Proposal for the Development of a Graduate Degree Program in Marine Biology at The University of Hawai‘i, Mānoa

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Name and Signature
MARINE BIOLOGY GRADUATE PROGRAM

1.0 Introduction

The University of Hawai‘i at Mānoa (UHM) is uniquely positioned to excel with a graduate program in Marine Biology. The university is situated in the Hawaiian Archipelago, which contains the largest coral reef habitats in the United States, and one of the largest marine refuges in the world. The coastal and open waters around the archipelago are a natural laboratory for the study of marine ecosystems, marine biogeochemical processes, reef and oceanic fisheries, and human/marine interactions. The university also currently employs a larger number of researchers and faculty in various departments whose expertise is related to the marine environment. There has been consistently high demand by incoming graduate students for training in marine biology, because of the natural advantages of location and the abundance of relevant research opportunities and infrastructure at the UHM campus. Unfortunately, the university has been unable to adequately serve the needs of these students. The only official academic opportunity in this field at this university is a specialization in marine biology offered as a supplement to a graduate degree in Microbiology, Oceanography, Botany, or Zoology. Because marine biology exists only as a specialization, students must meet the requirements of one of these four graduate programs, which severely restricts the marine biology training they can receive. A separate graduate program in Marine Biology would allow students to receive advanced training that is specifically tailored to their interests. Such a program would also address the growing need, locally and globally, for technically trained scientists, managers, and policy makers who understand the processes that govern tropical marine ecosystems. Sound management of marine resources is becoming critical as these resources come under mounting pressure for exploitation from a growing human population and increasing stress from global climate change.

In light of the high demand for graduate training in marine biology, the societal needs for specialists in this field, and the advantages of providing such training at this institution, it is hereby proposed that a graduate degree program in Marine Biology be established at the University of Hawai‘i at Mānoa. The proposed program brings to this graduate training, the considerable expertise in Marine Biology in the College of Natural Sciences and the School of Ocean and Earth Sciences and Technology.

2.0 Program Objectives

The objective of the Ph.D. and M.S. degree programs in Marine Biology is to train future leaders in the marine biological sciences that include fisheries, coral reef biology, marine ecological and evolutionary genetics, marine biosensory and physiological processes, and marine resource management as they relate to tropical marine life and systems. The world’s oceans are facing increasingly higher sea surface temperatures, increased CO₂ saturation, and rising sea levels. These changes are expected to have profound effects on marine ecosystems, affecting coral reefs with increased bleaching episodes and changing the food web dynamics that regulate the productivity of our fisheries. We will need scientifically trained leaders who can identify, investigate, and solve problems related to ocean and
coastal resources. The program will provide advanced professional training in Hawai‘i and help to meet State and national needs for mid-level managers in both the private and public sectors. Additionally, the Ph. D. programs will prepare future college-level faculty for entry into a rapidly expanding field in marine ecosystem research. The program will be an important bridge between University researchers, industry, and government via the Marine Biology Advisory Council (described later under Program Administration).

This inter-college/school, collaborative Ph.D. and M.S. program will admit highly qualified students with a background in biological sciences and a desire to be at the forefront of research and development in marine biological sciences. Prospective students will be the doctoral and master’s degree candidates who now apply for the Marine Biology specialization in Botany, Microbiology, Oceanography, and Zoology (Table 2). Since 2003, the number of applicants for the marine biology graduate program specialization has ranged from 67 to 186, and the number admitted from this pool has ranged from 5.6% to 20% with an average admittance rate of 11%. There is a great demand for this program, which is currently administered as a graduate specialization in which students are first admitted into the respective academic departments and then are accepted into the graduate specialization. Once accepted into one of the four academic homes, the student must abide by the graduate degree requirements of Botany, Microbiology, Oceanography, or Zoology before establishing their graduate research effort.

The College of Natural Sciences (CNS) and the School of Ocean and Earth Science and Technology (SOEST) have brought their faculty together in this collaborative effort to provide a Doctoral and Master’s degree program that will allow graduate students to work with scientists in both units to design a graduate research program that makes use of the marine science expertise in CNS, SOEST, and the University of Hawai‘i industry, state and federal agency partners.

The proposed graduate program will prepare graduates for leadership and innovation in marine biological sciences by fostering their development as critical thinkers, interdisciplinary scholars, communicators, educators and researchers. They will understand the research process, the engagement of cross-disciplinary teams in problem solving, and they will learn to communicate their findings to all audiences. To accomplish these goals, the program will ensure that graduates demonstrate:

1. A comprehensive understanding of marine biological systems including the organisms, their habitats and biodiversity. In particular, this program seeks to expose students to organisms, systems, and processes that occur in both offshore (oceanic) and near shore (coast and reef) environments with an emphasis on the important links between these habitats.
2. Expertise in the quantitative and qualitative methods for field and laboratory research.
3. A working, in-depth understanding of research methodologies and developed skills in competitive grant writing and the publication and dissemination of research findings in professional and practical applications.
4. Experience in industry, state and federal agency working environments. These program goals will be accomplished through the collective expertise of the graduate faculty of CNS and SOEST and their partners in marine biological sciences at state and federal agencies, and the oceanic and coastal industries.

