

**Notice of Meeting**

**UNIVERSITY OF HAWAI'I  
BOARD OF REGENTS COMMITTEE ON INDEPENDENT AUDIT**

Members: Regents McEnerney (Chair), Higaki (Vice-Chair), Acoba, Portnoy, and Shinsato

**Date:** Wednesday, December 19, 2018

**Time:** 10:30 a.m.

**Place:** University of Hawai'i at Mānoa  
Information Technology Building  
1<sup>st</sup> Floor Conference Room 105A/B  
2520 Correa Road  
Honolulu, Hawai'i 96822

**AGENDA**

**I. Call Meeting to Order**

- II. 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 US mail, email at [bor@hawaii.edu](mailto:bor@hawaii.edu), or facsimile at 956-5156. Individuals submitting written testimony are not automatically signed up for oral testimony. Registration for oral testimony on agenda items will be provided at the meeting location 15 minutes prior to the meeting and closed once the meeting begins. Oral testimony is limited to three (3) minutes. All written testimony submitted are public documents. Therefore, any testimony that is submitted verbally 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.

**III. Agenda Items**

**A. For Review and Acceptance:**

1. Report in Response to the Board of Regents Resolution Requesting a Financial Management Audit of Relevant University-related Entities Engaged in the Stewardship and Management of Maunakea

**IV. Adjournment**

# **UNIVERSITY OF HAWAII**

## **REVIEW OF MAUNAKEA**

September 2018



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University of Hawai'i  
Office of Internal Audit



October 30, 2018

To the University of Hawai'i Board of Regents  
and  
President of the University of Hawai'i System

On February 22, 2018, the University of Hawai'i (University) Board of Regents adopted a resolution directing the Office of Internal Audit (Internal Audit) to conduct an audit of relevant University-related entities engaged in the stewardship and management of Maunakea. The audit scope of the resolution included the evaluation of University funds, lease payments, and external funds received in the support of stewardship, management, education, and other activities related to Maunakea. The audit scope also included reviewing the transfers of funds between entities (including the University and the Research Corporation of the University of Hawai'i (RCUH)) and payments made to University-related support programs by Maunakea Observatories (Observatories) or other third parties in connection with the stewardship and management of Maunakea.

Through meetings and discussions with key personnel from University-related entities, review of documents and contracts, and analysis of financial records, Internal Audit identified various University entities involved with Maunakea, including but not limited to the University System, University of Hawai'i at Mānoa, the Institute for Astronomy (IfA), the University of Hawai'i at Hilo, the Office of Maunakea Management (OMKM), RCUH and Maunakea Observatories Support Services (MKSS). Internal Audit determined that these entities have developed processes and procedures to appropriately account for their respective financial transactions in connection with their management of Maunakea.

At present, there are 13 Observatories on Maunakea, four of which are owned by the University. According to the IfA website, construction costs associated with the Observatories approximated \$600 million and the annual estimated costs to operate the Observatories that are borne collectively by the individual owner/operator approximate \$70 million. Internal Audit determined that financial transactions related to the stewardship and management of Maunakea are ultimately recorded by OMKM and MKSS. The combined revenues (adjusted for intercompany transactions) of OMKM and MKSS for the year ended June 30, 2017 approximated \$5.4 million. Revenue sources include Observatory billings, general and tuition funds, research training and revolving funds, commercial tour operator billings and Thirty-Meter Telescope (TMT) lease rent. Personnel related costs are the most significant expense approximating \$3.8 million for the year ended June 30, 2017.

Internal Audit recommendations include consideration of allocating a portion of Ranger Program costs to all Observatories, determining whether the commercial tour operator passenger charge (\$6) is sufficient to recover the costs incurred by OMKM and MKSS in servicing these passengers, and consulting with the Financial Management Office to determine the applicability of a new governmental accounting pronouncement related to the future decommissioning of the four Observatories owned by the University. Finally, Internal Audit noted certain operational improvements related to the administering of MKSS financial reports.

On October 30, 2018, the Hawai'i State Supreme Court issued an opinion affirming the Board of Land and Natural Resources' decision to issue a Conservation District Use Permit for the TMT. This opinion was issued subsequent to the completion of the accompanying report.

Sincerely,

Glenn Shizumura  
Director

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## I. Background

According to the 2009 Maunakea Comprehensive Management Plan (CMP), the University of Hawai‘i (University or UH) manages approximately 11,288 acres at the summit of Maunakea (referred to as the “Science Reserve”) and approximately 19 acres at Halepōhaku (Hawaiian for “Stone House”) pursuant to leases with the State of Hawai‘i Department of Land and Natural Resources (DLNR). The Observatories are located within the Science Reserve. Halepōhaku consists of the Onizuka Center for International Astronomy (commonly referred to as the Visitor Information Station (VIS), which includes the First Light Bookstore (FLBS)), and a support facility for the Observatories with lodging, dining facilities, offices, meeting rooms and recreational areas. DLNR also provided the University with a Grant of Easement for the Summit Access Road (the Board of Land and Natural Resources (BLNR) approved 1985 Management Plan added an approximately 400-yard wide strip on either side of the road, excluding areas within the Natural Area Reserve) from Halepōhaku to the boundary of the Science Reserve. The Summit Access Road, Science Reserve and Halepōhaku are collectively hereafter referred to as UH-managed lands. Various University-related entities are involved in the management of the UH-managed lands, including but not limited to the University’s Institute for Astronomy (IfA), the Office of Maunakea Management (OMKM) and Maunakea Observatories Support Services (MKSS). In addition, the Research Corporation of the University of Hawai‘i (RCUH) provides different levels of administrative support to OMKM and to MKSS. (NOTE: In this report, “Maunakea” may refer to the dormant volcano /mountain in general or specifically to the UH-managed lands as described above. The intended meaning can be derived from the context surrounding its usage.)

On February 22, 2018, the University of Hawai‘i Board of Regents adopted a resolution directing the Office of Internal Audit (Internal Audit) to conduct an audit of the relevant University-related entities engaged in Maunakea stewardship and management. The approved resolution required that Internal Audit evaluate University funds, lease payments, and any external funds received in the support of stewardship, management, education, and other activities related to Maunakea, as well as review transfers of funds between entities including both the University and RCUH, and payments made to university-related support programs by Maunakea Observatories (Observatories) or other third parties. An Audit Plan – Supplement to the June 30, 2018 approved Audit Plan describing the nature, timing and extent of this Maunakea audit project was approved by the Board of Regents Committee on Independent Audit (Audit Committee) on March 8, 2018.

Previous audits of Maunakea have been conducted by the State of Hawai‘i Office of the Auditor (State Auditor) in 1998 and 2005, with follow up audits occurring in 2014 and 2017. These audits were primarily focused on the conservation of Maunakea rather than the financial results of the entities responsible for UH-managed lands.

Internal Audit’s audit process commences with the gathering and reviewing of information to obtain a preliminary understanding of the operations, activities or processes that will be audited (planning activities). Accordingly, Internal Audit’s initial audit phase consisted of research related to the history of astronomy on Maunakea, meetings with various stakeholders involved in the management and governance of Maunakea (see Appendix A for a summary of key personnel consulted with in connection with this audit), and requesting information and reports from the entities through which financial transactions related to Maunakea occur. The following summarizes information obtained in connection with Internal Audit’s planning activities.

### **Historical Perspective of Astronomy on Maunakea (*Sources: IfA and OMKM websites*)**

The development of astronomy facilities on Maunakea was not initiated by the University. Instead, in 1963, the Hawai‘i Island Chamber of Commerce represented by Mitsuo Akiyama, proposed the construction of astronomical facilities. Mr. Akiyama was instrumental in bringing the first telescope to Maunakea.

**University of Hawai‘i**  
**Review of Maunakea**  
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In 1964, the Board of Supervisors of the County of Hawai‘i (precursor to the Hawai‘i County Council) passed Resolution No. 361 calling upon the Governor, President of the Senate and Speaker of the House of Representatives of the State Legislature, and Hawai‘i’s Senators and Representatives in the U.S. Congress, to “use the powers of their office to facilitate the proposed road construction to and use of the Maunakea area as an observatory site.”

Additionally, the 1964 State Legislature passed a concurrent resolution (S. C. R. 16) stating that the “State of Hawai‘i and its citizenry are most desirous and willing to co-operate and aid in the promotion of our nation’s space program and research to the benefit of the County of Hawai‘i, the state and the nation.” It was resolved that the Governor set aside and establish an appropriate area on the summit of Maunakea for the installation and operation of observatory and astronomical activities. In response, Governor John A. Burns directed DLNR to fund the construction by the State of Hawai‘i Department of Transportation (DOT) of a road to the summit of Maunakea.

In January 1968, DLNR and UH entered into General Lease No. S4191 (the Master Lease) granting UH a lease of the Science Reserve on Maunakea for a term expiring on December 31, 2033. Under the Master Lease, UH is obligated to maintain the land in a clean and orderly condition, use the land as a scientific complex, and obtain prior written approval from DLNR before subleasing or making improvements. Since 1968, UH has subleased land at the Science Reserve to scientific institutions that have constructed Observatories. These subleases (approved by the DLNR) and their related Operating Agreements (Operating and Site Development Agreements, tripartite agreements, Statement of Work, etc.), approved by the University, generally require only a nominal ground rent (\$1/year), but grant UH an agreed upon amount of observing time at each Observatory. In September 1999, UH and DLNR entered into General Lease No. S-5529 for the period February 1986 to February 2041. This lease grants the University use of the 19-acre land parcel (site of Halepōhaku) located at the 9,200-foot level on the south slope of Maunakea. Additionally, in 1981 DLNR granted UH the right to use the Summit Access Road (extending from Halepōhaku to the boundary of the Science Reserve) through December 2033 under Grant of Easement No. S-4697.

## II. Work Performed

Subsequent to the completion of the planning activities discussed in the previous section, Internal Audit requested documentation and financial information from management of OMKM, MKSS, IfA, RCUH, and other University entities involved in the management of Maunakea, to further understand the governance structure, flow of financial transactions between the various related entities, and sources of revenues and types of expenses. Using this documentation and other information obtained from independent research, Internal Audit performed the following procedures:

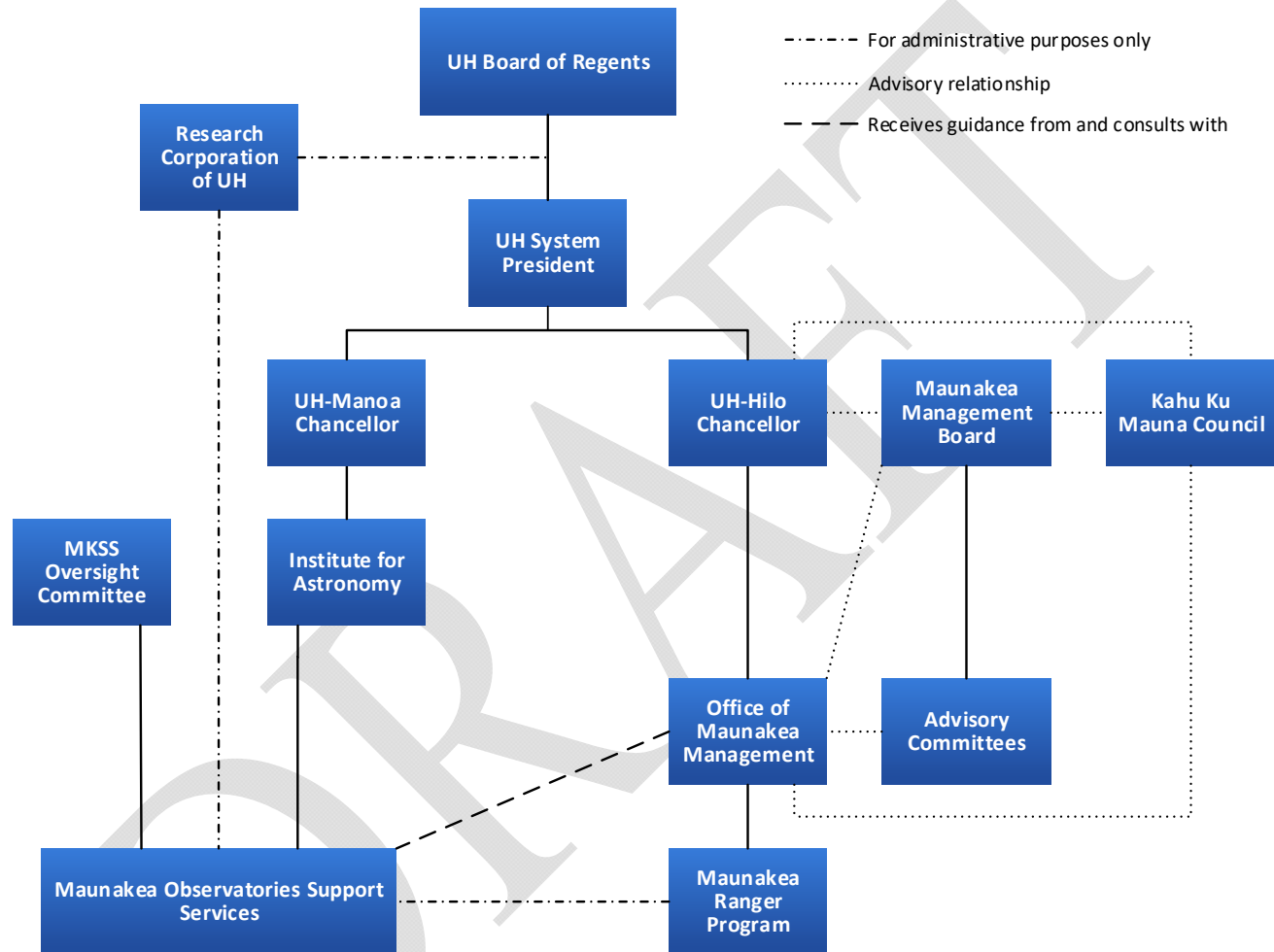
- read the CMP and related sub plans
- reviewed the 1979 MKSS Management Plan
- reviewed, compiled and analyzed revenue and expense ledgers (OMKM and MKSS)
- evaluated transfers between OMKM, MKSS and related entities (e.g., IfA, UHH, RCUH)
- reviewed contracts and agreements between the University and the Observatories
- reviewed prior State Auditor reports
- reviewed OMKM’s 2017 Annual Report to BLNR regarding the Status of the Implementation of the CMP
- reviewed contracts and agreements between OMKM and tour operators
- reviewed the establishment and funding of accounts held by RCUH (OMKM and MKSS)
- reviewed capital asset listings for reasonableness and appropriate accounting for depreciation (OMKM and MKSS)
- reviewed and evaluated minutes from meetings of the MKMB (as needed) and MKSS Oversight Committee (quarterly)
- examined a sample of MKSS invoices to the Observatories and OMKM noting the services performed, billing amount, date of services, etc.
- evaluated MKSS shared expense allocation methodology by cost center
- toured the University’s facilities on Maunakea, including the VIS and FLBS, lodging, dining and administrative facilities at Halepōhaku, and the Observatories within the Science Reserve
- obtained and reviewed UH Foundation accounts related to Maunakea
- examined other relevant documents as deemed appropriate

### III. Observations and Analysis

#### A. Overview

##### 1. Entities Governing Maunakea

An overall organizational chart of the entities related to the governance and management of Maunakea is as follows:



##### a) Board of Regents

In June 2000, the Board of Regents adopted a Master Plan for Maunakea, which serves as a policy guide for University management of Maunakea, including protection of the cultural, natural and scientific resources. This plan required the establishment of a community-based management structure on Hawai‘i Island. In accordance with the Master Plan, the University of Hawai‘i at Hilo (UH Hilo or UHH) Chancellor established OMKM on August 1, 2000. OMKM is the office charged with ensuring compliance with and implementation of the 2000 Master Plan.

