant new laws, regulations, and policies that have come into effect since the last update.
- MEU-3. Revising and updating planning documents. University plans (e.g., 2000 Master Plan) and renegotiated leases or agreements should be consistent with and reference the CMP.

Regarding the update provisions of the 2009 CMP, BLNR provided the following insight in its Conclusion of Law No. 158 of the Decision and Order for the Thirty Meter Telescope CDUP issued to the University:

When the BLNR approved the CMP, it only required the University or its designee to submit and present annual reports on the status of the CMP management actions. The BLNR does not require the University to prepare a five-year update...but provides that [CMS] may do one. This language is permissive, not mandatory. ... [A] five-year review is not necessary because [CMS's] annual reports are cumulative and reflect everything that was done since the CMP was first implemented. [...]

(Citations omitted.)

The University completed the Maunakea Comprehensive Management Plan Outcome Analysis Report, dated August 2021 ("**OAR**"). CMS submitted the OAR to DLNR, which posted the

OAR on its website in November 2021. CMS subsequently presented the OAR to BLNR at its public meeting on January 14, 2022.⁴

2. <u>Methodology</u>

The 2022 CMP Supplement updates the 2009 CMP primarily by replacing Section 7, *Management Component Plans*. Section 7 describes the 103 management actions needed to address the various management needs identified during the process of developing this 2009 CMP. As discussed in the 2022 CMP Supplement, page v, the substantive approach to the update process was to focus on the 103 management actions.

The 2022 CMP Supplement was crafted based on the information collected in the OAR and applying the "adaptive management" approach, which is defined in the 2009 CMP as:

[A] systematic process for continually improving management policies and practices for resource protection by learning from the outcomes of past and current management activities. Adaptive management recognizes that there is a level of uncertainty about the "best" policy or practice for a particular management issue, and therefore requires that each management decision be revisited in the future to determine if it is providing the desired outcome.

BLNR's conservation district rules also guided changes. HAR § 13-5-2, defines a "comprehensive management plan" as a "plan to manage multiple uses and activities in order to protect and conserve natural and cultural resources." HAR § 13-5-39(b), provides that:

The department or board may require the preparation of a comprehensive management plan where it finds that further development may lead to significant natural, cultural, or ecological impacts within the conservation district. The geographic area, specific resources to be protected and conserved, and other content of a comprehensive management plan shall be determined by the department or board.

To satisfy the above requirements, the planning team often consulted with the BLNR chairperson, as DLNR head, and the Office of Office of Conservation and Coastal Lands, which oversees conservation district regulations and approvals for DLNR.

In addition to DLNR consultation, the 2022 CMP Supplement benefited from meaningful outreach to the public on resource management, which is summarized in Appendix B of the 2022 CMP Supplement, entitled *Summary of Draft CMP Supplement Outreach, Input, and Related Plan Revisions*. The University conducted outreach between March 1 and March 31, 2022, when the draft CMP supplement was available for public review and comment. Appendix B also summarizes responses to substantive comments and revisions.

⁴ See Table 1: Management plans and annual reports, at https://dlnr.hawaii.gov/occl/maunakeamanagement/.

Among other things, Appendix B of the 2022 CMP Supplement documents the University's outreach efforts, which included:

- Announcements sent via U.S. mail to 242 individuals, groups, and agencies. The mailing was timed so that the announcement reached recipients on or near March 1, 2022.
- Announcements sent via email to 1,357 individuals, groups, and agencies. The email was sent on March 1, 2022.
- Press releases on March 1, 2022, March 14, 2022, and March 30, 2022, resulted in information regarding the draft CMP supplement and how to comment on it appearing prominently in many publicly available radio spots, TV news stories, and website news stories. This information was also posted on University social media feeds and websites.
- Personalized individual emails were sent on March 1, 2022, to those understood to be leaders of the Hawai'i Island kia'i. There were 13 intended recipients.
- Information similar to the press releases was included in the CMS e-newsletter sent on March 1, 17, and 30, 2022.

The review of the 2022 CMP Supplement was on the agenda of the March 15, 2022, Maunakea Management Board. Kahu Ku Mauna and the Environment Committee also reviewed the document during the comment period. Recipients of the announcements included federal, state, and local agencies (e.g., Office of Hawaiian Affairs, DLNR, and Department of Hawaiian Home Lands), organizations, elected representatives, kia'i, and all of those who requested inclusion on the University's Maunakea mailing list during the preparation of the 2022 Master Plan and other efforts.