3.0 Program Justification

Nearly 40% of the world’s population is concentrated in the continental coastal zones and many of these coastal residents depend directly on the ocean and coastal ecosystems for their livelihood. Marine resources, especially seafood, are the primary source of income and food for over a billion people on the globe and many are in developing countries. The needs for the ocean and coastal ecosystem goods and services are likely to increase substantially as the human population continues to grow and as more people move to coastal areas. As a consequence, the degradation of coastal and marine ecosystems is expected to worsen and there is a critical need to build capacity to ensure the future of ocean and coastal communities and the supporting ecosystem services. Capacity building for stewardship of the oceans and coasts is a complex multidimensional challenge and the University of Hawai‘i must take part in building that capacity. We describe here a program of graduate training that should strengthen the University’s efforts in developing a workforce that will participate in community, federal and state efforts to 1) anticipate and manage unprecedented changes in coastal ecosystems; 2) monitor marine ecosystems; 3) effect change in attitudes and knowledge about ocean and coastal ecosystems; 4) effect policies that ameliorate the impacts of land-based activities on coastal resources and ecosystem services; and 5) protect and respect the cultural and ecological knowledge of the Hawaiian people.

There are no other doctoral programs in marine biology in Hawai‘i. Hawai‘i Pacific University offers an M.S. degree in Marine Sciences and the University of Hawai‘i at Hilo offers an M.S. degree in Tropical Conservation Biology and Environmental Sciences in which a marine biology focus is possible. In the Pacific, the University of Guam offers an M.S. in Biology at the University of Guam Marine Laboratory. In 2011, there were only six institutions in the United States that offered a Ph. D. degree in Marine Biology: University of Alaska at Fairbanks, University of California in San Diego (Scripps Institution of Oceanography), University of Miami (RSMAS), University of Maine, The University of North Carolina at Wilmington, and University of Oregon at Eugene (Table 1. U.S. Institutes of Higher Education with Doctoral Programs in Marine Biology). Similarly, these are the same institutions that offer M.S. degrees in Marine Biology.
<table>
<thead>
<tr>
<th>Institution</th>
<th>Department</th>
<th>Ph. D.</th>
<th>M.S./M.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Calif. Los Angeles</td>
<td>Ecology &amp; Evolutional Biol</td>
<td>EEB</td>
<td>MA in Mar. Sci</td>
</tr>
<tr>
<td>Florida State University</td>
<td>Biological Sciences w/Ecology &amp; Evolution</td>
<td>Biological Sci</td>
<td>MS in Biological Sci</td>
</tr>
<tr>
<td>University of Guam</td>
<td>Marine Biology Laboratory</td>
<td>In academic discipline</td>
<td>MS in Mar. Sci.</td>
</tr>
<tr>
<td>Hawai‘i Pacific University</td>
<td>College of Natural Sciences, Marine Science</td>
<td>w/Mar.Biol. specializ.</td>
<td></td>
</tr>
<tr>
<td>University of Hawai‘i at Mānoa</td>
<td>Zoology, Botany, Microbiology, Oceanography</td>
<td>MS in discipline</td>
<td></td>
</tr>
<tr>
<td>University of Miami RSMAS</td>
<td>Marine Biology and Fisheries</td>
<td>Mar. Biol.</td>
<td>MS in MBF</td>
</tr>
<tr>
<td>University of Maryland</td>
<td>Marine-Estuarine Environ Sci</td>
<td>MEES</td>
<td>MEES</td>
</tr>
<tr>
<td>Boston University</td>
<td>Marine Science</td>
<td>Mar. Sci.</td>
<td>MA in Mar. Sci</td>
</tr>
<tr>
<td>Harvard University</td>
<td>Organismic &amp; Evol. Biol.</td>
<td>OEB</td>
<td>MA in OEB</td>
</tr>
<tr>
<td>University of Mass Dartmouth</td>
<td>Marine Science</td>
<td>Mar. Sci.</td>
<td>MS in Biology</td>
</tr>
<tr>
<td>Rutgers Inst. Marine &amp; Coastal Sci</td>
<td>Marine Science (Oceanography)</td>
<td>Oceanog</td>
<td>MS in Oceanog</td>
</tr>
<tr>
<td>Cornell University</td>
<td>Ecology or Evolutionary Biol.</td>
<td>E or EB</td>
<td>MS in E or EB</td>
</tr>
<tr>
<td>Texas A&amp;M University Corpus Christi</td>
<td>Biology/Marine Biology track</td>
<td>Biology</td>
<td>MS in Biology</td>
</tr>
<tr>
<td>University of Texas Austin</td>
<td>Marine Science</td>
<td>Mar. Sci.</td>
<td>MS in Mar. Sci.</td>
</tr>
</tbody>
</table>
4.0 Needs Assessment

Demand for the Program

The need for a graduate degree program in Marine Biology is demonstrated by the annual requests for admission into the marine biology program specialization. There were 125 applicants in 2003, 154 in 2004, 186 in 2005, 67 in 2006, 101 in 2007, 75, in 2008, and 96 in 2009. In the case of botany, the requests remain at a very low rate of the total departmental doctoral applicant pool (3-7%), in Microbiology from 9-67%, in Oceanography from 18-36%, and in Zoology from 50-64% (Table 2. Marine Biology Graduate Applications for 2003-2010). The program has maintained a steady number of approximately 100 applicants for the doctoral program. The number accepted, however, indicates that there is an unmet need. In Oceanography, the number admitted ranged from 9-12% and in Zoology, from 15-33% of the applicant pool. In Botany, the single doctoral candidate admitted into the marine biology specialization in 2005-6 was one of two applicants. The Marine Biology graduate specialization program has never engaged in any recruitment efforts and potential graduate students have to make a real effort to understand the process of applying for a graduate specialization in marine biology that is hosted by four academic homes. Often students are confused by the process that requires each potential applicant to first gain admittance into one of the four academic departments before they can be admitted into Marine Biology.