In accordance with the requirements of Hawai‘i Revised Statutes (HRS) §304A-1902 (enacted 2009), the Board of Regents may enter into lease agreements for UH-managed lands provided the University complies with all statutory requirements related to ceded lands with any fees established in open public hearings pursuant to HRS Chapter 92. Also pursuant to §304A-1902, rents and leases shall be deposited into the

Maunakea lands management special fund (established by §304A-2170) to be used exclusively for managing Maunakea lands.

In April 2009 BLNR approved the CMP which serves as the State of Hawai‘i’s plan for the University’s management of Maunakea. As a condition of BLNR’s approval of the CMP, the University was required to prepare and submit four sub plans. Accordingly, during 2009 and 2010, the following supplementary sub plans were approved by the University’s Board of Regents, and approved by BLNR in March 2010:

- September 2009- Maunakea Natural Resources Plan (NRMP)- a framework for protecting and preserving natural resources on Maunakea
- October 2009- Maunakea Cultural Resources Management Plan (CRMP)- provides measures to avoid or minimize impacts of activities to historic properties
- January 2010- Maunakea Public Access Plan- a set of principles and policies to develop management actions and administrative rules relating to public and commercial activities
- January 2010- Maunakea Decommissioning Plan- provides a process for decommissioning (the partial or total removal of all structures associated with an observatory facility and the restoration of the site, to the greatest extent possible, to its pre-construction condition) observatories, including financial planning

Collectively, the Master Plan, CMP and its sub plans provide a framework for management of Maunakea. OMKM must provide an annual progress report to BLNR regarding the status of implementing the CMP

**b) Office of Maunakea Management**

As previously noted, OMKM is the office charged with ensuring compliance with and implementation of the 2000 Master Plan and CMP. In addition to OMKM, the Maunakea management structure is composed of a Hawai‘i Island volunteer community-based Maunakea Management Board (MKMB) and the Kahu Kū Mauna council. The MKMB, which is comprised of seven members nominated by the UH Hilo Chancellor and approved by the Board of Regents, is responsible for providing input on Maunakea operations and activities, developing policies, and reviewing and providing recommendations for land uses planned for UH-managed lands. The Kahu Kū Mauna council is a volunteer community-based council whose members are from the native Hawaiian community. Kahu Kū Mauna advises the MKMB, OMKM and the UH Hilo Chancellor on Hawaiian cultural matters. Additionally, the Kahu Kū Mauna council review proposed projects and provide input to the MKMB. Finally, members of Kahu Kū Mauna participate in public MKMB meetings. At various times, Advisory Committees have also been established by MKMB to focus on particular aspects of managing Maunakea. Currently, only one Advisory Committee is active, the Environment Committee. The Environment Committee was established to advise and provide expertise on environmental issues with the objective of protecting natural resources on Maunakea.

**c) Institute for Astronomy**

IfA provides University oversight of MKSS. IfA also funds and operates the UH 2.2m Telescope. Furthermore, ownership of two additional Observatories (the United Kingdom Infrared Telescope or UKIRT and the James Clerk Maxwell Telescope or JCMT) were transferred to the University during 2014 and 2015. (See section *III.A.3. Observatories* and **Table 2** for more information.)

**d) Maunakea Observatories Support Services**

While the above-noted entities are responsible for overall governance of Maunakea, MKSS manages the daily logistical activities on Maunakea. MKSS was established in April 1979 under a “Management Plan” which described the purpose, objectives and policies/procedures for MKSS. The MKSS Management Plan noted that MKSS was created by IfA as an independent service unit to:

- Provide a range of support services responsive to the needs of the user community (including the University) that has astronomical facilities on Maunakea.
- Broaden the scope of services as necessary and desirable, including the requirements of new facilities that may be approved for location on Maunakea.
- Minimize operating costs by precluding the duplication of support services and facilities needed by Observatories.
- Develop a management structure that will provide efficient and responsive support services on a basis equitable to each user.

The support services listed by the MKSS Management Plan included but are not limited to food and lodging, provision of electrical power and water, transportation services, auxiliary services and library services. The Management Plan also noted that MKSS is a separate division within IfA and operated through RCUH with an objective of recovering the actual cost of operations with no provision for profits.

**e) MKSS Oversight Committee**

The MKSS Oversight Committee (MKSSOC) is composed of representatives from all of the Observatories, including those owned and operated by IfA. OMKM representatives are also invited to attend MKSSOC meetings to provide updates on Maunakea management. Each Observatory pays into accounts held by RCUH that are used to fund MKSS activities, including road maintenance, snow removal, facilities maintenance and management at Halepōhaku, common utilities and the VIS (the MKSSOC is described in greater detail in section *III.A.3.c) Annual budget*). Finally, RCUH provides administrative services to MKSS (payment processing, disbursements, etc.) in exchange for a 3.2% administrative fee.

**2. Condensed Financial Results**

As a result of the planning activities described in section *I. Background* and discussions with management at OMKM, MKSS and IfA, Internal Audit determined there are two significant entities through which financial transactions related to Maunakea are recorded: OMKM and MKSS.

The following table presents condensed combined financial results for OMKM and MKSS for the year ended June 30, 2017. The “Adjustments” column represents account balances resulting from identified transactions between OMKM and MKSS.

**Table 1: Combining Financial Results (000's)**

	Revenue and Expense data (unaudited)		
	For the Year Ended June 30, 2017		
	Separate Financial Statements	Adjustments *	Total Combined
	OMKM	MKSS	
<b>Revenues:</b>			
General funds	\$ 405	-	\$ 405
Observatory/OMKM/IFA payments	-	\$ 2,421	1,333
Research Training and Revolving Funds (RTRF) and tuition special funds	1,200	-	1,200
FLBS/Room and Board (net)	-	1,902	1,902
Tour operators	362	-	362
TMT rent	149	-	149
Other	-	78	78
Total	2,116	4,401	5,429
<b>Expenses:</b>			
Compensation and benefits	696	3,079	3,775
Rangers	910	-	-
Utilities	-	122	122
Repairs and maintenance	12	376	388
General administrative services	-	87	87
Payments to MKSS	178	-	-
Other	362	666	1,028
Total	\$ 2,158	\$ 4,330	\$ 5,400

Source: Kualii Financial System and MKSS fiscal office

\* Adjustments related to payments made to MKSS by OMKM

### 3. Observatories

#### a) General

According to the IfA website, construction costs associated with the Observatories approximated \$600 million. The varying types of Observatories have specialties for studying different aspects of the universe and the costs to operate such a set of Observatories are borne collectively by the individual owner/operator. The IfA website estimates these costs to approximate \$70 million annually. The Observatories also share in the costs of operating shared facilities and maintaining roads and access to the Science Reserve in addition to contributing to educational outreach and workforce development through programs such as Journey to the Universe, Astroday, Maunakea Fund scholarship, Maunakea Scholars and the Akamai Workforce Initiative. Finally, the Observatories and MKSS collectively employ approximately 500 Hawai‘i Island residents. (Source: IfA website, as of March 2016.) During the site visit, Internal Audit toured the Science Reserve, including the W.M. Keck I/II Observatories. Internal Audit noted that the Science Reserve was clean and free of litter. Many of the roads within the Science Reserve were unpaved and sloped, requiring a four-wheel drive vehicle for safety purposes.

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**Table 2: Maunakea Observatories**

Identifier	Observatory	Estimated Original Cost (000's)	Telescope Specs	Construction Funding Source	Owner/Operator	Annual Operating Cost (000's)	Year Built	Sublease Term	UH observing time <sup>(4)</sup>
<b>Optical/Infrared</b>									
UH 0.6m <sup>(1)</sup>	UH Hilo Educational Telescope	\$100	0.6 meters	U.S. Air Force	University	NA	1968	NA	100%
UH 2.2m	UH 2.2m Telescope	\$5,000	2.2 meters	UH - 40% NASA - 60%	University	\$1,000	1970	NA	100%
IRTF	NASA Infrared Telescope Facility	\$10,000	3.0 meters	NASA	NASA/University	\$5,100	1979	1974 - 2033	15%
CFHT	Canada-France-Hawaii Telescope	\$30,000	3.6 meters	Canada - 50% France - 50%	Canada-France / University	\$7,400	1979	1975 - 2033	15%
UKIRT	UK Infrared Telescope	\$5,000	3.8 meters	United Kingdom	University <sup>(2)</sup> (formerly the UK Joint Astronomy Centre)	\$2,200	1979	NA	100%
Keck I	W.M. Keck Observatory	\$170,000 (combined cost)	10 meters	Caltech - 30% W.M. Keck Foundation - 70%	Caltech / University of California	\$13,500 (combined cost)	1992	1985 - 2033	10%
Keck II	W.M. Keck Observatory		10 meters	Caltech - 30% W.M. Keck Foundation - 70%	Caltech / University of California		1996	1985 - 2033	15%
Subaru	National Astronomical Observatory of Japan Subaru Telescope	\$170,000	8.3 meters	National Astronomical Observatory of Japan	National Astronomical Observatory of Japan	\$17,000	1999	1992 - 2033	14%
Gemini	Gemini Northern Telescope	\$92,000	8.1 meters	USA - 50% UK - 25% Canada - 15% Argentina - 2.5% Brazil - 2.5% Other - 5%	USA / UK / Canada / Argentina / Australia / Brazil / Chile	\$13,700	1999	1994 - 2033	10%
<b>Submillimeter</b>									
CSO <sup>(5)</sup>	Caltech Submillimeter Observatory	\$10,000	10.4 meters	Caltech	Caltech / National Science Foundation (NSF)	NA	1987	1983 - 2033	NA
JCMT	James Clerk Maxwell Telescope	\$32,000	15 meters	United Kingdom- 55% Canada - 25% Netherlands - 20%	University <sup>(3)</sup> (formerly the UK Joint Astronomy Centre) / East Asian Observatory	\$4,700	1987	NA	12%
SMA	Submillimeter Array	\$80,000	8x6 meters	Smithsonian - 85% Taiwan - 15%	Smithsonian Astrophysical Observatory / Taiwan	\$5,500	2002	1995 - 2033	15%
<b>Radio</b>									
VLBA	Very Long Baseline Array	\$7,000	25 meter antenna	National Radio Astronomy Observatory	National Radio Astronomy Observatory / Associated Universities Inc. / NSF	\$400	1992	1990 - 2033	15%

(1) In 2008, UHH began the process to remove the original 0.6m telescope and subsequently installed a 0.9m telescope (known as Hoku Kea) using NSF funding. The telescope did not achieve satisfactory operational performance and UHH decided to cease the effort to bring it into full operation. UHH has since issued a Notice of Intent (NOI) to decommission. MKMB deferred approval of the NOI until a new location for the Observatory can be determined. In 2016, a new telescope, dome and peripherals were purchased by the University for approximately \$400,000 using Capital Improvement Project funding provided by the State of Hawaii. This observatory is currently not operating pending the determination of the new location.

(2) In 2014, ownership of UKIRT was transferred from the United Kingdom to the University.

(3) In 2015, ownership of JCMT was transferred from the United Kingdom to the University.

(4) Observing time as of September 2018. University observing time is based on a percentage of the overall astronomical observing time, which excludes telescope usage for purposes other than astronomical research (e.g., testing, development and maintenance of telescopes, etc.). The University's observing time is equally distributed over the seasons of the year and other observing conditions.

(5) Observatory is in the process of being decommissioned.

Additional one-time payments were made to the University by certain Observatories to fund improvements to roads and the continued development of Maunakea infrastructure. These payments ranged between \$628,000 and \$2,363,000. Internal Audit also noted other significant financial components of the University’s agreements with the Observatories as follows:

- From 2005 through 2009, SMA made five annual contributions of \$100,000 to support the SMA Fellowship Program at IfA (astronomical research fellowships awarded to recent PhD graduates or visiting senior scientists).
- Gemini made a one-time payment of \$255,000 in partial consideration for the loss of use of an existing telescope and for the University’s expenses for the telescope’s removal.
- The University is responsible for operating and maintaining IRTF under the terms of a May 2014 contract (Statement of Work) with the National Aeronautics and Space Administration (NASA). NASA pays the University an annual fixed fee of approximately \$5 million (excluding reimbursement for other supplies or services).
- The University is committed to contribute annually approximately \$400,000 (indexed for inflation beginning in 1974) for the operating costs of CFHT (up to a maximum of 15% of operating costs for the observatory). According to the Interim Director of IfA, the University’s current contribution is approximately \$765,000 (the \$400,000 inflation-adjusted for 2018). In addition, the University pays the observatory’s share of road maintenance costs. Finally, the University pays the payroll costs for one of the resident astronomers (an IfA faculty member).