In addition, the OAR included outreach specifically related to OAR requirements, which is summarized on page viii of the OAR, attached to the 2022 CMP Supplement as Appendix X, as follows:

A draft of the OAR was circulated among stakeholders and agencies in order to: (i) inform them of the steps that UH has taken to date to implement the CMP's 103 management actions; (ii) solicit their opinions as to the success and value of those measures; and (iii) obtain their suggestions regarding any adjustments (i.e., revisions, deletions, or additions) to management actions they believe should be made moving forward. In general, UH attempted to consult with all the government agencies having direct responsibility for regulating uses on Maunakea and organizations that have operations within or immediately adjacent to UH's Maunakea lands.

3. <u>Next Steps</u>

If the Board adopts the 2022 CMP Supplement, the University will transmit the 2022 CMP Supplement to DLNR for BLNR's consideration and approval. As stated above, if HB 2024 becomes law, the University would no longer be able to implement a CMP once the existing astronomy facility CDUPs are canceled or transferred to another entity. At that point, the entity responsible for the stewardship of Maunakea would be subject to a CMP as required by BLNR. The new entity may adopt the 2022 CMP Supplement as its own, use parts of it in its own CMP, or reject it entirely.

If HB 2024 does not become law, the University would then be responsible for implementing the 2009 CMP as revised and updated by the 2022 CMP Supplement, assuming BLNR approval.

F. ACTION RECOMMENDED

Approval of the 2022 CMP Supplement amending the 2009 CMP, for submission to BLNR for approval.

G. ATTACHMENTS

Exhibit A. Additional Revisions based on SHPD Comments

c: Dr. Gregory Chun, Executive Director, Center for Maunakea Stewardship Kendra Oishi, Executive Administrator and Secretary of the Board, University of Hawai'i

EXHIBIT A

1.1 NEED

Given the significance of the cultural landscape as a whole, there is a need to continue the implementation of the CMP's management actions related to the cultural landscape to avoid and/or minimize disturbance and potential impacts to the cultural landscape. The CMP strategies reflect a series of general guidelines including:

- Acknowledging that Mauna Kea is a *wahi pana* (legendary, storied place) and is within the *wao akua* (the realm of the gods) and for some it is sacred. Recognizing that Maunakea is for some is a *wahi pana* (storied/legendary place) and for others is a *wao akua* (realm of the gods).
- Recognizing the need to continue and reinvigorate outreach to the Native Hawaiian community, including customary and traditional practitioners and families with lineal and historic connections to Maunakea, when formulating plans and guidelines.
- Recognizing that Native Hawaiian customary and traditional practices may evolve over time and that management needs may also change.
- Ensuring a balanced approach between Native Hawaiian customary and traditional practices related to the cultural landscape and the need to protect natural resources and historic properties.¹
- Disseminating culturally sensitive and appropriate educational information to visitors and others who are not familiar with this cultural landscape or who do not engage in customary and traditional Native Hawaiian practices to protect the cultural landscape effectively and efficiently.
- Complying with and enforcing applicable rules and regulations to protect the cultural landscape.
- Focusing efforts to address issues identified in the *Independent Evaluation of the Implementation of the Mauna Kea Comprehensive Management Plan* (Kuiwalu, December 2020), specifically (*i*) materials and training programs to increase understand of Native Hawaiian history and cultural practices related to Maunakea; and (*ii*) engagement with the Native Hawaiian community.

¹ The 2009 CMP did, and this document confirms, that pursuant to the legal requirements under the Hawai'i Supreme Court's ruling in *Ka Pa'akai*, access to UH Management Areas for Native Hawaiian traditional and customary practices will not be restricted. To the extent that public safety and resources are affected, activities may be allowed under the Maunakea Administrative Rules with reasonable restrictions to ensure public safety and resources protection. The 2009 CMP lists the following as examples of the access that it expects will continue: (*i*) access for traditional and customary practices, including the gathering of cultural resources; (*ii*) access for families to visit *na iwi kupuna* (the bones of their ancestors); (*iii*) access to scatter 'ohana ashes; (*iv*) access through the trails located within the UH Management Areas for subsistence gathering and hunting; (*v*) access for families to continue to bury their 'ohana piko; (*vi*) access for families to gather water from Lake Wai'au for religious and spiritual purposes. The CMP also outlines an approach to be used in the event of disputes or determination of appropriateness of traditional and customary practices, including cultural, historical, and natural resources.

• Embracing UH's commitment² to collaboratively build a global model of harmonious and inspirational stewardship that is befitting of Maunakea that is informed by and integrates indigenous and other management principles, including the kānāwai principles.

² UH Board of Regents Resolution "Affirming Commitment to the Collaborative Stewardship of Maunakea's Cultural, Natural, Educational and Scientific Resources" adopted August 24, 2017.