The four academic departments that currently train graduate students in marine biological sciences have their own graduate degree requirements that take precedence over the marine biology courses that would provide a broader, more comprehensive training in the field. The academic disciplines also require a majority of the advisory committee to be composed of members of the academic discipline so that a truly interdisciplinary committee is not possible. For instance, Biological Oceanography students must have at least 3 of 6 Ph. D. committee members in the Oceanography Department. This requirement, often, does not meet the need for interdisciplinary training of many Marine Biology students. Clearly, the justification of this program is the interdisciplinary training of marine biology graduate students. This program would bring together faculty across departments and schools to serve equally in graduate training. They would also participate in a comprehensive survey course in Marine Biology.

The proposed graduate program will also bridge the professional development of students across University of Hawai‘i campuses. The University of Hawai‘i at Hilo has a very active undergraduate program in Marine Science (College of Arts and Sciences). This bachelor’s degree is designed to provide students with a comprehensive understanding of the world’s oceans and an appreciation of the importance of marine ecosystems to the global environment and human life. This includes basic and advanced training in oceanographic and marine biology, including marine fisheries. Bachelor of Science degree specializations are offered in both Aquaculture and Coastal Resources & Watershed Management (College of Agriculture, Forestry & Natural Resource Management). These tracks prepare many students with undergraduate training in the biology, management, conservation and policy issues

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relative to coastal marine ecosystems, including fisheries and aquaculture. Masters of Science degrees in Tropical Conservation Biology and Environmental Science are also offered at UH Hilo that involve many faculty from these colleges. The establishment of the proposed Marine Biology graduate program at UH Mānoa would provide additional degree opportunities at the MS and PhD levels for students at UH Hilo. Furthermore, the program can potentially facilitate future cross-campus collaborations in marine biology, fisheries, aquaculture and other promising areas of marine research (see letters of support).

Demand for Ph. D. and M.S. Graduates in Marine Biology

In the 2010-2011 Occupational Outlook Handbook, employment opportunities for biological scientists are projected to grow 21% over the 2008-2018 decade, much faster than the average for all other occupations. There were 91,300 employed biological scientists in 2008 and in 2018, there is expected to be 110,500 jobs for biological scientists (21% increase; 1920 new jobs each year). Largely fueled by biotechnological research and development, the job growth is expected in the environmental and marine sciences. It is clear, however, that graduates in marine biology should gain training that allows them to consider a wider choice of employment opportunities in government and industrial research and development, regulatory agencies, as well as academic research programs. In Hawai‘i, the job outlook for life sciences employment excluding agricultural biotech in 2007 was 7,970 positions with a growth rate of 2.3% (2002-2007) as compared to a growth rate of 1.4% in the U.S. (Innovation & Technology in Hawai‘i: An Economic & Workforce Profile, October 2008).

In 2008, NOAA undertook the study “The Shortage of the Number of Individuals with Post-Baccalaureate Degrees in Subjects Related to Fishery Science” and found that the market for stock assessment scientists is increasing (Boremann, 2008). The Magnuson-Stevens Fisheries Conservation and Management Reauthorization Act of 2006 had projected an increasing need for careful scientific assessments of the managed fisheries stocks in the United States. Scientists with “the ability to conduct high-quality scientific research in stock assessment, fishery population dynamics, and related fields” were not going to be available to meet a minimally estimated need of 180-340 nationwide over the next 10 years. The results of the study indicate that the gap between supply and demand will widen as the current proportion of faculty working on population dynamics and other fields related to stock assessment training is expected to decrease in the foreseeable future. The National Marine Fisheries Service has initiated partnerships with academic institutions to recruit faculty who will assist in the training of future scientists by offering graduate courses in marine population dynamics/stock assessment. The University of Hawai‘i is the recipient of one of these positions.
### Table 2. MARINE BIOLOGY GRADUATE APPLICATIONS FOR 2003-2010

<table>
<thead>
<tr>
<th>Marine Biology specialization applicant pool</th>
<th>Total applicant pool per department</th>
<th>% depart. applicants in Marine Biol</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOT MS</td>
<td>3 5 4 3 5</td>
<td>7.41% 3.03% 4.76%</td>
</tr>
<tr>
<td>BOT PHD</td>
<td>2 5 2 1 1</td>
<td>27 29 33 21 15</td>
</tr>
<tr>
<td>MICR MS</td>
<td>2 8 5 2 3</td>
<td>9 5 11 12 12</td>
</tr>
<tr>
<td>MICR PHD</td>
<td>2 5 6 1 2</td>
<td>91 56 59 60 64</td>
</tr>
<tr>
<td>OCN MS</td>
<td>25 27 37 10 16</td>
<td>36.26% 23.21% 33.90% 18.33% 34.38%</td>
</tr>
<tr>
<td>OCN PHD</td>
<td>22 31 33 13 22</td>
<td>16.67% 20.00% 9.09% 16.67% 16.67%</td>
</tr>
<tr>
<td>ZOOL MS</td>
<td>39 37 36 16 28</td>
<td>53.39% 40.38% 50.94% 46.15% 63.64%</td>
</tr>
<tr>
<td>ZOOL PHD</td>
<td>30 39 63 21 27</td>
<td>118 52 53 52 33</td>
</tr>
<tr>
<td>total</td>
<td>125 154 186 67 101</td>
<td>118 52 53 52 33</td>
</tr>
</tbody>
</table>

| % of MB applicants accepted                  | 50% 17% 20% 12% 15% 9% 18% 21% 24% 15% 33% 33% |