Certain Observatories’ (Subaru, JCMT, SMA and Gemini) lease land from the University adjacent to the IfA Hilo Facility for an annual ground rent of \$1. These Observatories’ respective astronomy base facilities are situated on the leased land. During January 2016, the University entered into a ground lease with the National Astronomical Observatory of Japan for their astronomy base facility known as the Joint Astronomy Centre (JAC), which is also adjacent to the IfA Hilo Facility. The lease expires on December 31, 2033 and JCMT pays annual ground rent of \$10,000.

In regards to JCMT, the University entered into a Scientific Cooperation Agreement (SCA) with the East Asian Observatory (EAO), in which EAO funds and operates the observatory and provides the University with 12% of JCMT’s observing time. The SCA expires five years after the effective date (March 1, 2015). In regards to UKIRT, IfA is responsible for all operational costs but generally works with external partners to defray a portion of these costs. According to the Interim Associate Director of IfA, currently the largest external partner is the United States Naval Observatory, which is funding approximately 50% of UKIRT’s operating costs. (See section *III.A.3.b Decommissioning* for more information on JCMT and UKIRT.)

At present, there are 13 Observatories on Maunakea, four of which are owned by UH. According to the Interim Director of IfA, the 13 Observatories represent the original number of Observatories planned under the 1983 Maunakea Science Reserve Complex Development Plan. Over the years, this number became understood as a maximum number of Observatories that can be constructed on Maunakea through the year 2000. The 2000 Master Plan did not specify a maximum number of Observatories that can be constructed on Maunakea. As noted in **Table 2**, two of the Observatories are in the process of decommissioning. (See section *III.A.3.b Decommissioning* for more information.)

Twelve of the thirteen Observatories are located at the summit of Maunakea (14,000 feet above sea level) as depicted in the picture below, while the VLBA is located below the summit (12,200 above sea level), but within the Science Reserve.



Each Observatory is permitted to operate on Maunakea under the terms of Operating Agreements and related subleases (as described in section *I. Background*) with the University. Although the subleases (excluding Thirty Meter Telescope (TMT)) generally require an insignificant \$1 annual rent payment, each Observatory is required to contribute to funding MKSS operations based on allocations approved by the MKSSOC, as well as provide a portion of observing time to the University.

Internal Audit noted numerous references in testimony to the Hawai'i State Legislature and BLNR to HRS §171, specifically in regards to establishing “fair market rents” for all ceded lands. Internal Audit reviewed HRS §171 and noted three references to “fair market rents”, specifically in §171-17, §171-36 and §171-41.6. Pursuant to HRS §171, fair market rents must be determined by:

- (1) An employee of BLNR qualified to appraise lands; or
- (2) A disinterested appraiser whose services shall be contracted by BLNR

UH Hilo senior management stated in written communication to BLNR on June 25, 2014 that HRS 171's appraisal requirement does not apply to the University's Observatory subleases on Maunakea. This assessment is consistent with BLNR's Conclusions of Law (COL) dated April 12, 2013 in regards to the contested case hearing for Conservation District Use Permit (CDUP) HA-3568 for the TMT at the Maunakea Science Reserve. COLs 238 and 239 on page 117 state specifically that HRS §171-17 does not apply, and that under HRS §171-95 BLNR may lease state land to governments and government agencies at such rent and on such terms and conditions as it may decide.

Based on Internal Audit's research,” the market value of a real estate property is influenced by various factors, including:

- Social- population trends, changes in architectural designs, and other changes in social values and preferences
- Economic- quantity, quality, and location of natural resources; commercial and industrial trends; price levels, interest rates, tax burdens, and availability of money and credit
- Governmental- zoning, building codes, and ordinances, such as rent controls and special-use permits
- Physical or environmental- climate and topography, land (soil and subsoil characteristics), location, technological advances affecting land use, proximity of transportation and roads

The summit of Maunakea is widely considered to be one of the finest astronomical observing sites in the world. Physical characteristics that set Maunakea apart from other sites include: high altitude, atmospheric stability, minimal cloud cover (above 325 days per year are cloud free at the summit), low humidity, dark skies (because of its distance from urban development), and the transparency of the atmosphere to infrared radiation. Due to the location of the Hawaiian Islands within the northern hemispheric tropics, astronomers can observe the entire northern sky and nearly 80 percent of the southern sky. Given the Science Reserve’s unique location and characteristics and the lack of an established real estate market for astronomy sites, Internal Audit believes a real estate appraiser may be significantly challenged to opine on fair market rent in connection with the Observatories following the three traditional real estate valuation methods (sales comparison approach, cost approach, income approach).

**b) Decommissioning**

In the event of termination or expiration of tenancy, the Observatory subleases require sublessees to 1) remove the facilities and restore the property at the expense of the sublessee (see description of the Maunakea Decommissioning Plan under section *III.A.1.a Board of Regents*); 2) sell the facilities to the University or a third party; or 3) surrender the facilities to the University upon approval of the University and the Chairman of BLNR.

As noted in **Table 2**, the University owns four of the Observatories, including UKIRT and JCMT. Ownership of UKIRT and JCMT was transferred to the University in 2014 and 2015, respectively, as part of the termination of each sublease. Additionally, the termination of each sublease included a \$2.5 million payment to the University to be used for the future decommissioning of UKIRT and JCMT. The respective sublease termination agreements (including the amount of the \$2.5 million payment to the University to be used for future decommissioning costs) were approved by the Board of Regents on April 17, 2014 and November 20, 2014, respectively. According to the action memos provided by University management to the Board of Regents for both UKIRT and JCMT, due diligence was jointly conducted by the University and its counterparty (the Science and Facilities Council of the United Kingdom) and decommissioning cost estimates were obtained from a third party. Based on those estimates, University management believes the \$2.5 million payment for each observatory is sufficient to cover the costs of decommissioning. However, the University bears the risk of any shortfall resulting from increases in decommissioning costs between the date of the sublease termination agreements and the time of decommissioning. According to the aforementioned Decommissioning Plan, OMKM is responsible for overall coordination and oversight of the decommissioning process, but does not conduct or incur the costs associated with the actual decommissioning of the observatory, which is the responsibility of the respective owner. For each decommissioning, a Site Decommissioning Plan (SDP) must be developed, which includes: 1) a Notice of Intent, 2) an environmental due diligence review, 3) a Site Deconstruction and Removal Plan, and 4) a Site Restoration Plan. All components of the SDP must be approved by MKMB followed by approval by the University President. Finally, the final SDP may also require approval by the University Board of Regents.

**c) Annual budget**

On an annual basis prior to the start of each fiscal year, the MKSSOC reviews and approves the annual MKSS operating budget. MKSS budgets and allocates expenses (based on cost centers) to OMKM and the Observatories based on an annual allocation schedule approved by the MKSSOC. These expenses include costs for personnel, equipment (including depreciation), supplies, overhead, utilities, etc. The allocations are based on various factors, including Observatory size (i.e., each Observatory is assigned a “Class” from 1 to 3 primarily based on telescope mirror size), relevance of each expense to the Observatory/OMKM, original agreements and decisions made by the MKSSOC. The following table illustrates the breakdown of Classes amongst the Observatories:

**Table 3: Observatory Allocation Factors**

<u>Observatory Identifiers</u>	<u>Class</u>	<u>Factor based on Class*</u>
CSO, IRTF, UKIRT, UH 2.2m	1	0.8
CFHT, JCMT, Keck II, SMA, VLBA	2	1.0
Gemini, Keck I, Subaru	3	1.2

*\* The factor indicates the amount of expenses the Observatory will be allocated relative to Observatories in other Classes. For example, a Class 3 Observatory will be allocated approximately 20% more than a Class 2 Observatory.*

The MKSSOC meets on a quarterly basis to review budget to actual financial reporting, discuss and resolve prior action items, review and approve policy changes and receive operational/governance updates from MKSS and OMKM. Minutes of each meeting are prepared and approved at the following meeting.

#### **4. Current Developments**

##### **a) Administrative rules**

In the 2017 follow up audit report, the State Auditor noted that certain recommendations could not be fully implemented due to the Governor of Hawai‘i (Governor) requesting that the University temporarily halt the process of finalizing administrative rules. OMKM informed Internal Audit that progress on the finalization of administration rules had been halted prior to the Governor’s request due to concerns raised by petitioners in the TMT contested case hearing regarding ex parte communications between the University and DLNR. OMKM also stated that finalization of the administrative rules were further delayed due to pending issues requiring BLNR approval. Internal Audit noted progress during 2018 toward the finalization of the aforementioned administrative rules as follows:

- On January 11, 2018, the University received permission from the Governor to proceed with the administrative rules.
- On June 7, 2018, the University of Hawai‘i Board of Regents authorized the University President to request approval from the Hawai‘i Office of the Governor to conduct public hearings on the proposed adoption of Chapter 20-26, Hawai‘i Administrative Rules, entitled “Public and Commercial Activities on Maunakea Lands” (proposed Maunakea Administrative Rules). Internal Audit was informed that the proposed Maunakea Administrative Rules were reviewed by both the Office of Hawaiian Affairs (OHA) and DLNR, and that their collective comments were considered and incorporated as appropriate into the proposed Maunakea Administrative Rules.
- On June 20, 2018, the Hawai‘i Small Business Regulatory Review Board approved the proposed Maunakea Administrative Rules to be provided to the Governor for consideration for public hearings.
- On July 10, 2018, the Governor approved the proposed Maunakea Administrative Rules for public hearings.
- On August 19, 2018, the University published the dates for four public hearings, as follows:
  - Oahu: September 24, 2018- Sullivan Conference Center, UH Cancer Center
  - Hawai‘i Island:
    - September 25, 2018- ‘Imiloa Astronomy Center of Hawai‘i
    - September 26, 2018- Waikoloa Elementary and Middle School
  - Maui: September 28, 2018- UH Maui College

**b) New land authorization**

In recent years, the University has commenced the process of obtaining authorization to utilize the land at the Science Reserve beyond the expiration of the Master Lease on December 31, 2033 (new land authorization). The process is as follows:

- In February 2018, the University published an Environmental Impact Statement Preparation Notice (EISPN) for Long-Term Continuation of Astronomy on Maunakea, which began the public review period.
- Open houses were held on March 12, 2018 (Waimea), March 13, 2018 (Hilo) and March 14, 2018 (Honolulu) to provide community outreach regarding the EISPN, and to encourage and receive public input.
- Public input from the EISPN process will be considered in the Draft Environmental Impact Statement (DEIS) to be prepared by the University’s consultant, Planning Solutions, Inc.
- Once the DEIS is published, another public review period will take place for public input. Additional public input will be reviewed and incorporated in the Final Environmental Impact Statement (FEIS).
- The Governor can approve or deny the FEIS or delegate this decision to BLNR.

Currently, three options are being considered in regards to the Master Lease:

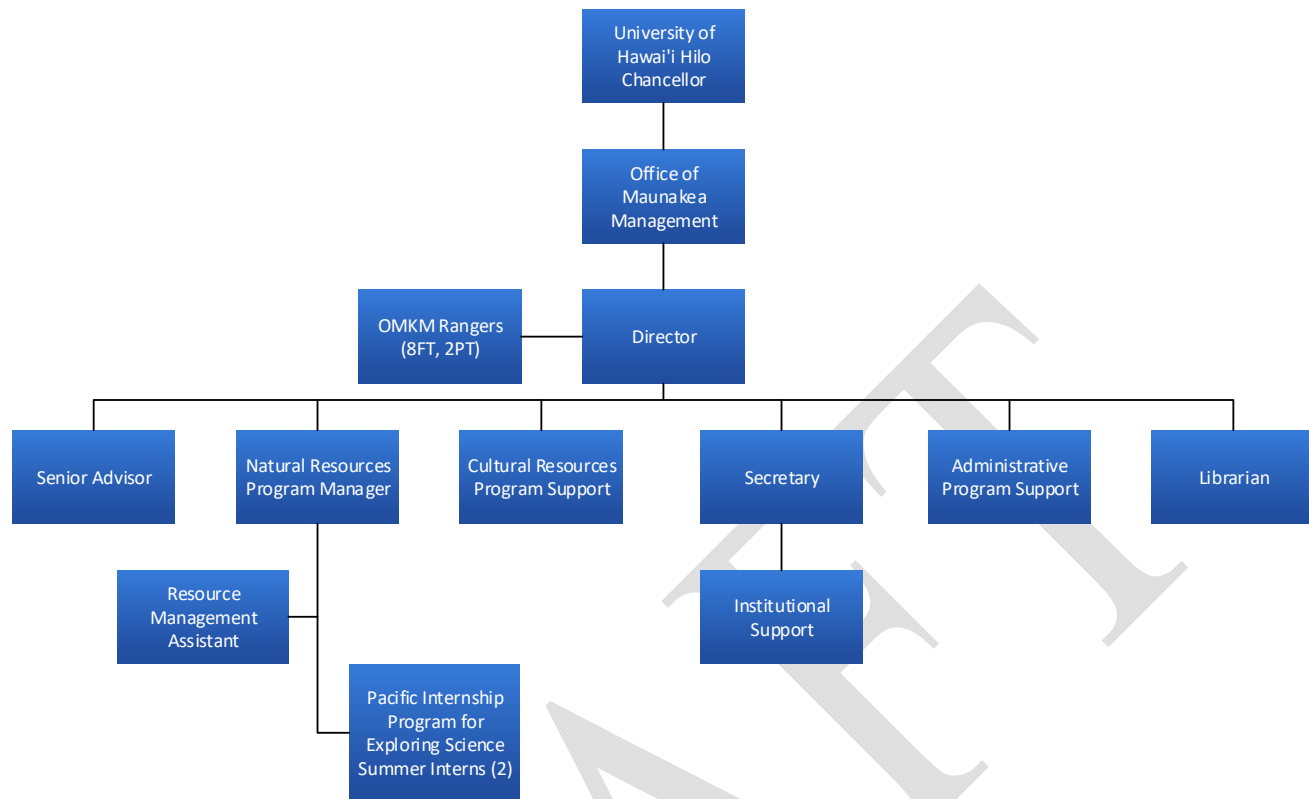
- 1) No action- this option would result in the current lease expiring on December 31, 2033 and the University ceasing all operations on Maunakea.
- 2) An authorization of reduced areas of UH-managed lands on Maunakea.
- 3) An authorization of the same UH-managed lands on Maunakea.