MAUNAKEA COMPREHENSIVE MANAGEMENT PLAN 2022 SUPPLEMENT

BOARD OF REGENTS MAY 19, 2022 Consistent with Hawai'i Administrative Rules (HAR) §13-5-2, the CMP is UH's "comprehensive plan to manage multiple uses and activities in order to protect and conserve natural and cultural resources."

- The CMP is a requirement of our Conservation District Use Permits (CDUPs) and is approved by the BLNR.
 - I8 CDUPs/280+ conditions
 - I03 CMP management actions

PURPOSE OF THE CMP

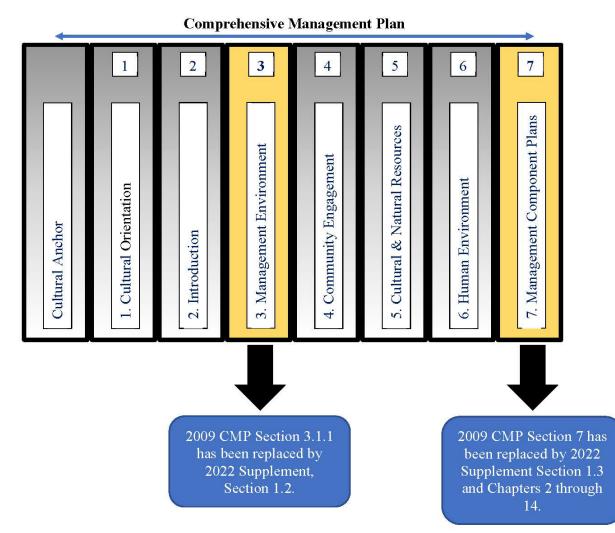
WHY APPROVING THE SUPPLEMENT IS IMPORTANT

- > Management is our responsibility until it isn't.
- > BLNR expects us to update the CMP.
- As specified in the 2009 CMP, status reports and periodic updates/supplements are to be conducted to ensure the management actions remain relevant and sufficient to achieve the desired outcomes based on experience, data, and learning (See Board Action Memo).
- The 2009 CMP was developed and based on the principle of adaptive management which means we are continuously improving what we are doing so the CMP should reflect that.
- **Because the mauna and the public deserve it.**

SUPPLEMENT SECTIONS

All other sections of the 2009 CMP remain intact

GRAPHICAL SUMMARY OF HOW THE 2009 CMP HAS BEEN SUPPLEMENTED BY THE 2022 SUPPLEMENT



VOL I APPENDIX B: SUMMARY OF OUTREACH

- Announcement sent via U.S. mail to 242 individuals, groups, and agencies.
- Announcement sent via email to 1,357 individuals, groups, and agencies.
- Press releases on March 1, 2022, March 14, 2022, and March 30, 2022, which resulted in information regarding the Draft CMP Supplement and how to comment on it appearing prominently in many publicly available radio spots, TV news stories, and website news stories. They were also posted on the UH social media feeds, and websites.
- Personalized individual emails were sent on March 1, 2022, to those UH understood to be leaders of the Hawai'i Island kia'i. There were 13 intended recipients.
- Information similar to the press releases was included in the CMS e-newsletter sent on March 1, 17, and 30, 2022.
- The review of the supplement was on the agenda of the March 15, 2022, MKMB public meeting.
- The supplement was also reviewed by KKM and EC during the comment period.

CMP 2022 Supplement Cultural Landscape

1.1 NEED

Given the significance of the cultural landscape as a whole, there is a need to continue the implementation of the CMP's management actions related to the cultural landscape to avoid and/or minimize disturbance and potential impacts to the cultural landscape. The CMP strategies reflect a series of general guidelines including:

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- Recognizing the need to continue and reinvigorate outreach to the Native Hawaiian community, including customary and traditional practitioners and families with lineal and historic connections to Maunakea, when formulating plans and guidelines.
- Recognizing that Native Hawaiian customary and traditional practices may evolve over time and that management needs may also change.
- Ensuring a balanced approach between Native Hawaiian customary and traditional practices related to the cultural landscape and the need to protect natural resources and historic properties.¹
- Disseminating culturally sensitive and appropriate educational information to visitors and others who are not familiar with this cultural landscape or who do not engage in customary and traditional Native Hawaiian practices to protect the cultural landscape effectively and efficiently.
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SHPD FEEDBACK SINCE APRIL 21, 2022