### Admitted

<table>
<thead>
<tr>
<th>Marine Biology specialization applicant pool</th>
<th>Total applicant pool per department</th>
<th>% depart. applicants in Marine Biol</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOT MS</td>
<td>1 1 1 1 1</td>
<td>50%</td>
</tr>
<tr>
<td>BOT PHD</td>
<td>1 1 1 1 1</td>
<td>17%</td>
</tr>
<tr>
<td>MICR MS</td>
<td>1 4 2 1 1</td>
<td>12%</td>
</tr>
<tr>
<td>MICR PHD</td>
<td>1 2 1 1 1</td>
<td>21%</td>
</tr>
<tr>
<td>OCN MS</td>
<td>1 2 1 1 1</td>
<td>24%</td>
</tr>
<tr>
<td>OCN PHD</td>
<td>1 4 4 3 4</td>
<td>15%</td>
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<tr>
<td>ZOOL MS</td>
<td>3 4 3 4 7</td>
<td>9%</td>
</tr>
<tr>
<td>ZOOL PHD</td>
<td>1 3 13 5 4</td>
<td>33%</td>
</tr>
<tr>
<td>total</td>
<td>7 18 27 7 12</td>
<td>15 19</td>
</tr>
</tbody>
</table>

### Enrolled

<table>
<thead>
<tr>
<th>Marine Biology specialization applicant pool</th>
<th>Total applicant pool per department</th>
<th>% depart. applicants in Marine Biol</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOT MS</td>
<td>1 1 1 1 1</td>
<td>50%</td>
</tr>
<tr>
<td>MICR MS</td>
<td>3 1 1 1 1</td>
<td>17%</td>
</tr>
<tr>
<td>MICR PHD</td>
<td>1 1 1 1 1</td>
<td>12%</td>
</tr>
<tr>
<td>OCN MS</td>
<td>1 2 1 1 1</td>
<td>21%</td>
</tr>
<tr>
<td>OCN PHD</td>
<td>1 3 3 1 4</td>
<td>24%</td>
</tr>
<tr>
<td>ZOOL MS</td>
<td>3 4 2 2 7</td>
<td>15%</td>
</tr>
<tr>
<td>ZOOL PHD</td>
<td>1 3 8 5 4</td>
<td>33%</td>
</tr>
<tr>
<td>total</td>
<td>6 15 18 7 5</td>
<td>11 18</td>
</tr>
</tbody>
</table>
5.0 Program Description

The Graduate Program in Marine Biology will provide an integrated graduate education for students seeking careers in research and teaching with emphasis on recent advances in understanding of coastal reef and open ocean marine systems at the ecological, organismal, and cellular-molecular levels. It will be housed in the College of Natural Sciences and the School of Ocean and Earth Science and Technology. The program will allow students to become specialists in the marine field of their choice by selecting courses, advisors, and research opportunities from many disciplines, including aquaculture, behavior, biosystematics, marine botany, ecology, genetics, virology and marine microbiology, molecular biology, fisheries, coral reef biology and zoology. This graduate degree program includes faculty whose research interests are focused in these areas and who provide a program of special excellence at the University of Hawai‘i at Mānoa. The University is based in a tropical setting on geographically the most isolated archipelago in the world. The Pacific Ocean location and volcanic origin of the islands are key factors to many of the unique research opportunities available at the University of Hawai‘i in marine biology.

Admissions

Applications to the Marine Biology graduate program will be accepted in the fall semester and processed for admission for the following fall semester. Admissions will involve a careful evaluation and selection process by an admissions committee composed of Marine Biology graduate faculty and led by the Marine Biology graduate chair. The admissions committee will involve faculty from participating departments and research units that include the Departments of Biology, Botany, Microbiology, Oceanography, the Hawai‘i Institute of Marine Biology (HIMB), and the Kewalo Marine Laboratory. The admissions criteria and procedures will conform to the Graduate Division’s standards for all Mānoa Master of Science and Doctorate programs. To ensure consistent quality of training and financial support, the number of applicants admitted will be limited by the availability of advisors and support (i.e., funding to support the student for 2 years). No student will be admitted by the admissions committee without a plan to support them and evidence of a good “fit” between the student’s needs and interests, and a graduate faculty member’s ability to serve as an advisor and mentor. It is anticipated that 5-10 doctoral students will be admitted into the program each year reaching a total enrollment of 30-70 students in 3-5 years assuming that some of the 29 students currently enrolled in the Marine Biology graduate specialization transfer to the degree program.