The University is in the process of establishing a timeline with respect to a new land authorization.

**B. Financial information**

**1. Office of Maunakea Management**

OMKM is responsible for day-to-day management of the UH-managed lands (Maunakea Science Reserve, mid-level facilities at Halepōhaku and the Summit Access Road) on Maunakea. As previously noted, the 2009 CMP was approved by BLNR. One of the conditions of approval was that the University’s Board of Regents be responsible for implementation of the CMP, but may delegate this responsibility to another University entity. In a letter to BLNR, the University’s Board of Regents delegated the responsibility for implementing the CMP to OMKM. Another condition requires annual written and in-person reports to BLNR regarding the status of implementing the CMP. Internal Audit reviewed the 2017 OMKM written report noting the inclusion of tasks such as efforts to protect natural and cultural resources, development of community outreach programs, implementation of policies and procedures, and using sustainable technologies within Maunakea facilities. In addition, OMKM provides logistical support for scientific studies, the majority of which are conducted by University programs at UH Hilo, Mānoa and Hawai‘i Community College. Excluding the OMKM Rangers, OMKM has seven full-time and two part-time employees (Librarian and Institutional Support). In addition, OMKM hires two to three Summer Interns each year. Two of OMKM’s staff are RCUH employees (a part-time Librarian and the Senior Advisor). OMKM’s organizational chart as of September 2018 is as follows:



#### a) Financial Results

The following is a summary of OMKM's cash basis revenues and expenses from the Kualii Financial System (KFS), the University's general ledger system, for the three years ended June 30, 2017. The letters in the Reference column correspond with the descriptions of each significant account that follows this table.

**Table 4: OMKM Financial Results**

**Office of Maunakea Management  
Statements of Revenues and Expenses (Unaudited)  
For the Three Years Ended June 30,**

	<u>Reference</u>	<u>2017</u>	<u>2016</u>	<u>2015</u>
<b>Revenues</b>				
RTRF	<i>c</i>	\$ 639,894	\$ 560,000	\$ 420,000
Tuition special funds - UHH	<i>a</i>	560,691	649,951	736,596
General funds	<i>a</i>	404,880	291,052	253,689
Tour operator revenues	<i>b</i>	361,702	354,084	381,002
TMT rent	<i>b</i>	148,950	301,050	279,041
Interest income		305	838	-
Total revenues		2,116,422	2,156,975	2,070,328
<b>Expenses</b>				
Ranger Program	<i>d</i>	910,016	764,859	627,310
Personnel	<i>g</i>	695,852	734,102	681,519
Other payments to MKSS	<i>e</i>	178,325	190,716	232,378
Payments to OHA	<i>f</i>	102,616	129,652	134,838
Equipment		81,172	138,948	44,860
Printing and advertising		65,649	57,746	82,707

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Supplies and materials	15,096	24,208	31,859
Travel	13,411	20,308	31,401
Repairs and maintenance	11,752	15,769	10,234
Other	83,604	108,216	55,268
Total expenses	<u>2,157,493</u>	<u>2,184,525</u>	<u>1,932,373</u>
<b>Revenues in excess (deficit) of exp.</b>	<u>\$ (41,071)</u>	<u>\$ (27,550)</u>	<u>\$ 137,955</u>

*Source: Kualī Financial System*

(1) Significant Sources of Revenue

*a. General and Tuition Special Funds:*

As part of the UH Hilo annual budgeting process, OMKM receives general and special funds on an annual basis. Salaries for general funded positions are paid from general funds while all other expenses are paid from tuition special funds. Monitoring of the mix of spending from general funds and tuition special funds is performed by the UH Hilo Business Management Office. Internal Audit obtained the UH Hilo budget allocation for the three years ended June 30, 2017, and compared the total allocation to OMKM to the sum of general funds and tuition special funds recorded on the trial balance, noting no differences.

*b. Maunakea Lands Management Special Fund:*

HRS §304A-2170 established a Maunakea lands management special fund, into which shall be deposited:

- appropriations by the legislature;
- all net rents from leases, licenses, and permits, including fees and charges for the use of land and facilities within the Maunakea lands;
- all moneys collected for violations; and
- interest earned or accrued on moneys in the special fund.

According to UH Hilo fiscal personnel and review of OMKM accounts in KFS, Internal Audit noted that the Hawai‘i State legislature has not historically appropriated funds into this account. Instead, the account has primarily been used to account for payments by commercial tour operators (see *Commercial Tour Operator Revenues*), proceeds from the TMT sublease (see *TMT International Observatory, LLC Sublease*), and the collection of interest (minimal). According to HRS §304A-2170, the proceeds of this special fund shall be used for:

- managing the Maunakea lands, including maintenance, administrative expenses, salaries and benefits of employees, contractor services, supplies, security equipment, janitorial services, insurance, utilities and other operational expenses; and
- enforcing administrative rules adopted relating to the Maunakea lands.

As previously discussed, administrative rules have been drafted and distributed for public comment but have not yet been finalized and adopted (see Administrative Rules section *III. A. 4. a*). Expenses paid from this account relate to payments to the Office of Hawaiian Affairs (see *Payments to the Office of Hawaiian Affairs*) and payments to MKSS (see *Other MKSS Allocated Expenses*). As noted above, the primary sources of revenue for the Maunakea lands management special fund are:

(i) TMT International Observatory, LLC (TIO) Sublease:

In 2009, TMT scientists selected Maunakea as the site for the TMT. In 2014, BLNR approved a sublease between the University and TIO. This sublease requires semi-annual rent payments to the University according to the following schedule consistent with the achievement of certain milestones:

**Table 5: TMT Milestones**

<u>Year(s)</u>	<u>Annual Rent</u>	<u>Milestone</u>
1-3	\$300,000	Civil construction
4-5	\$400,000	Enclosure
6-7	\$600,000	Telescope structure
8-9	\$700,000	Instruments and mirrors
10	\$900,000	Commissioning
11+	\$1,080,000	Operations

The sublease expires on December 31, 2033 (the termination date of the University’s Master Lease). Eighty percent of each sublease payment is retained by OMKM while twenty percent is paid to the Office of Hawaiian Affairs (see *Payments to the Office of Hawaiian Affairs* later in this report). Thus far, annual sublease payments within the 1-3 year range have been made to OMKM (pro rata in years 1 and 3). However, due to legal challenges, the University and TIO agreed in early 2017 to defer further sublease payments until these legal challenges are resolved by the courts. On August 8, 2018, the Hawai‘i State Supreme Court unanimously ruled against a contested case hearing regarding the TIO sublease. Internal Audit evaluated the sublease payments noting that the amounts recorded and recognized by OMKM were reasonable.

According to the TIO website, TIO has a commitment to fund \$1 million annually for STEM (science, technology, engineering and mathematics) education on Hawai‘i Island. The \$1 million annual payment is distributed through the THINK (The Hawai‘i Island New Knowledge) Fund, which was established in 2014. As of June 2018, TIO has distributed \$4 million to THINK. The THINK Fund is unrelated to the University’s or OMKM’s operations and accordingly is not recorded in KFS.

(ii) Commercial Tour Operator Revenues:

Commercial tour operator permits are managed by OMKM but signed by the UH Hilo Chancellor with review by the University’s General Counsel Office. As of September 2018, there are eight commercial tour operators with University approved permits:

- 1) Arnott’s Lodge & Hiking Adventures
- 2) Meridian H.R.T., Inc.
- 3) Hawai‘i Forest & Trail, Ltd.
- 4) Paradise Safaris, Inc.
- 5) Hawaiian Haoles, Inc.
- 6) Robert’s Tours & Transportation, Inc.
- 7) Taikobo, Hawai‘i, Inc.
- 8) Jack’s Tours, Inc.

Jack’s Tours, Inc. ceased operations on July 31, 2018. However, OMKM personnel stated that Jack’s Tours, Inc. continues to make required monthly minimum payments (\$1,200) to OMKM under the terms of their permit

Based on the websites of each of the permitted commercial tour operators, passengers are charged between \$150 and \$221 for tours to Maunakea, which may include various amenities such as hotel pickup, beverages, use of cold weather clothing, dinner and snacks. The permit allows commercial tour operators to transport passengers to the Maunakea Science Reserve and Halepōhaku daily (weather permitting). The permit contains restrictions on the number of tours allowed per day, the number of vehicles per day and the number of guests per vehicle. On a monthly basis, the commercial tour operators pay OMKM the greater

of \$1,200 or \$6 per passenger (\$2 for students). On a daily basis, each commercial tour operator must submit a passenger count report. The Maunakea Rangers (see *Maunakea Ranger Program*) are responsible for performing random counts of passengers which OMKM compares to daily passenger count reports. Unpermitted tour operators found to be operating on UH-managed lands on Maunakea are issued notices requesting cessation of commercial activities. Between January 2015 and June 2018, 37 notices were issued to 26 unpermitted commercial tour, taxi and limousine operators. However, no fines were issued by OMKM as draft administrative rules have not been approved. Administrative rules would provide OMKM with the authority to assess fines. According to OMKM personnel, OMKM collaborates with DLNR on documenting unpermitted tour operators on DLNR lands. This has resulted in DLNR citing and issuing fines to unpermitted tour operators.

On a monthly basis, each commercial tour operator must submit a monthly passenger count report. On an annual basis, OMKM compares these monthly reports to the daily reports. If there is a difference between the sum of the daily and monthly counts, the commercial tour operator is required to pay based on the greater amount. For the three years ended June 30, 2017, commercial tour operators reported approximately 60,000 passengers each year.

Internal Audit compared total commercial tour operator revenues recorded in KFS to a summary of aggregated monthly reporting compiled by OMKM and noted variances ranging between a \$1,000 deficit and \$10,200 for the three years ended June 30, 2017. The Director of Accounting and Finance at UHH identified and quantified the causes of the variances, which were primarily due to the following:

- Payments received on each month's passenger reports are typically deposited the following month. Therefore, passenger reports for June are not reflected in KFS until July (the next fiscal year).
- Late submittal (after the closure of the VIS for daily passenger reports and later than ten calendar days after month end for monthly passenger reports) of daily/monthly passenger reports by commercial tour operators results in a \$50 fine for each instance. During the three years ended June 30, 2017, seven, 10 and 15 late fines were assessed to commercial tour operators, respectively, resulting in additional revenue of \$350, \$500 and \$750.
- There were four instances where commercial tour operator monthly passenger counts were less than the minimum monthly payment of \$1,200. Therefore, the payment amount recorded in KFS was greater than the amounts reported on the monthly passenger counts.

As previously described in this report, Internal Audit noted that administrative rules governing commercial activities on UH-managed lands have been drafted and distributed for public comment but have not yet been finalized and approved (see Administrative Rules section *III. A. 4. a*). Until such administrative rules have been approved and implemented, OMKM cannot enforce unpermitted commercial tour operators from engaging in commercial activity on UH-managed lands. As noted previously, OMKM personnel informed Internal Audit that OMKM collaborates with DLNR to identify and document unpermitted operations on DLNR lands, resulting in the issuance of citations and fines by DLNR.

*c. Research Training and Revolving Funds:*

On an annual basis, OMKM submits a RTRF budget request to the University's VP for Research and Innovation. As a result of the annual RTRF budget request, OMKM has received RTRF funds ranging between \$420,000 and \$640,000 for the three years ended June 30, 2017. For these years, Internal Audit reviewed documents approved by the VP for Research and Innovation evidencing the annual RTRF allocation provided by the University System to OMKM. Internal Audit compared the RTRF amounts from the VP for Research and Innovation approved documents to the RTRF amounts recorded in KFS for OMKM noting no differences.

RTRF funds are used by OMKM to fund RCUH Internal Service Order accounts established to administer operational expenses, including payroll related to RCUH personnel. The most significant expense is the salary and benefits for RCUH personnel (as noted previously, two of the employees on OMKM’s organizational chart are paid by RCUH) or other temporary employees. Internal Audit noted that the funding of the RCUH accounts requires approval by senior management at OMKM, UHH and RCUH. Internal Audit reviewed the approved RCUH Internal Service Order forms for all OMKM funding for the three years ended June 30, 2017 and compared approved amounts to the amounts recorded to KFS, noting no differences.

## (2) Significant Expenses

### *d. Maunakea Ranger Program:*

OMKM established the Ranger Program (Ranger Program) in 2001. Each of the eight full-time Rangers (as of September 2018) generally work two 13-hour and one 12-hour shift per week (in addition to travel time, for a total of 40 hours per week) in order to provide daily oversight of activities on UH-managed lands on Maunakea 365 days a year from 7:15am to 10:15pm. A minimum of two Rangers work per shift but generally three Rangers work per shift with at least one stationed at the VIS. Responsibilities include protecting Maunakea resources, helping ensure public health and safety and informing visitors about the cultural, natural and scientific significance of Maunakea, as well as potential hazards. Additional duties include providing emergency assistance, litter and invasive species removal, conducting trail maintenance, semi-annual inspections of the Observatories and MKSS facilities at Halepōhaku for compliance with their CDUPs and random counts of passengers in commercial tour vans. Internal Audit obtained recent examples of letters sent to Observatories and MKSS related to the Rangers’ semi-annual CDUP compliance inspections, noting no instances of CDUP noncompliance. During the site visit, Internal Audit met two of the Rangers who were in the process of performing their daily inspections of the VIS before traveling to the Science Reserve.

Although OMKM is responsible for and fully funds the Ranger Program, MKSS provides administrative support including human resource services through RCUH. Rangers submit patrol reports daily to OMKM. Internal Audit reviewed a Ranger patrol report and noted information on the work performed by the Ranger and the location of the work. Activities also listed on the patrol report included potential safety hazards requiring resolution and counting of commercial tour passengers within UH-managed lands.