¹ The 2009 CMP did, and this document confirms, that pursuant to the legal requirements under the Hawai'i Supreme Court's ruling in Ka Pa'akai, access to UH Management Areas for Native Hawaiian traditional and customary practices will not be restricted. To the extent that public safety and resources are affected, activities may be allowed under the Maunakea Administrative Rules with reasonable restrictions to ensure public safety and resources protection. The 2009 CMP lists the following as examples of the access that it expects will continue: (*i*) access for traditional and customary practices, including the gathering of cultural resources; (*ii*) access for families to visit *na ivi kupuna* (the bones of their ancestors); (*iii*) access to scatter 'ohana ashes; (*iv*) access through the trails located within the UH Management Areas for subsistence gathering and hunting; (v) access for families to continue to bury their 'ohana piko; (v') access for families to gather water from Lake Wai'au for religious and spiritual purposes. The CMP also outlines an approach to be used in the event of disputes or determination of appropriateness of traditional and customary practices, including religious and spiritual purposes. The CMP also outlines an approach to be used in the avent of disputes or determination of appropriateness of traditional and customary practices.

Archaeological Sites
 Astronomy Precinct
 Hale Pohaku Mid-Level facility
 Natural Area Reserve (NAR)
 Mauna Kea Science Reserve (MKSR)
 Mauna Kea Access Road 400 Yd Boundary

2 km

CMP IN ACTION

17



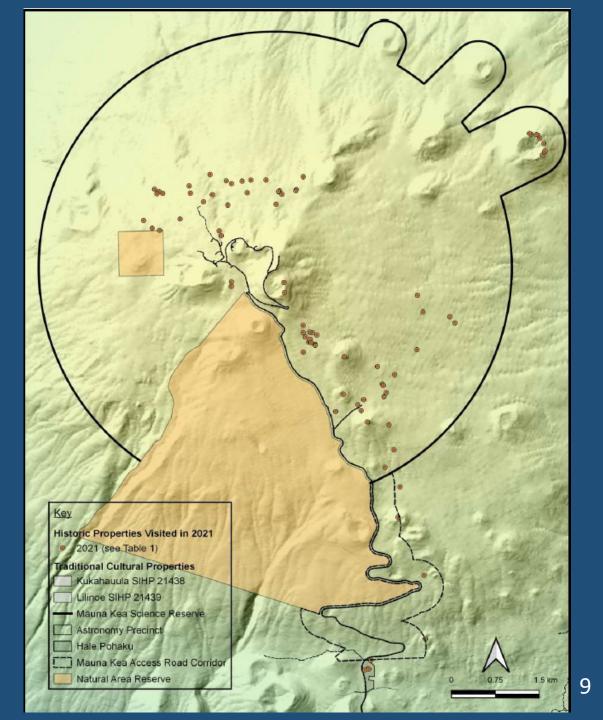
RANGER PROGRAM

Historic Property Monitoring

90 sites visited in 2021

- Annual: 57 sites
- 3yr: 27 sites
- 5yr: 6 sites

No changes to sites





INVASIVE SPECIES MANAGEMENT: PREVENTION

> 57 Large vehicle inspections



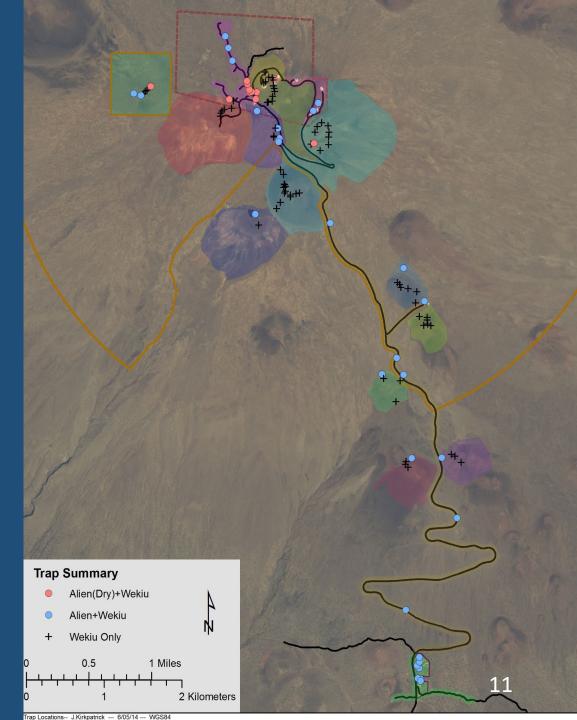
Invasive Species Management: Early Detection & Monitoring

Annual Arthropod Surveys

- 111 sites
- Traps: Yellow pan, baited pitfall, un- baited pitfall, PBJS, hand search
- No new invasive species threats