Applicants should have a B.S., B.A. or M.S. degree in the biological sciences including Zoology, Biology, Microbiology, Botany, Biological Oceanography, and Marine Biology. However, highly motivated students with other degrees may be considered if they have strong academic backgrounds and demonstrated experience in the biological sciences. Students without evidence of adequate preparation in mathematics, physics, and biochemistry will be required to make up these prerequisites prior to or after admission. Applicants apply directly to the M.S. or Ph.D. degree programs and the admissions committee will determine the students readiness for their chosen program. Any course deficiencies in an applicant’s background will be identified and provided to the student and potential advisor in the
letter of acceptance. Newly enrolled students who select the Ph.D. track will be required to
demonstrate doctoral-level proficiency in the two Marine Biology core courses for advancement (see
Degree requirements section below).

Additional admission requirements include a minimum cumulative grade point average of 3.2 out of 4.0,
submission of GRE General Subject Test scores, three positive letters of recommendation, and a
completed Graduate Admissions Application including a personal statement of objectives and resume.
Foreign applicants must obtain a TOEFL score of 600 or above. Interviews (in person or by phone by
members of the graduate selection committee) will be required of all applicants deemed acceptable by
the admissions committee. In selecting applicants for admission, particular attention will be paid to the
quality and depth of the personal statement, the student’s potential in research, the strength of the
letters of recommendation and the professional qualities and academic depth presented in the
interviews.

Degree requirements

Students admitted to the Marine Biology graduate program will come from a wide range of
undergraduate and MS majors that include oceanography, environmental science, marine science,
marine biology, zoology, microbiology, botany, biology and other life science majors. All applicants are
expected to have a strong background in math, chemistry, physics and life sciences but will have clear
differences in their undergraduate training. The first teaching goal is to present all first-year students
with a comprehensive overview of the many abiotic and biotic processes that influence the dynamics of
biological systems in marine environments. This will involve sequential fall and spring semester
introductory courses entitled “Marine Biology – Environments and organisms” and “Marine Biology –
Processes and Impacts”, respectively. These courses will involve formal lectures, guest speakers and
rigorous examinations. Students will also participate in a concurrent laboratory section that will provide
practical exposure to a diversity of marine organisms, relevant research methods and field experience.
Basic descriptions of these two courses are provided below. Further details for each are provided in the
accompanying UHM-1 Forms for the addition of new courses (see Appendix). Their basic content is
provided below.

1. Course: Marine Biology – Environments and Organisms (BIO 601, 4 Credits, 3 h lecture and
laboratory). Required of all new students, but can be waived on demonstration of equivalent
proficiency prior to the start of the first year.

   Course Objectives and Goals: This first semester course will introduce students to the diversity
of marine organisms and the many specialized habitats in which they live. This will include
three main themes in lecture: 1) “Features of the oceans” will cover the abiotic physical,
geological, and chemical processes that affect the biology and distribution of marine organisms.
This will include lectures on topics such as plate tectonics, geography, volcanic processes, ocean
currents, tides, chemistry and geomagnetism. 2) “Habitats” will review in detail the primary
environments in which marine organisms occur. Students will receive lectures on the open ocean, coastal and reef habitats in polar, temperate and tropical latitudes. 3) “The diversity of marine life” lectures will provide students with a comprehensive survey of marine life from microbes to macro-organisms. Lecture material will be complemented by laboratories and research experiences that are focused into three modules: 1) surveys and sampling of marine habitats, 2) survey of marine organisms, and 3) molecular investigations. Students will be expected to complete assignment reports for each laboratory session. Laboratory sessions will expose students to laboratory and field work associated with selected lecture topics. Fieldwork will include at least one 2-day cruise in Hawaiian waters, during which student will learn how to measure physical, chemical and biological features of the open ocean. They will also participate in sampling and analyses of pelagic and benthic marine microbes, plankton, vertebrate, invertebrate and benthic organisms. Students will also investigate organisms associated with nearshore reef habitats through field trips to HIMB and other sites around O‘ahu. Laboratory demonstrations and exercises will be conducted at HIMB and the Departments of Biology, Botany, Microbiology, and Oceanography.

2. Course: Marine Biology – Processes and Impacts (BIO 602, 4 Credits, 3 h lecture and laboratory). Required of all new students with BIO 601 as a prerequisite. Can be waived on demonstration of equivalent proficiency by examination prior to the start of the first year.

This second semester course will build upon previous semester course in which the students were familiarized with the diversity of marine organisms and their habitats. This course will primarily investigate biological phenomena and processes, and is grouped into four main themes: 1) “Productivity and food webs” section will present students with detailed lectures on photosynthetic and other primary pathways of autotrophic energy fixation. 2) “Community structure and ecology” theme will involve spatial patterns of biomass and temporal patterns of populations and communities, 3) “Adaptations and physiology” will present students with specific examples of how marine organisms have evolved morphological, biochemical, behavioral and physiological adaptations to their marine habitats, and 4) “Human activities and their impacts” that will familiarize students with the interpretation of relevant contemporary issues such as overfishing, ocean acidification and global climate change. Students will also receive training on the main issues with overexploitation of natural fisheries resources and their conservation. Lecture materials in these areas will be complemented by laboratories, field trips and research experiences that are focused into three modules: 1) marine productivity, 2) populations and communities, and 3) anthropogenic impacts. Students will be expected to complete assignment reports for each laboratory session.

In this course, students will be responsible for a report and oral presentation to their classroom audience on a research topic in Marine Biology. Students will conduct an independent literature research over the course of the semester and prepare a 15 minute presentation on an approved topic. Fellow students and the instructor will ‘judge’ each presentation through comments.
sheets. All comments will be collated into a personal one-page summary: Students will receive a summary of all comments, with constructive advice (if needed) on how to improve (if necessary) their future presentations. Students will submit a term paper on their research topic that will be graded for its content.