OMKM informed Internal Audit that the Ranger Program was established with only two full-time employees with an original purpose of Maunakea resource protection and public safety. However, according to the Director of OMKM, over time Ranger Program responsibilities have expanded to include activities that benefit all users of UH-managed lands, including the Observatories. In connection with the process of obtaining the new land authorization, Internal Audit believes that OMKM and IfA should initiate discussions with the Observatories regarding allocating a portion of Ranger Program expenses to the Observatories.

Internal Audit noted the cost of the Ranger Program has increased from \$627,310 for the year ended June 30, 2015, to \$910,016 for the year ended June 30, 2017. The increase is primarily due to an increase in the number of Rangers from between six and eight full-time Rangers during the year ended June 30, 2015 to between eight and nine full-time and two part time Rangers during the year ended June 30, 2017. For the three years ended June 30, 2017, Internal Audit compared the amounts recorded by OMKM for the Ranger Program to the amounts recorded by MKSS, noting differences ranging between \$6,000 and \$38,000. MKSS provided a schedule reconciling the differences accompanied with supporting documentation evidencing that the differences were due to the timing of invoice payments and credit memos issued subsequent to fiscal year end. See **Table 9** for details.

*e. Other MKSS Allocated Expenses:*

In addition to the cost of the Ranger Program, MKSS allocates certain expenses shared by OMKM and the Observatories (see *III.B.2.a(1)a. Payments from Observatories* for information on the allocation methodology). MKSS expenses allocated to OMKM include expenses related to the VIS, road maintenance and snow removal. The combined amount of MKSS allocated expenses (excluding the Ranger Program) ranged from approximately \$175,000 to \$225,000 for the three years ended June 30, 2017.

*f. Payments to the Office of Hawaiian Affairs:*

OMKM makes ceded land payments to OHA annually (20 percent of revenues received from commercial tour operators and TMT). For the three years ended June 30, 2017, payments have ranged from \$100,000 to \$135,000. Internal Audit recalculated the OHA payments for reasonableness without exception.

*g. Personnel Costs:*

OMKM personnel costs include full-time, part-time and student employees (excluding employees of the Ranger Program, see organizational chart at the beginning of section *III.B.1. Office of Maunakea Management*). As previously noted, certain RCUH wages and fringe benefits are also included in personnel costs.

(3) Assets

As of March 2018, OMKM capital assets recorded in KFS are as follows:

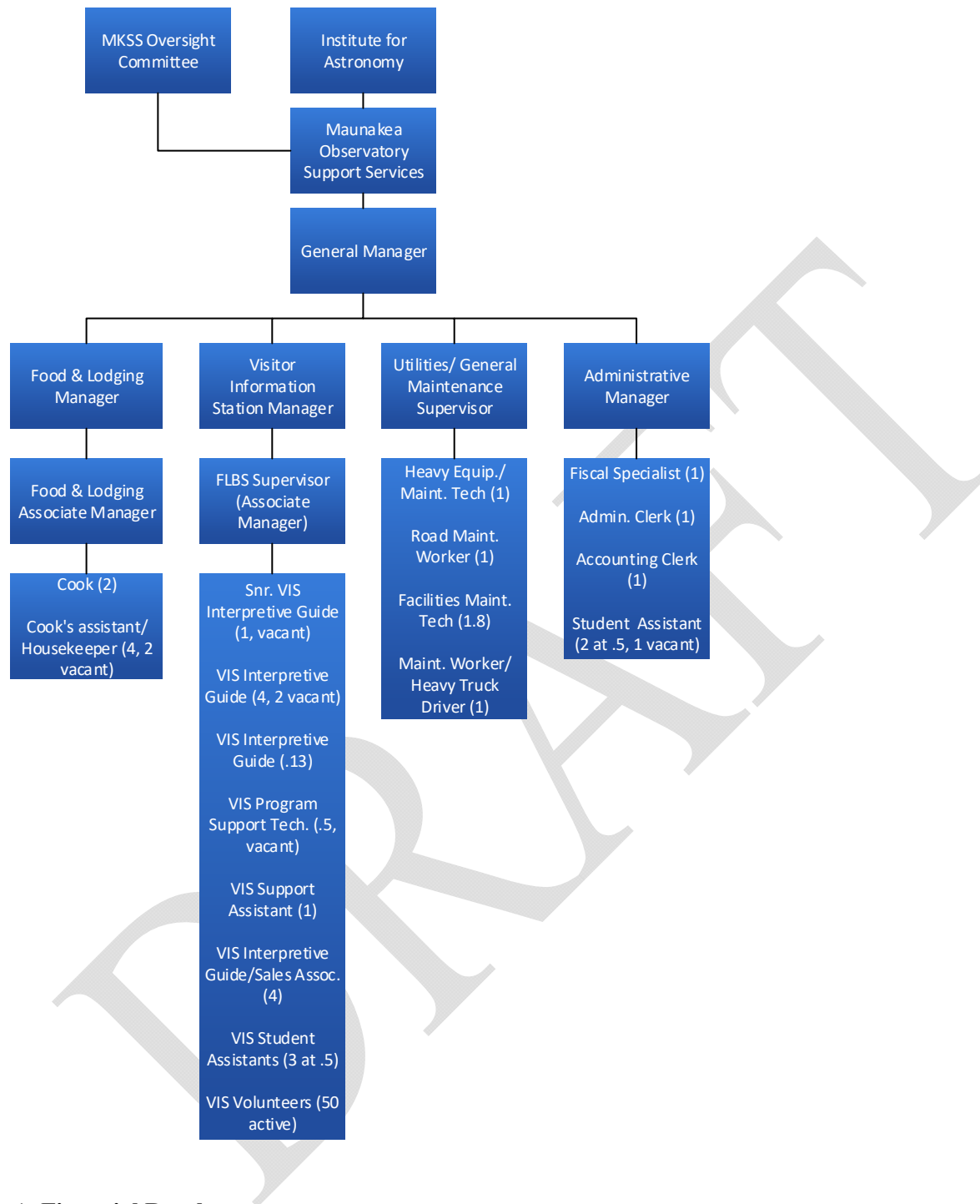
**Table 6: OMKM Capital Assets**

<u>Asset type</u>	<u>Original Cost</u>	<u>Accum. Deprec.</u>	<u>March 2018 Cost</u>
Vehicles	\$ 625,183	\$ (261,331)	\$ 363,852
Printer/copier	17,624	(9,227)	8,397
Totals	<u>\$ 642,807</u>	<u>\$ (270,558)</u>	<u>\$ 372,249</u>

Furthermore, when reviewing the MKSSOC September 2016 meeting minutes, Internal Audit noted that OMKM has a \$1.5 million budget for facility improvements to the VIS. Internal Audit was informed by the OMKM Director that the VIS improvements include construction of a 40-stall parking lot and a lane adjacent to the VIS and parallel to the road fronting the VIS. The purpose of the additional lane is to improve the safety for the dropping off and picking up of passengers.

## **2. Maunakea Observatories Support Services (MKSS)**

MKSS is a service organization that operates under the direction of the MKSSOC and provides logistical support services to all Observatories and operates and maintains the mid-level facilities at Halepōhaku. MKSS also supports, under the direction of OMKM, the Ranger Program. The MKSS organizational chart as of April 2018 was as follows:



#### a) Financial Results

RCUH provides administrative services to MKSS under a general internal agreement with the University. Internal Audit requested but could not be provided with the original MKSS Revolving Fund Service Order Form used to establish revolving funds with RCUH. According to the MKSS General Manager, this is likely due to the relationship between MKSS and RCUH being established many years ago. However, on an annual basis, MKSS submits an RCUH Revolving Account Service Order Request, as well as a Revolving Fund Certification. Internal Audit obtained both of these documents for each of the three years ended June 30, 2017, noting no exceptions. Based on these approved documents, RCUH provides administrative services such as

recording accounting transactions, procuring goods and services from vendors and disbursing the related payment, processing payroll, reconciling cash receipts, etc.

Each Observatory makes payments to MKSS based on budgeted amounts required to fund MKSS operations or for use of MKSS facilities/services. These payments are deposited into a RCUH bank account then disbursed to fund services performed by various MKSS cost centers (i.e., road maintenance, snow removal, etc.). See section *III.B.2.a(1)a. Payments from Observatories* for a description of each cost center. MKSS does not maintain its own cash accounts. MKSS manually records all financial transactions initially recorded into RCUH’s general ledger system into MKSS’ Denali accounting system. MKSS prepares financial reports using a combination of spreadsheets and Denali reporting to provide to the MKSSOC and other stakeholders. Expenses in these financial reports are classified by cost center and budget category rather than by expense nature or function to demonstrate that each cost center is operating on a break-even basis. According to the General Manager of MKSS, this methodology is required due to the various stakeholders (the University, RCUH and the Observatories) to which MKSS provides financial information. Different stakeholders require different presentation of information (i.e., cash basis, accrual basis, cost center allocations, etc.). MKSS revenue and expense transactions are not recorded in KFS.

For the purposes of this report, Internal Audit collaborated with MKSS to aggregate and summarize revenues by source and reclassify expenses by nature of expense rather than cost center and budget category. Information on which cost center and budget categories to reclassify was not readily available and required detailed review by MKSS personnel. However, in collaboration with MKSS personnel, Internal Audit was able to identify transactions and reclassify expenses to present the following summary of MKSS’s revenues and expenses for the three years ended June 30, 2017 on an accrual basis. The letters in the Reference column correspond with the descriptions of each significant account that follows this schedule.

Table 7: MKSS Financial Results

**Maunakea Observatories Support Services  
Statements of Revenues and Expenses (Unaudited)  
For the Three Years Ended June 30,**

	<u>Reference</u>	<u>2017</u>	<u>2016</u>	<u>2015</u>
<b>Revenues</b>				
Payments from Observatories:				
Allocated		\$1,178,560	\$1,179,928	\$934,411
Pay-per-use		78,492	98,384	117,326
Total	<i>a</i>	1,257,052	1,278,312	1,051,737
Payments from OMKM				
Ranger Program		907,795	803,034	621,348
Other		187,259	165,633	209,246
Total	<i>b</i>	1,103,679	968,667	830,594
FLBS (net of COGS of \$649,325, \$585,752 and \$631,802)	<i>c</i>	959,386	754,758	797,165
Room and board (net of COGs of \$237,404, \$258,195 and \$275,184)	<i>d</i>	942,733	927,368	1,123,394
Payments by IfA	<i>e</i>	60,000	60,000	60,000
Other services, fees and gains	<i>f</i>	86,592	177,695	78,320
Total revenues		4,400,817	4,166,800	3,941,210
<b>Expenses</b>				
Personnel	<i>*</i>	3,079,420	2,907,405	2,636,422
Repairs & maintenance		376,118	378,386	403,506
Utilities		152,665	230,270	418,520
Professional services		63,500	52,889	78,800
RCUH overhead		141,076	133,789	137,534
Depreciation		90,091	84,160	84,816
General admin		86,539	43,312	53,457
Transportation		36,521	27,742	11,379
Supplies		81,299	89,450	111,844
Office expenses		80,735	52,553	69,295
Outreach/marketing		48,009	48,188	28,624
Internal services		31,695	23,803	13,550
Other expenses		61,806	63,107	43,826
Total expenses		4,329,474	4,135,054	4,091,573
<b>Revenues in excess (deficit) of exp.</b>		<u>\$ 71,343</u>	<u>\$ 31,746</u>	<u>\$(150,363)</u>

Source: MKSS fiscal office

\* See section III.B.2.a(2) Significant Expenses for additional information.

**(1) Significant Sources of Revenue**

*a. Payments from Observatories:*

For pay-per-use services provided by MKSS (food and lodging, cleaning and office services, water, gasoline, etc.), Observatories are billed based on actual goods and/or services received. Additionally, monthly invoices are provided to the Observatories for their allocated portion of shared expenses. As previously noted, MKSS budgets and allocates expenses (based on cost centers) to OMKM and the Observatories based on an annual allocation schedule approved by the MKSSOC. The amounts recorded as revenue by MKSS represents the allocated portion of Observatory shared expenses invoiced to the Observatories. According to the General Manager of MKSS and Internal Audit's review of the MKSS operating budgets and consistent with the MKSS Management Plan, the objective of the budgeting and allocation of expenses process is to break-even (i.e.,

cover all MKSS costs). Budgeted and actual expense allocations to each Observatory and OMKM for the three years ended June 30, 2017 can be summarized as follows:

**Table 8: Observatory/OMKM Budgets to Actuals**

Observatory	For the Three Years Ended June 30,					
	2017		2016		2015	
	Budget*	Actual	Budget	Actual	Budget	Actual
UH 2.2m	\$ 77,096	\$ 83,703	\$ 76,909	\$ 76,909	\$ 61,006	\$ 58,456
IRTF	86,715	96,288	87,240	87,240	73,810	73,809
CFHT	72,387	82,149	68,680	68,680	60,972	56,242
UKIRT	65,776	71,431	66,786	66,786	55,658	53,365
Keck I/II	207,907	229,778	215,191	211,495	175,936	175,936
Subaru	143,055	161,415	146,930	146,930	111,674	111,531
Gemini	115,514	127,284	120,884	120,884	97,768	97,768
CSO	13,900	13,900	24,694	24,694	39,924	37,072
JCMT	101,991	113,685	87,395	87,395	81,238	76,930
SMA	96,710	106,911	96,653	96,653	79,951	79,951
VLBA	58,242	58,242	54,079	54,079	44,779	44,779
TMT	120,759	33,774 *	138,183	138,183	68,300	68,572
Total Observatory allocated expenses	<u>\$1,160,052</u>	<u>\$1,178,560</u>	<u>\$1,183,624</u>	<u>\$1,179,928</u>	<u>\$951,016</u>	<u>\$934,411</u>
OMKM allocated expenses (Ranger Program)	<u>993,349</u>	<u>907,795</u>	<u>791,445</u>	<u>803,034</u>	<u>646,959</u>	<u>621,348</u>

Source: MKSS

\* According to MKSS, in December 2016 the fiscal year 2017 budget was revised. Due to legal challenges regarding the TIO sublease, the University and TIO agreed to suspend payments of certain MKSS cost allocations (because of the delays in TMT construction and use of Maunakea roads and facilities) until a decision is rendered by the courts. The resulting budgetary shortfall was funded by the other Observatories.