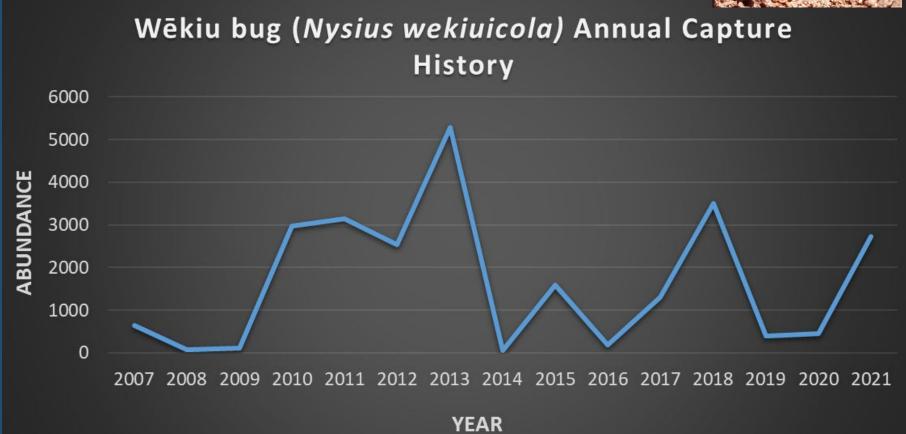


Ceratopogonidae: midge fly



Native Species Monitoring: Wēkiu bug surveys





August 2019





Native Plant Restoration



August 2020

Native Plant Restoration

Plant counts- 11/17/21

- Māmane- 495
- 'Āweoweo- 120
- Pāwale- 17
- Pua Kala- 22
- 'Ena'ena- 1,295
- Native grasses-782

8600lbs of weeds removed from our restoration area



Habitat Monitoring: Research

- Arthropod Food webs UH Mānoa
- Arthropod Biodiversity Cal U of PA
- Climate monitoring UH Mānoa
- Endosymbionts in Nysius spp. UC Merced
- Permafrost monitoring Planetary Science Institute
- Water Isotopes UH Mānoa
- Seabirds & Bats- UH Hilo
- Visitor impact study UH Mānoa
- Hydrogeology Proposed



Outreach

- West HI Exploration Academy-Invasive species presentation: Feb 2021
- 'Imiloa- Maunakea insects presentation: April 2021
- AstroDay Hilo- April 2021
- Science Camps of America (2 groups) weed pull- July 2021
- AstroDay Kona- November 2021
- MKO weed pull- December 2021
 *Removed <u>1,400 pounds</u> of weeds





Education: Signage



KAIANOHO (Habitat)



ENVIRONMENTAL PROTECTION



- Please help us protect Maunakea ecosystems by ensuring that your vehicle is free of mud and that personal belongings are free of any plant, animal, or earthen materials (mud, seeds, ants, food scraps).
- - Pack out any trash or food and dispose of it properly in trash receptacles.
 - Don't leave organic material (peels, seeds shells) in the environment as it feeds and provides habitat for invasive insects.



M

NTER FOR MAUNAKI

Native Ecosystem Protection

- Be respectful of and do not disturb all plants and animals.
- Report any sightings of ants to MK Rangers or VIS staff.

Holo me ka ha'aha'a (Travel humbly: Be aware, be respectful, be mindful)

ed "Public and Commercial Activities on Maunakea Lands" (Chapter 20-26) are in effect www.hawaii.edu/offices/bor/adminrules/chapter26.pd







RESPECT FOR CULTURAL SITES



Maunakea is considered to be one of the most sacred places in Hawai'i as it is home to various Hawaiian deities. Please treat Maunakea with the proper respect.

- Please refrain from removing, replacing, or adding any stones or objects to an Ahu (altar).
- Please refrain from climbing or standing on Ahu, including the summit Ahu.
- Please do not knock over standing stones or relocate them.
- Keanakāko'i (the adze guarry) is a traditional resource, please do not displace stones.
- Lake Waiau and its waters are very sacred, please stay out of the lake and refrain from throwing objects into the lake.
- Treat the mountain, especially the summit, with the utmost respect.



HILO

Holo me ka ha'aha'a (Travel humbly: Be aware, be respectful, be mindful) ve Bules Entitled "Public and Commercial Activities on Maunakea Lands" (Chanter 20-26) are in effect www.hawaii.edu/offices/hor/ad





PAU

<u>https://www.youtube.com/watc</u> <u>h?v=HljWe0VX45M</u>

The CMP is the heart of UH's stewardship. Our people live, breath, and act on it every single day. And as a result, the mauna and those who practice, visit, and work here are protected.