Significance – This core course sequence will deliver to new students both basic and advanced information in important areas of contemporary marine biology research. Each one-semester course will be led by one instructor (for a total of two new faculty members) who will be responsible for the design and implementation of the course, arranging guest speakers (up to 1 per week) and administration of exams. This format is preferred over a course with a rotation of multiple instructors because of the many organizational details required to develop consistent lecture, lab and field components across years. In addition, a single course instructor provides a point of contact for students.

These core courses will also serve an important function for student advancement. Written exams will be considered as “Qualifying Exams” that are used to determine the performance and writing proficiency of each student. At the end of the spring semester, the performance of each student will be assessed by a Marine Biology assessment committee of participating faculty and the two course instructors. Graduate course requirements will also be designed so that Master’s students can complete the majority of their formal coursework by the end of the first year of study. The committee will assess each student’s performance according to pre-defined criteria, such that qualifying students can be advanced to the Ph. D. track at the conclusion of their first year of study. Students who fail to pass these courses at the Master’s level will be dismissed from the program.

There are several courses that are not currently taught at UH Mānoa and are needed to provide a balanced curriculum for graduate training in Marine Biology. These courses will be considered as electives selected by the students based on their particular interests and area of study. The new program will develop the following courses that will be offered as electives to graduate students in the Marine Biology and potentially other relevant graduate programs. These will be formally developed and faculty positions provided by the College of Natural Sciences (see letters of support).

3. Course – Marine Molecular Ecology and Bioinformatics (3 Cr, 600 level) - This course will focus on problems, methods, and advances in the analysis of marine prokaryotic and eukaryotic genes and genomes. Molecular methods, those based largely on the analysis of nucleic acids, or the proteins they encode as genes, are prominent in fields from biogeochemistry to population recruitment and dynamics. Every student in the life sciences, and particularly those in any aspect of ecology, should be familiar with the range and applicability of such methods, as well as the analysis of the data they generate. Students here will learn how to collect samples from various marine organisms for such analyses, and also how to select and apply the correct analytical tools. They will then apply these lessons in a laboratory class, wherein they will have opportunities to work with material of the type they plan to study in their graduate research.
4. Marine Fisheries (600 level, 3 Cr) – Marine fisheries provide a critical protein supply and represent a multi-billion dollar industry. This course will focus on the various fisheries across the world presently and historically. The biology of exploited populations and the ecology of exploited systems will be explored. The effects of fishing on habitats, exploited stocks, and indirect top down effects will all be lecture topics. With this background the various methods to manage fisheries will be explored and will include classic single species stock assessment, models which include by catch and multi-species interactions, marine protected areas, and other recent techniques which hope to achieve federally mandated ecosystem based management. Guest lectures will also include fisheries law and fisheries economics provided by affiliate faculty in NREM and the Richardson School of Law.

5. Coral Reef Ecology (600 level, 3 Cr) – Coral reefs are built from colonies of small animals that secrete calcium carbonate exoskeletons. They are widespread in warm, shallow, oligotrophic waters, and are considered among the most diverse ecosystems on Earth. Coral reefs are also crucial in tourism, fisheries and protection of coastal habitats and human populations. This course will provide students with a strong theoretical background of various coral reef systems, knowledge of past and recent empirical studies, and also current and future problems that face coral reef habitats. These include damage by climatic changes in weather, microbial diseases, shipping and recreational activities, and longer term threats such as changes in water temperature and pH, i.e., ‘ocean acidification’.

6. Marine Conservation and Habitat Restoration (600 level, 3 Cr) – Many marine habitats have experienced change or degradation of their biotic communities caused by anthropogenic activities. This course will address sources of environmental degradation caused by coastal development, industrial pollution, fresh water run-off, ocean dumping of waste, climate change and others. These factors will be investigated in relation to models of ecosystem function, science-based strategies for recovery and modern means of implementation. Students will study developments in policy and law that govern research, such as the United Nations Convention on the Law of the Sea (UNCLOS), and emerging legislation that will affect marine research and associated activities at sea. This course is intended to provide both a solid scientific basis for marine conservation but also an important ‘stepping-stone’ for future involvement in marine legislation and policy by scientists.

In addition to the one-year core course and new courses above, students will take additional relevant courses to fill out their course requirements. Since the program for a Marine Biology graduate specialization already exists, there are several other courses regularly offered by instructional faculty that will serve as supplemental course work for the marine biology graduate degree (see Appendix). In addition, there are many research faculty and agency partners who will participate in the teaching efforts of this program (see SOEST letter of support). This can include the formation of new formal courses in their area of expertise or formal seminar courses that will enrich the learning experience for all graduate students in the biological sciences.

**Master’s of Science degree.** The requirements for the M.S. degree will align with the requirements of the Graduate Division’s Master’s Plan A. A minimum of 30 credits is required, including at least 18
credits of course work and between 6 to 12 credits of Research (699) or Thesis (700) work. All candidates will be required to enroll in and pass with a "B" or better grade, the introductory graduate core courses in Marine Biology (BIO 601 and 602 4 credits each). The MS degree candidate will provide a graduate seminar on their thesis proposal to their graduate committee at which time they will be subjected to an oral examination. The approved proposed thesis research must result in an M.S. thesis that is a scholarly contribution based on original research conducted by the student under the supervision of the thesis committee chair. A final thesis examination and the approval of the thesis by the student's committee will be required. A Plan B Master's degree will not be offered.