Internal Audit obtained monthly invoices (related to allocated/budgeted costs only) to each Observatory for the three years ended June 30, 2017 and compared the invoiced amounts to allocated Observatory payments recorded by MKSS, noting no differences. An explanation of the allocation methodology for each significant cost center follows.

(i) *Visitor Information Station and First Light Bookstore:*

The previously described VIS and FLBS are partially funded by the Observatories, each of which is allocated costs based on Class (see **Table 3**) to fund any expenses greater than the corresponding revenues from operations. For the year ended June 30, 2017, OMKM estimates that there were between 160,000 and 175,000 visitors to the Science Reserve.

(ii) *Maunakea Astronomy Outreach:*

Internal Audit was informed by MKSS that the Maunakea Astronomy Outreach cost center provides funding for a portion of the community outreach programs funded and sponsored by the Observatories. The Maunakea Astronomy Outreach Committee (comprised of representatives from each of the Observatories as well as other organizations within the Hawai‘i Island astronomy community) is responsible for coordinating and planning the various outreach programs funded by the Maunakea Astronomy Outreach cost center. Programs include but are not limited to the Maunakea Scholars, the Waimea Solar Walk, Journey Through the Universe, Astroday and the Kama‘aina Observatory Experience. Generally, all expenses from this cost center are allocated based on Class to the Observatories.

However, on an ad hoc basis, there may also be contributions from non-Observatory sources, which reduce the costs allocated to the Observatories.

*(iii) Utility Department:*

The Utility Department is responsible for maintaining utilities for facilities on UH-managed lands. Utility operating charges and other expenses (e.g., depreciation) are allocated to the other relevant cost centers (i.e., Food & Lodging, Visitor Center, Road Maintenance, etc.) based on utility employees’ daily timesheets and the amount of time spent on work related to each cost center.

*(iv) Road Maintenance:*

Given the harsh climate and conditions on Maunakea, maintaining roads and access to the UH-managed lands is an ongoing challenge. According to the Director of OMKM, the road fronting the mid-level facilities at Halepōhaku (and extending 125 feet past the VIS entrance) is owned by DOT with all other roads within UH-managed lands (i.e., the Summit Access Road from Halepōhaku to the Science Reserve) owned by DLNR. However, given the aforementioned Grant of Easement issued to the University, MKSS is responsible for providing daily road maintenance on the unpaved portion of the Summit Access Road, which is consistent with the CMP. MKSS also provides road maintenance as needed on the paved roads above Halepōhaku. Daily road maintenance includes activities such as repairing potholes, tarring cracked roadways, regrading (occurs regularly on a 4.7 mile stretch of cinder/ash), repairing road reflectors, cleaning out culverts and repairing damaged guardrails. According to the MKSS General Manager, major road improvements occurred in 2005, 2012 and 2017, providing easier access up Maunakea. Road maintenance costs are allocated to the Observatories based on a combination of Class and road usage, each of which is equally weighted. To determine road usage, each Observatory vehicle must have an RFID (radio-frequency identification) tag that is scanned when vehicles pass certain points on Maunakea.

*(v) Snow Removal:*

The English translation of Maunakea is “White Mountain.” Snowfall, while not common for most of the year, generally occurs during the winter (December through February) on areas of Maunakea above 11,000 feet in elevation. During this time, MKSS operates a snow removal crew responsible for clearing roads of snow and ice (including cutting away chunks of ice to maintain access to the Science Reserve). Road closures are enforced under the following conditions:

- Any snow/ice on the road
- Sustained winds greater than 55 miles per hour (mph) or gusts greater than 65 mph
- Less than 50 feet of visibility
- Any emergent condition that makes the road unsafe for travel

Snow removal costs are allocated in the same manner as noted in section *III.B.2.a(1)a.(iv)Road Maintenance*, except that MKSSOC determined that the VLBA would be allocated half their usage factor with the other half allocated evenly across the other Observatories.

*(vi) Gasoline and Diesel:*

MKSS owns (through IfA) and maintains three underground fuel tanks and related fuel pumps. The underground fuel tanks are permitted by the State of Hawai‘i Department of Health (DOH). Internal Audit reviewed the current DOH permit and noted an effective date of April 28, 2015 (expiring April 28, 2020). Additionally, MKSS obtains an annual inspection report by a technician certified to work on the specific fuel tank system at Halepōhaku. Internal Audit obtained the most recent inspection report (dated March 6, 2018) and noted all three tanks were inspected and deemed to “Pass” the various tests with a final conclusion stating that all functions were operating normally. According to the General Manager of

MKSS, there are plans to replace the fuel tanks within five years. Internal Audit requested original cost and depreciation information for the fuel tanks but MKSS was unable to provide this information given the age of the fuel tanks, which likely were purchased in the 1980s. MKSS stated that the fuel tanks are fully depreciated. In addition to the cost of the fuel, significant expenses for this cost center include the following:

- Fuel pump system repairs and maintenance
- Utility charges
- Employee training

The associated costs (excluding the cost of fuel) are divided by the projected fuel consumption (in gallons) to determine MKSS’s fixed cost per gallon. The fixed cost/gallon is added to the wholesale cost/gallon and multiplied by the overhead rate (comprised of MKSS’s administrative overhead rate of approximately 13% (see *General Administration*) plus RCUH’s overhead rate of 3.2%) to determine the price to charge per gallon. Only pre-authorized vehicles from organizations working or conducting research on Maunakea (excluding commercial tour operators) may be refueled at Halepōhaku.

*(vii) Water:*

MKSS owns (through IfA) and maintains two 40,000 gallon water tanks. Internal Audit requested original cost and depreciation information for the water tanks but MKSS was unable to provide this information given the age of the water tanks, which likely were purchased in the 1980s. MKSS stated that the water tanks are fully depreciated. The tanks are refilled in 5,000 gallon increments using three MKSS-owned water tankers that transport potable water to Maunakea. According to the MKSS General Manager, the tankers are relatively old and require substantial repairs and maintenance, and will eventually need to be replaced. The water contract is bid every three years via a Competitive Sealed Bid. In addition to the cost of the water, significant expenses for this cost center include the following:

- Water system/tanker repairs and maintenance
- Water hauls (water deliveries to the Observatories within the Science Reserve or to the mid-level facilities at Halepōhaku)

The cost of water per gallon is calculated using the actual water costs as well as the various costs noted above, divided by the projected water usage. Two separate calculations are performed: 1) cost of water/gallon at Halepōhaku and 2) cost of water/gallon within the Science Reserve. This is necessary as the cost of transporting water to the Science Reserve is significantly greater than the cost to transport water to Halepōhaku. According to the MKSS fiscal year 2018 budget, the cost per gallon of water hauled to the Science Reserve was approximately 50 percent greater than that of Halepōhaku. Each Observatory has a water tank and is invoiced based on gallons of water delivered by MKSS.

*(viii) Halepōhaku Rehabilitation:*

Significant repairs to lodging facilities at Halepōhaku are funded via a maintenance surcharge on overnight stays (See section *III.B.2.a(1)d. Room and board*).

*(ix) Maunakea Weather Center:*

Operations of the Maunakea Weather Center are described in more detail in section *III.B.3.c Weather Center*. Weather Center costs are allocated based on Class to the Observatories that use the Weather Center’s services.

(x) *Communications Network:*

Halepōhaku includes a computer room with high-speed internet and printing services. All expenses from this cost center are allocated based on Class to the Observatories.

(xi) *Maunakea Atmospheric Monitor and All-Sky Infrared Visible Analyzer:*

The Maunakea Atmospheric Monitor (MKAM) and All-Sky Infrared Visible Analyzer (ASIVA) are technical equipment developed and purchased, respectively, by certain Observatories which now share the operating costs based on Class.

(xii) *General Administration:*

The General Administration cost center is used to budget and record all other administrative costs applicable to the Observatories in order to determine the MKSS overhead rate to apply to each of the other cost centers. Thus, this cost center is indirectly allocated to the Observatories through each of the previously described cost centers. The administrative overhead rate for the year ended June 30, 2017 was approximately 13%.

b. *Payments from OMKM:*

As previously noted in this report, OMKM makes payments to MKSS related to the Ranger Program and other expenses as described in section III.B.2.a(1)a. *Payments from Observatories* and **Table 8**. Internal Audit compared OMKM Ranger Program and other payments recorded by MKSS in **Table 7** with the payments to MKSS recorded by OMKM in **Table 4**, noting the following differences:

**Table 9: Comparison of OMKM payments from Table 4 to Table 7:**

	June 30,		
	2017	2016	2015
<u>OMKM Ranger Program payments:</u>			
Recorded by OMKM ( <b>Table 4</b> )	\$ 910,016	\$ 764,859	\$ 627,310
Recorded by MKSS ( <b>Table 7</b> )	907,795	803,034	621,348
Difference	2,221	(38,175)	5,962
Due to timing of Ranger Program payments	(11,003)	42,111	(1,118)
Due to credits or other adjustments by MKSS	8,782	(3,936)	(4,844)
Total difference	\$ -	\$ -	\$ -
<u>Other OMKM payments to MKSS:</u>			
Recorded by OMKM ( <b>Table 4</b> )	\$ 178,325	\$ 190,716	\$ 232,378
Recorded by MKSS ( <b>Table 7</b> )	187,259	165,633	209,246
Difference	(8,934)	25,083	23,132
Due to timing of payments	(1,844)	(25,083)	(23,132)
Due to reclassification of snow-related costs	10,778	-	-
Total difference	\$ -	\$ -	\$ -

As noted in **Table 9**, the differences in Ranger Program/other payments were due to the timing of Ranger Program/other payments, credits and other adjustments by MKSS. Internal Audit reviewed documentation and determined that all significant reconciling items were reasonable and supportable. Additionally, Internal Audit obtained monthly invoices to OMKM for the three years ended June 30, 2017 and compared the invoiced amounts to OMKM payments recorded by MKSS, noting no differences.

*c. Visitor Information Station/First Light Bookstore:*

The Maunakea VIS (established in 1986) is generally open daily from 9am to 10pm (as of August 26, 2018, the VIS is now closed on Sundays), and offers Interpretive Guides, informational panels, interactive displays, handouts and a video program to educate visitors regarding Maunakea. Rangers (at least one Ranger at any given time) are also situated at the VIS to answer visitor questions. Additionally, telescopes are available to the public at the VIS for stargazing four nights a week, weather permitting. During the site visit, Internal Audit toured the VIS and noted a number of telescopes that appeared to be in good operational condition (see section III.B.4. *UH Foundation* for more information) for the use of visitors to the VIS. Also located at the VIS is the FLBS, which sells Maunakea and astronomy related apparel, books, DVDs and other items. In addition to the physical store within the VIS, FLBS maintains an online e-store. MKSS management is responsible for determining the selection of product inventory.

Beginning in May 2016, FLBS began using the ShopKeep point-of-sale (POS) system to record, track and monitor sales, inventory and cost of goods sold. (Prior to May 2016, the POS system was NCR Counterpoint.) A daily comparison is performed between reporting from the POS system and the actual cash collected in the registers. This comparison includes a peer review for accuracy. Additionally, a second comparison is performed the following morning by the manager on duty, which may be the same employee that performed the previous day’s comparison (there must always be a second employee present). Daily cash collections are maintained in a locked safe in an individual bag for each day. Deposits are made to a RCUH account approximately three times a week due to logistical and personnel constraints. Daily, a sales report is provided by VIS/FLBS personnel to MKSS fiscal personnel, who enter the information into the Denali accounting system. Once the deposit is complete for a particular day, the deposit amount and POS credit card settlement report is compared to the sales amount entered in Denali for accuracy. Any discrepancies are investigated.

Revenues generated at the VIS reduce the costs allocated to the Observatories. Internal Audit compared FLBS revenue reporting from ShopKeep for the year ended June 30, 2017 to the revenues recorded by MKSS, noting no differences. According to MKSS personnel, no revenue reporting is available for previous fiscal years from the prior POS system (NCR Counterpoint).

On an annual basis, FLBS personnel perform a physical inventory count, which is then compared to inventory reported in ShopKeep. A summary of FLBS inventory for the three years ended June 30, 2017 is provided below:

**Table 10: FLBS Inventory Summary**

Financial information	For the three years ended June 30,		
	2017	2016	2015
Gross sales	\$1,608,711	\$1,340,510	\$1,428,967
Cost of goods sold	\$649,325	\$585,752	\$631,802
Gross margin	60%	56%	56%
Inventory per POS system	\$269,198	\$340,363	\$321,556
Less: Inventory per physical count	\$260,304	\$329,380	\$308,614
Shrinkage (\$)	\$8,894	\$10,983	\$12,942
Retail Shrinkage Rate (%)	0.55%	0.82%	0.91%

Source: MKSS

Internal Audit noted that MKSS calculates retail shrinkage (the loss of inventory due to theft, administrative error, damaged goods, or cashier errors) rates by dividing inventory shrinkage (based on the **cost** of inventory) by gross sales. Based on Internal Audit’s research, the retail shrinkage rate is generally calculated by dividing

inventory shrinkage (based on the **retail value** of inventory) by gross sales. This represents the difference between the optimal sales income that could have been realized (if not for the shrinkage) related to the inventory purchased and the actual sales income realized.

Using the actual gross margin rates from **Table 10**, Internal Audit calculated the retail shrinkage rates in a manner consistent with Internal Audit’s research. The resulting retail shrinkage rates for the three years ended June 30, 2017 were 1.38%, 1.86% and 2.06%, respectively. According to the 2017 National Retail Federation’s (NRF) Security Survey, the average retail shrinkage rate (not segregated by type of retail store) is 1.44% (an increase from 1.38% as stated in the 2016 and 2015 NRF surveys). Shrinkage rates may also be calculated by dividing the inventory shrinkage (based on the cost of inventory) by the ending cost of inventory (based on the accounting records). Using this methodology, Internal Audit noted the inventory shrinkage rates were 3.30%, 3.23% and 4.02% for the three years ended June 30, 2017, respectively. Internal Audit noted that during the three years ended June 30, 2017, MKSS retail shrinkage rates have improved year over year. Furthermore, the retail shrinkage rate for the year ended June 30, 2017 was below the average retail shrinkage rate noted in the NRF survey.