Doctor of Philosophy degree. The requirements for the Ph. D. degree will align with the requirements of the Graduate Division for doctoral degrees. The principal requirements are: 1) enroll in and pass with a grade of "B" or better in the introductory graduate courses in Marine Biology (BIO 601 and 602), 2) complete additional relevant coursework as indicated by the dissertation committee, and 3) defend a doctoral dissertation that presents original, independent research. In addition, all PhD candidates will be required to participate in a teaching project with a graduate faculty mentor during at least one semester of their program.

a. Doctoral Research proposal. Students will be required to present their research progress and dissertation research proposal in an oral comprehensive exam to the satisfaction of their dissertation committee. To advance to candidacy, the student must successfully complete this exam administered by their committee as specified by the Graduate Division's standards for all Mānoa doctoral programs. After admission to candidacy, each student must provide an annual research progress seminar to their committee.

b. Required course work. Ph. D. students entering without a M.S. degree will be required to take a minimum of 30 graduate course credits, including at least 18 credits of course work and between 6 to 12 credits of Research (699) or Dissertation (700) work. An incoming student with a M.S. degrees must meet the requirements of the Graduate Division. Students entering the program with a M.S. degree will also be required to take the core courses (BIO 601 and 602) unless they can demonstrate equivalent proficiency by exam to the course instructors.

c. Dissertation. All Ph. D. candidates must conduct scholarly, independent, original research that contributes new knowledge to the field. The candidates develop and conduct research projects under the direction of their dissertation advisor and committee. At the conclusion of the research, students write a dissertation, i.e. a scholarly presentation of their research in publication form. The student's dissertation committee then conducts a final examination to assess the student's ability to orally present their dissertation in a public defense of their research and dissertation. The final exam by the committee is repeatable once after successful petition to the Graduate Dean. The final exam criteria and procedures will conform to the Graduate Division's standards for all Mānoa doctoral programs. Ph. D. students who are
advanced to candidacy, passed their oral comprehensive exam and demonstrated publication of their thesis work can apply for an 'en route' M.S. degree.

This degree is designed to facilitate completion of formal course requirements in the first two years of study. A summary of courses completion is listed in the Table below.

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<thead>
<tr>
<th>Year 1</th>
<th>Comments</th>
<th>Credit Hours</th>
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<tr>
<td>BIO 601/602 series</td>
<td>All students with Bachelors degree enter on M.S. or PhD track. Core courses are required of all 1st year students. Those entering with M.S. degree can take course or demonstrate equivalency by exam. Students with Bachelor's degree are advanced to either M.S. or PhD track at conclusion of second semester.</td>
<td>8</td>
</tr>
<tr>
<td>Elective courses</td>
<td></td>
<td>8</td>
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</tbody>
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<table>
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<tr>
<th>Year 2</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Complete elective courses</td>
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</tr>
</tbody>
</table>

6.0 Program Administration

The Marine Biology Graduate program will be an inter-college/school program supported and housed by the School of Ocean and Earth Science and Technology and the College of Natural Sciences. The administrative structure of the program will be composed of three components: a Marine Biology Program Committee, a Marine Biology Graduate Faculty and a Marine Biology Advisory Council. These are described below.

Central to the degree program will be the Marine Biology Program Committee. This committee will be chaired by a dedicated Program Director appointed jointly by the Deans of SOEST and CNS, and approved by the Marine Biology graduate faculty. From 2005-2007, the Marine Biology graduate specialization program was administered by Dr. David Karl of the Oceanography Department, and before that by Dr. Julie Brock of the Zoology Department. Dr. Jo-Ann Leong, Director of the Hawai'i Institute of Marine Biology, is currently chair of the Specialty and will serve until the proposed Graduate Degree Program is approved. The Program Committee will also include at least two faculty representatives from each of CNS and SOEST. The Faculty representatives and Director will be responsible for design of the Marine Biology Degree Program and participate in program decisions in concert with the Program Coordinator and Advisory Council Chair (see below) during the implementation phase.
The Program Director will organize and chair regular meetings of the Committee and carry recommendations of the Committee directly to the Deans of SOEST and CNS. Director will oversee duties of a Program Coordinator. The Program Coordinator will be an administrative, professional, technical (APT) position to assist the Program Director and other committees (e.g., day-to-day academic administrative functions of the program as well as some student services). Clerical functions and student services will be absorbed by existing staff until the program is converted from provisional to established status. Thereafter, dependent on program growth, additional funds may be required to hire additional faculty, full-time clerical and/or student services staff.

The Admissions Committee will consist of, at least, two faculty each from SOEST and CNS and will be responsible for screening applicants, defining deficiencies in an applicant’s background, and determining if students are admitted to the program. This information will be provided to the student and potential advisor in the letter of acceptance.