During the site visit, Internal Audit toured the sales floor of the FLBS and the locked inventory stock room noting that inventory was well-organized and appeared saleable with no obsolete or damaged items. In addition to its two cash registers, Internal Audit noted two safes, each of which were locked and secure. Internal Audit was informed that one safe is used to secure cash prior to deposit into the RCUH bank account, while the other maintains the daily cash register starting funds used to make change on cash purchases.

*d. Room and Board:*

The University owns the lodging facilities at Halepōhaku, which includes 72 rooms in the main lodge, four rooms in another structure for cooks, Halepōhaku workers, etc., and four cabins with four rooms each for construction workers.



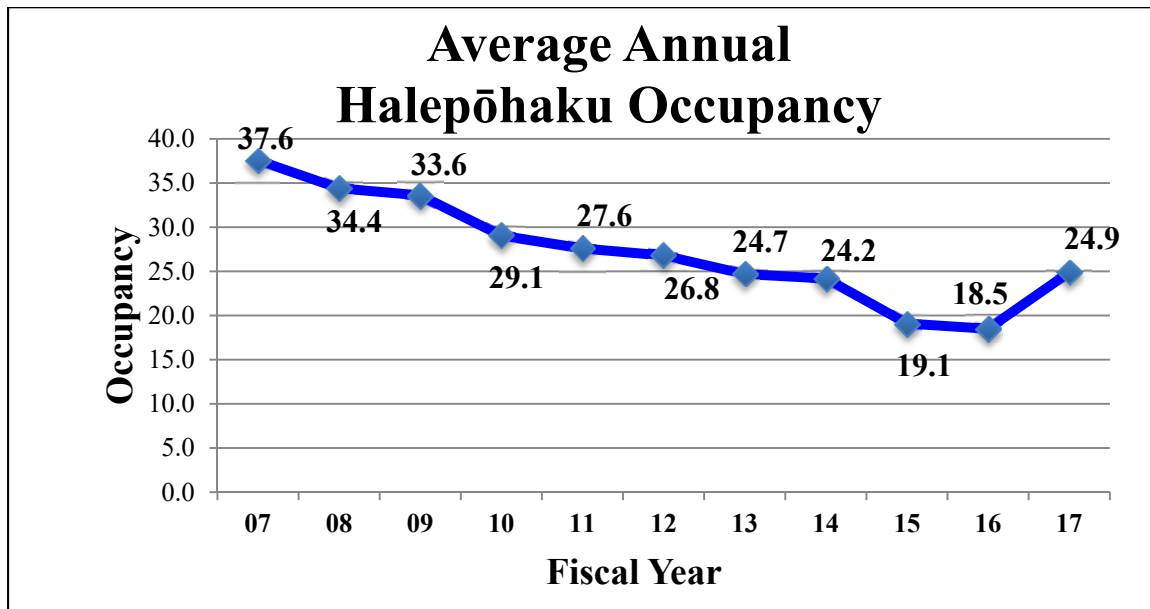
Observatories and the University have a “right of first use” for a specified number of rooms (ranging between two and 18 amongst the Observatories/University) in the main lodge based on amounts contributed toward original construction of Halepōhaku facilities (see section *III.B.2.a(3)Assets* later in this report). For those Observatories built after Halepōhaku was constructed, the number of rooms allocated is based upon contributions using the historical construction costs (total costs of approximately \$6.1 million between 1977 and 1991 to construct four dormitories, the lounge/dining facility, a utilities building, a generator building and the VIS). Currently, the University has the right of first use for the most rooms (18), due to the Joint Astronomy Centre ceasing scientific operations on Maunakea and turning over the UKIRT and JCMT telescopes to the University. The current allocation of rooms at Halepōhaku is as follows:

**Table 11: Halepōhaku Room Allocation**

<u>Observatory</u>	<u>Rooms Allocated</u>
UH	18
IRTF	13
CFHT	11
Keck I/II	9
CSO	6
Subaru	6
EAO	4
Gemini	3
SMA	2
Total	<u>72</u>

On any given night, vacant rooms are available for use by any other organization preauthorized to use the facilities. Room rates are re-evaluated quarterly based on current occupancy levels to ensure the facility is able to generate sufficient revenues to fund operations. In other words, if occupancy levels decrease, rates must be increased to compensate. Rates include two components: 1) the base rate determined by estimated costs divided by actual occupancy levels, and 2) a maintenance surcharge. A greater maintenance surcharge (approximately 50% greater) is assessed to non-Observatory personnel. For the three years ended June 30, 2017, daily room rates (including maintenance surcharge) have ranged between \$132 and \$165.

As shown by the following graph, occupancy rates at the main lodge have fluctuated, but have generally trended downward due to Observatories accessing and operating Observatories remotely.



Source: MKSS

Using monthly average occupancy data for the three years ended June 30, 2017, Internal Audit recalculated the revenue related to room and board and compared to actual room and board revenue recorded, noting that room and board revenues reflected in the **Table 7** MKSS financial results are reasonable.

Each room booking and the corresponding room rate includes three meals per day that are provided at a central dining facility. Food may also be obtained on an ala carte basis, but no payments are accepted on site at the dining facilities. Ala carte food purchases are recorded on a pre-printed form by the purchaser to allow MKSS to invoice the appropriate Observatory or other authorized entity (MKSS, OMKM, IfA, etc.). A physical food inventory is performed on a quarterly basis and subtracted from food inventory receipts to determine the cost of goods sold for each period. Internal Audit reviewed the physical food inventory count listings as of June 30 and December 31, 2015, 2016 and 2017, noting that the value of food inventory ranged from \$23,000 to \$36,000 during the period.

Internal Audit toured the food and lodging facilities at Halepōhaku and noted the kitchens are clean and in good condition. Food inventory was well-organized with no signs of outdated food or spoilage. Internal Audit also noted that Halepōhaku was inspected by the DOH for food safety and received a “Pass” rating. Internal Audit had three meals in the dining facility and found the food to be fresh, hot and high-quality. Dining is a combination of cafeteria and buffet style with no payment required. Instead, each diner completes one of two forms to be invoiced (either included in the cost of their lodging or ala carte). Additionally, Internal Audit stayed overnight in the lodging facilities and noted the room was clean with hot water and an effective heating system, as well as a humidifier and electric blanket. The lodging and dining facilities were equipped with wireless internet access.

*e. Payments by IfA:*

On an annual basis, IfA provides funding to support the VIS and FLBS. The amount is based on the MKSS annual operating budget approved by the MKSSOC. For the three years ended June 30, 2017, IfA made payments of \$60,000 annually to MKSS. Internal Audit obtained the MKSS annual operating budgets for the same period and noted budget allocations to IfA for the VIS/FLBS of \$60,000 for each year. Additionally, as previously noted, the University owns four of the Observatories, each of which are allocated annual expenses as noted in **Table 8**.

*f. Other Services and Fees:*

MKSS provides other services to the Observatories and visitors to Maunakea. These services include observatory cleaning, ad hoc snow removal, office services and special assistance at the VIS.

Internal Audit also noted that MKSS supports the Stargazing Live program (generally monthly) at the UH Hilo ‘Imiloa Astronomy Center (‘Imiloa). The program includes real-time images projected from the imaging telescopes at the VIS to guests at ‘Imiloa. According to the General Manager of MKSS, MKSS does not receive any revenues from this program and utilizes an insignificant amount of MKSS personnel resources. ‘Imiloa charges between \$6 and \$10 per ticket for the event.

(2) Significant Expenses

Other than the previously noted costs allocated to the Observatories and OMKM, MKSS’s greatest expense is personnel costs. MKSS personnel are primarily RCUH employees (except for two part-time UH employees for which payroll costs were less than \$40,000 annually for each of the three years ended June 30, 2017). For the three years ended June 30, 2017, Internal Audit compared the MKSS payroll registers (RCUH and UH payroll) to the MKSS trial balance, noting several differences due to timing (cash vs. accrual), all of which were reconciled and explained by MKSS personnel. Finally, Internal Audit noted that a summarized year-to-date payroll register could only be provided for the year ended June 30, 2017. For purposes of evaluating personnel costs for the two years ended June 30, 2016, Internal Audit manually aggregated payroll schedules by pay period and cost center then compared the summarized total to the MKSS trial balance, noting no significant unexplained differences. Internal Audit was informed by MKSS and RCUH personnel that year-to-date payroll registers are “purged” once the prior year’s records are “closed”. According to RCUH personnel, a system enhancement is in process to maintain historical year-to-date payroll registers.

(3) Assets

Various buildings for dining, lodging, visitors and administration were constructed at Halepōhaku between 1984 and 1991, and certain improvements were completed in 2012, as follows:

**Table 12: Halepōhaku Buildings**

<b>Structure Description</b>	<b>Year Built</b>	<b>Original Cost</b>	<b>Improvements (2012)</b>	<b>Accumulated Depreciation</b>	<b>June 30, 2017 Net Book Value</b>
Lounge/Dining	1983	\$ 715,469	\$261,957	\$ (697,309)	\$ 280,117
Dorm A	1984	574,848	44,198	(587,002)	32,044
Dorm B	1984	1,644,453	108,038	(1,417,657)	334,834
Dorm C	1984	1,139,304	81,847	(1,161,812)	59,339
Dorm D	1991	1,323,230	81,847	(918,798)	486,279
Utilities Bldg	1984	201,151	52,382	(184,180)	69,353
Generator Bldg	1984	79,233	16,369	(71,376)	24,226
Visitor Center	1984	432,267	52,382	(379,246)	105,403
Totals		<u>\$6,109,955</u>	<u>\$699,020</u>	<u>\$(5,417,380)</u>	<u>\$1,391,595</u>

In addition to the structures at Halepōhaku, MKSS owns capital assets that can be summarized as follows:

**Table 13: Halepōhaku Capital Assets**

<b>Asset type</b>	<b>Original Cost</b>	<b>Accum. Deprec.</b>	<b>June 30, 2017 Net Book Value</b>
Heavy machinery	\$ 729,381	\$ (657,229)	\$ 72,152
Vehicles	553,038	(380,088)	172,950
Heating/cooling systems	110,142	(59,138)	51,004
Communications, software and servers	78,435	(77,671)	764
Other	13,762	(12,142)	1,620
Totals	<u>\$1,484,758</u>	<u>\$(1,186,268)</u>	<u>\$298,490</u>

The above listing of capital assets does not include vehicles used by the Ranger Program which are purchased, owned and recorded by OMKM (except for a Ranger vehicle purchased by OMKM but procured by RCUH), capital assets purchased by IfA (see section *III.B.3. Institute for Astronomy*) or capital assets purchased through MKSS’s UH Foundation account (see section *III.B.4. UH Foundation*). Internal Audit also noted that MKSS recently acquired an ice detector system for approximately \$60,000 (not yet placed in service) to enable the early detection of black ice (ice on roads that is difficult to identify visually) that may create safety hazards. Internal Audit reviewed the operating budgets and statements of operations prepared by MKSS for the three years ended June 30, 2017, and noted that capital asset depreciation is accumulated within the related cost centers and allocated to the Observatories and OMKM as described previously in this report.

During the site visit, Internal Audit toured each of the above-noted buildings and structures noting that while many of the facilities are aging, they are in good, working condition. Internal Audit also noted a number of four-wheel drive vehicles for use between Halepōhaku and the Science Reserve, as well as some two-wheel drive vehicles to travel from Halepōhaku to sea level. Finally, Internal Audit noted heavy machinery used to maintain the roads, two water tanks containing potable water for use at the VIS and the dining/lodging facilities, and a refueling station to access the underground gasoline and diesel tanks.

### 3. Institute for Astronomy

As previously noted, IfA provides University oversight of MKSS while also managing operations for two of the four University-owned observatories (UH 2.2m Telescope and UK Infrared Telescope) and the Infrared Telescope Facility under contract with NASA.

#### a) Accounting for Decommissioning of Observatories

The decommissioning of Observatories is governed by the Decommissioning Plan. The Decommissioning Plan requires financial planning in regards to the expected costs to decommission each of the Observatories. Given the University’s ownership of four of the Observatories, the University is responsible for all costs associated with the decommissioning of these Observatories. According to the Decommissioning Plan, expected future decommissioning costs should be derived from common engineering cost estimate methods. Effective for fiscal years beginning after June 15, 2018 (fiscal year ended June 30, 2019 for the University), Government Accounting Standards Board (GASB) Statement No. 83, *Certain Asset Retirement Obligations* (GASB 83), requires that a governmental entity that has legal obligations to perform future asset retirement activities related to its tangible capital assets (i.e., the Observatories) should recognize a liability measured based on the best estimate of the current values of outlays expected to be incurred. Simultaneous to recognizing the liability, a corresponding deferred outflow of resources (asset) must be recognized. Over the estimated remaining useful life of each Observatory, the asset should be reduced and recognized as an outflow of resources (expense) in a systematic and rational manner. Internal Audit believes that the provisions of GASB 83 may be applicable to

the decommissioning of University-owned Observatories. Accordingly, IfA fiscal personnel should discuss the applicability of GASB 83 with the University's Financial Management Office (FMO).

#### **b) Capital Assets Purchased for MKSS**

From time to time, IfA has purchased capital assets for MKSS. These assets that are currently in use include hardware for the communications network (original cost of \$12,640), road maintenance equipment (original cost of \$57,014) and snow removal equipment (original cost of \$84,676). The MKSS capital asset listing did not include accumulated depreciation for IfA purchased capital assets as such capital assets and the related depreciation is accounted for by IfA. However, Internal Audit noted that given the in service dates of the capital assets it is likely that all IfA purchased assets are now fully depreciated.

#### **c) Weather Center**

The Maunakea Weather Center is a weather research and forecast facility funded by certain of the astronomical Observatories on Maunakea (as described in section *III.B.2.a(1)a.(ix) Maunakea Weather Center*). Weather Center personnel include the Director, a University of Hawai'i at Mānoa Department of Meteorology faculty member (.083 FTE), and two full-time RCUH employees. In addition to Maunakea weather forecasting, the Weather Center completes projects (e.g., development of models to determine atmospheric conditions, turbulence, etc.) at the discretion of the Site Monitoring Oversight Group (SMOG), which is composed of representatives from each of the Observatories that use the Weather Center's services.

### **4. UH Foundation**

Internal Audit consulted with UH Foundation senior management personnel and obtained a list of UH Foundation accounts related to Maunakea. Only one of the accounts provided is directly relevant to University operations on Maunakea. The account is managed by IfA/MKSS and is used for donations received by the VIS. According to the IfA website, the VIS accepts donations in person, online or via mail through an account administered by the UH Foundation. Donations are used to fund free public educational programs, including the telescopes included in the free nightly stargazing. Internal Audit confirmed the existence of the VIS UH Foundation account with UH Foundation personnel. Furthermore, Internal Audit reviewed the MKSS capital asset list and noted seven telescope-related items purchased from the UH Foundation account since 2000 totaling approximately \$55,000. As of May 2018, the account contained approximately \$23,000.

### **5. Other Financial Transactions not Directly Related to Management of Maunakea**

Through Internal Audit's discussions with the personnel listed in Appendix A, Internal Audit noted other University financial transactions related to Maunakea but not directly related to the management of Maunakea, as follows:

#### **a) RTRF Funds**

During the year ended June 30, 2016, Internal Audit noted a RTRF budget request by the Chancellor of UH Hilo to the University's VP for Research and Innovation to fund certain research, cultural development and programming, and community integration related to Maunakea. The budget request included funding for three projects, as follows:

- 1) Hawaiian Culture and Community Research and Data Collection- Aggregate, classify and interpret cultural and historic resources related to Maunakea.
- 2) Campus Programming- Develop educational and learning resources for faculty, staff and students to address soci-political-cultural themes through in-class activities.

- 3) Hawai‘i Island Community Development and Educational Outreach- Collaborate with elementary school and high school partners to provide island-wide development workshops regarding the role of Maunakea on Hawai‘i Island.

According to information provided by UH Hilo fiscal personnel and recorded in KFS, Internal Audit noted that the three projects noted above collectively received \$150,000 and \$178,761 during the years ended June 30, 2016 and 2017, respectively. As of June 30, 2018, approximately 75% of the amounts received were spent on personnel costs, with the remaining 25% comprised primarily of printing, advertising and supplies expenses.

**b) ‘Imiloa**

As noted on the ‘Imiloa website, ‘Imiloa (originally called the Maunakea Astronomy Education Center) was established in 2006 as a gathering place that advances the integration of science and indigenous culture. ‘Imiloa’s exhibits link early Polynesian navigation history and knowledge of the night skies to today’s Hawaiian culture and wayfinding, and the growth of astronomy and scientific developments on Hawai‘i Island. The 40,000-square-foot exhibition and planetarium complex cost approximately \$28 million and is located on nine acres in the University’s Science and Technology Park near the UH Hilo campus. From research and discussions with the various personnel listed in Appendix A, Internal Audit noted that ‘Imiloa is not involved with the stewardship or management of Maunakea, but does allow visitors to obtain information about Maunakea and remotely stargaze (through the Stargazing Live program, as described previously) without driving to Halepōhaku. Internal Audit noted that ‘Imiloa receives funding from UH Hilo in the form of general funds and tuition special funds, and also generates its own revenue through general admission tickets (for entrance into the facility and planetarium showings), special events (e.g., Stargazing Live), a gift shop and its Sky Garden Restaurant. According to UH Hilo fiscal personnel, ‘Imiloa may also, from time to time, receive extramural funds in the form of contracts and grants. Finally, ‘Imiloa accepts donations online through the UH Foundation.

#### IV. Overall Observations and Conclusions

This report identified and described various University entities involved with Maunakea. Internal Audit determined that each entity has a distinct and separate function as well as operating objectives. Accordingly, no individual or group of individuals at any entity could describe the University's overall operations and related financial results associated with the UH-managed lands on Maunakea. Internal Audit does not believe this to be a deficiency or weakness as the various University entities collaborate and coordinate their efforts effectively. However, this created challenges for Internal Audit in identifying the Maunakea related University entities resulting in the scheduling of a substantial number of meetings and phone calls and the distribution of e-mails and other forms of correspondence to understand the nature and breadth of University related Maunakea operations. In addition, the volume of documents requested and reviewed by Internal Audit resulting from these meetings and correspondence were substantial.

Based on the work performed, Internal Audit believes **Table 1** presents the significant revenues and expenses related to the University's management of Maunakea. In addition, Internal Audit believes University entities involved with Maunakea have developed processes and procedures to appropriately account for their respective financial transactions in connection with their management of Maunakea.

The remainder of this section is to summarize Internal Audit's overall observations and conclusions in connection with this audit. Internal Audit recommendations are included if warranted.

As described above and noted throughout this report, Internal Audit determined that various University entities were appropriately accounting for their respective financial transactions associated with the University's management of Maunakea. These entities include but are not limited to the University of Hawai'i at Mānoa, IfA, UHH, OMKM, RCUH and MKSS. As noted in this report, RCUH provides administrative services to MKSS including recording accounting transactions and processing payroll. MKSS prepares financial reports by combining spreadsheets generated from RCUH's general ledger (cash basis) with accounting records maintained by a software package named Denali (accrual basis).

OMKM and MKSS combined revenues (adjusted for intercompany transactions) for the year ended June 30, 2017 approximated \$5.4 million. Revenue sources include Observatory billings, general and tuition special funds, research training and revolving funds, commercial tour operator billings and TMT lease rent. Personnel related costs are the most significant expense approximating \$3.8 million for the year ended June 30, 2017. The Ranger Program approximates \$910,000 of the \$3.8 million. OMKM funds all Ranger Program expenses.

Although not classified as revenue, Internal Audit also noted other sources of cash provided by the Observatories. These sources include Observatory initial construction costs (\$600 million), contributions by certain Observatories for Maunakea infrastructure improvements (ranges from \$628,000 to \$2.4 million) and a \$1 million annual contribution by the TIO to fund STEM education programs on Hawai'i Island. Additional benefits to Hawai'i Island include the collective employment (Observatories, OMKM and MKSS) of approximately 500 Hawai'i Island residents, as well as various community outreach programs (e.g., Maunakea Scholars, the Waimea Solar Walk, Journey Through the Universe, Astroday and the Kama'aina Observatory Experience) delivered by the Observatories.

The following summarizes Internal Audit recommendations previously described in this report:

1. MKSS should consider consulting and collaborating with RCUH to determine whether accounting system enhancements are available to allow for a more efficient recordation of transactions initially recorded into the RCUH system into the Denali system.

2. Internal Audit noted that payroll registers for historical fiscal years (in excess of one year) are not maintained by RCUH. Accordingly, MKSS should monitor the status of RCUH’s proposed system enhancement to archive historical payroll registers.
3. MKSS should consider improving its documentation in regards to transfers between cost centers to ensure the flow of financial information is complete and accurate. Each transfer made should include clear documentation as to which expense accounts the transfer is being made to and from in the related cost centers.
4. In connection with the process of obtaining the new land authorization, OMKM and IfA should initiate discussions with the Observatories with respect to allocating a portion of Ranger Program costs to all Observatories given the increase of this cost since 2000 and since the services provided by the Rangers benefit all entities operating at Halepōhaku and within the Science Reserve, including the Observatories. The sharing of this cost would also allow RTRF and tuition special funds provided to OMKM from the University to be used for other purposes.
5. Determine if the commercial tour operator per passenger charge (\$6) is sufficient to recover the costs incurred by OMKM and MKSS in servicing these passengers.
6. IfA should consult with FMO to determine the applicability of GASB 83 related to the future decommissioning of the four Observatories owned by the University. If GASB 83 accounting entries must be recorded, discussions should commence estimating the value of each Asset Retirement Obligation.

Appendix A

Key Personnel Consulted During the Course of the Audit

<b>Name</b>	<b>Position</b>	<b>Department</b>
Vassilis Syrmos	Vice President for Research and Innovation	System- Office of the Vice President for Research and Innovation
Stephanie Nagata	Director	Office of Maunakea Management
Gregory Chun	Chair (and Associate Specialist)	Maunakea Management Board (and Social Science Research Institute)
David Lonborg	Interim Associate Director	Institute for Astronomy
Stewart Hunter	General Manager	Maunakea Observatories Support Services
Douglas Tonokawa	Director of Finance	Research Corporation of Hawai‘i
Jennifer Chang	Project Administrator	Research Corporation of Hawai‘i
Mason Kuo	Director of Accounting and Finance	UH Hilo
Lois Fujiyoshi	Executive Director of Budget and Business Management	UH Hilo
Kevin Hanaoka	Manager of Data Analysis	System- Office of Research Services
Kelcie Watai	Fiscal Accounting Specialist	System- Capital Asset Accounting Office
Dawn Pamarang	Secretary	Office of Maunakea Management
Robert McLaren	Interim Director	Institute for Astronomy
Paul Kobayashi	Chief Financial Officer	UH Foundation
Jason Ono	Chief Administrative Officer	UH Foundation
Joyce Merrick	Fiscal Specialist	Maunakea Observatories Support Services
Gwen Biggert	Administrative Officer	Maunakea Observatories Support Services

University of Hawai'i at Hilo Administration  
Office of the Chancellor



UNIVERSITY  
of HAWAII  
**HILU**

November 19, 2018

**MEMORANDUM**

TO: Mr. Glenn Y. Shizumura  
Mr. David Estes  
Office of Internal Audit, UH System

FROM: David Lassner *David Lassner*  
Chancellor, University of Hawai'i at Manoa

Marcia Sakai *Marcia Sakai*  
Interim Chancellor, University of Hawai'i at Hilo

SUBJECT: Response to audit conclusions and management recommendations, regarding  
the review of Maunakea

Thank you for the opportunity to comment on your audit report entitled "University of Hawai'i Review of Maunakea" dated September 2018.

As indicated by your letter to the Board of Regents and President of the University of Hawai'i System, the scope of the audit included an "evaluation of University funds, lease payments, and external funds received in support of stewardship, management, education, and other activities related to Maunakea." The audit also included a review of transfers of funds between the University and the Research Corporation of the University of Hawai'i, payments made by the Maunakea observatories to University-related Maunakea support programs, and other sources of funds used for stewardship functions on Maunakea.

The issues surrounding the stewardship of Maunakea are complex and I appreciate the thoroughness in your review. Generally, we agree with your review and recommendations. Attached is our comments to your recommendations.

Please let me know if you have any questions.

Attachment

cc: Kalbert Young, Vice President for Budget & Finance, Chief Financial Officer, University of Hawai'i

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**Memo attachment: Response to audit conclusions and management recommendations regarding the review of Maunakea**

**Recommendation 1: MKSS should consider consulting and collaborating with RCUH to determine whether accounting system enhancements are available to allow for a more efficient recordation of transactions initially recorded into the RCUH system into the Denali system.**

Management Response: We concur and have implemented this recommendation by consulting with RCUH. RCUH has been very responsive to MKSS' concerns and has worked with MKSS to implement data transfer between RCUH and the Denali system. MKSS was given permission to work directly with RCUH's technology consultant, DataHouse, to explore implementation of automated financial data transfer between RCUH and the MKSS Denali accounting programs. However, due to data security and integrity concerns at RCUH, it was determined that accounting system enhancements of this nature are not feasible at this time. We concur and are implementing this recommendation by consulting with RCUH regarding system enhancements and monitoring progress.

**Recommendation 2: Internal Audit noted that payroll registers for historical fiscal years (in excess of one year) are not maintained by RCUH. Accordingly, MKSS should monitor the status of RCUH's proposed system enhancement to archive historical payroll registers.**

Management Response: We concur and are implementing this recommendation by consulting with RCUH regarding system enhancements and monitoring progress. MKSS is hopeful that a soon-to-be-released RCUH payroll reporting system will include past year payroll registers. MKSS has asked that the updated system also have improved search functions for both calendar and fiscal years.

**Recommendation 3: MKSS should consider improving its documentation in regards to transfers between cost centers to ensure the flow of financial information is complete and accurate. Each transfer made should include clear documentation as to which expense accounts the transfer is being made to and from in the related cost centers.**

Management Response: We concur. MKSS has implemented additional budget codes within the MKSS internal accounting system to more clearly document and track transfers between related cost centers.

**Recommendation 4: In connection with the process of obtaining the new land authorization, OMKM and IfA should initiate discussions with the Observatories with respect to allocating a portion of Ranger Program costs to all Observatories given the increase of this cost since 2000 and since the services provided by the Rangers benefit all entities operating at Halepōhaku and within the Science Reserve, including the Observatories. The sharing of this cost would also allow RTRF and tuition special funds provided to OMKM from the University to be used for other purposes.**

Management Response: We agree that the Maunakea Observatories should share in the costs of the Ranger program in the future. Current cost-sharing arrangements are established pursuant to contracts entered into between the University and the Observatories at the time

each Observatory was constructed. Discussions have been initiated and are ongoing between the University and the Observatories regarding the allocation of stewardship and management costs, including costs of the Ranger program, under the new agreements that will be established after the University obtains the new land authorization. The University is committed to ensuring that all new agreements include sharing of stewardship and management costs.

**Recommendation 5: Determine if the commercial tour operator per passenger charge (\$6) is sufficient to recover the costs incurred by OMKM and MKSS in servicing these passengers.**

Management Response: The OMKM is working with the University's School of Travel Industry Management on a study that will evaluate visitor characteristics, including numbers, vehicles, activities and recreational use, behavior patterns, capacity and related impacts, and admission fee policies and rates. In addition the study will evaluate the capacity of commercial tour vehicles, passenger quantities, time of day visitation, and permit fees rates. The study is entitled, *Determination of Visitor Characteristics, Impacts, and Capacities in the Halepōhaku and Summit Areas of Maunakea*. The anticipated completion date of this study is December 2021 with the majority of related field work expected to be completed by the end of 2019.

**Recommendation 6: IfA should consult with FMO to determine the applicability of GASB 83 related to the future decommissioning of the four Observatories owned by the University. If GASB 83 accounting entries must be recorded, discussions should commence estimating the value of each Asset Retirement Obligation.**

Management Response: Management recognizes the auditor's advisement regarding accounting standards for recording, and the accounting of, future potential decommission costs. IfA will provide information and analysis to FMO as needed to support the preparation of the University's financial reports.