The program will include a Marine Biology Graduate Faculty body that consists of tenured/tenure-track faculty in marine biology oriented academic and research units at UH Mānoa. More than 40 faculty conduct research or teach in marine biology in the College of Natural Sciences [Departments of Botany (2), Microbiology (2), Biology (5), Geography (1), Cell and Molecular Biology (1)], Pacific Bioscience Research Center (PBRC) [Kewalo Marine Laboratory (4)], SOEST [Department of Oceanography (11), Geology & Geophysics (2) and Hawai‘i Institute of Marine Biology (16)] and College of Agriculture and Human Resources (CTAHR) [Molecular Biosciences and Bioengineering (1)]. Marine Biology Faculty members from these units are the crucial components of the proposed program. They already teach many marine biology-related graduate courses and supervise graduate student projects. Members of the Marine Biology Graduate Faculty will be expected to work with their Faculty Representative to address the development of new courses and changes in courses as the Marine Biology graduate program becomes established.
A Marine Biology Advisory Council, which will consist of non-University partners, will be created to provide information on the employment and research needs of the region. The Marine Biology Program Director and representatives from the Department of Business, Economic Development and Tourism (DBEDT); Department of Land and Natural Resources, Division of Aquatic Resources; National Marine Fisheries Service; representatives of the Deans of SOEST and CNS who provide resources for the program; will serve on the Advisory Council. The chair of the Advisory Council will have a two-year rotation among the members. The Advisory Council will review current issues, and provide recommendations to their Chair for presentation at MB Program Committee meetings. This Council will be responsible for identification of important issues in the community, state, nation and beyond that are directly applicable to development and operation of the degree program. We should also expect members of the Council to facilitate learning and research opportunities for graduate students in the proposed Marine Biology program. As with all graduate programs, overall administrative leadership will come from the Graduate Division.

7.0 Relationship to University and Campus Mission, Plans and Needs

This is a joint program in the College of Natural Sciences and the School of Ocean and Earth Science and Technology. It addresses the System Strategic Plan Goal 2 [objectives 1 (to excel in basic and applied research for the discovery and dissemination of new knowledge) and 2 (to support Hawai’i’s economy, workforce development, and improved access and flow of education in Hawai’i from preschool through a life time of learning by building partnerships with the University and with other public and private educational, governmental, and business institutions)], and Goal 3 [objective 2 (to establish the University of Hawai’i and the state of Hawai’i as the research, service, and training hub of Oceania, with bridges to the Asia-Pacific region, the Americas, and the rest of the world)]. The program also supports the UH-Mānoa strategic plan core commitment to research and Chancellor Hinshaw’s investment criterion No. 2, building academic excellence, especially to meet cross-campus needs.

The program will be multidisciplinary with core faculty in the Departments of Biology, Botany, Microbiology, and Oceanography, as well as research faculty in the Hawai’i institute of Marine Biology. The program has also engaged State and Federal agencies to enhance the education and research training of Marine Biology graduate students. The program is intended to be Pacific-wide, and during its third year, will seek appropriate approvals to develop exchange agreements and agreements for joint degree offerings in the Western United States, Canada, Mexico and Central America, New Zealand and other Pacific Island Nations, U.S. Territories, Japan, Korea, China, Southeast Asia, and Australia. Ultimately, graduates of the Marine Biology graduate program will provide a workforce to serve scientific, management and policy needs in marine biology for the State of Hawai‘i, federal government and international agencies.
8.0 Description of Resources required

**Faculty**
A new one-year course required of all first year students is proposed and two, temporary faculty members funded by CNS will teach this course over two sequential semesters (described above). In addition, four other graduate courses in need of development are Marine Molecular Ecology and Bioinformatics, Marine Fisheries, Ecology of Coral Reefs, and Marine Conservation and Habitat Restoration. These new courses will be complemented by existing marine courses taught by the current marine biology graduate faculty (discussed above in 5.0 Degree requirements).

Based on current enrollment of 29 students, we estimate use of existing faculty and staff resources at approximately 2.5 FTE annually in terms of administration (0.5 FTE), student services (0.5 FTE), and Faculty (1.5 FTE) distributed across the participating institutes and academic departments at UH Mānoa (Primarily SOEST, CNS, and PBRC). There are 27 proposed graduate faculty from SOEST and 12 from CNS, 4 from PBRC and 1 from CTAHR. These faculty members will make up the bulk of the Marine Biology graduate faculty. The Marine Biology survey course for graduate students will be taught by two, temporary faculty hires supported by CNS. However, there will be a critical need for a Program Coordinator during the implementation phase of the program. A marine fisheries population dynamics faculty is being recruited now at HIMB as part of a 5 year grant to Jo-Ann Leong. This faculty member may contribute to the new Marine Fisheries course. A new endowed chair in Biology may also contribute to the teaching effort in the proposed Marine Biology program. In addition, proposed affiliate graduate faculty from USGS, FWS, NOAA, and DLNR will contribute to the teaching program by serving on graduate committees, participating in lecture and laboratory courses, and training graduate students directly. We expect that there will be increased demand for this course and, we will seek reassignment of resources to hire additional faculty to meet this increased demand.

**Library resources (including an evaluation of current resources and an estimate of the cost of additional resources required).**

The library currently maintained by the University of Hawai‘i (Hamilton Library) is adequate to support the graduate program. Hamilton Library offers major research engines for research publications as well as a fully services and well-subsidized interlibrary loan program for all books and research papers that are not held within the UH system. Head Librarian Paul Mochida has provided a survey of the Library resources as they relate to Marine Biology (see Review of Library Marine Biology Resources section).

**Physical resources (space, equipment, etc.)**

*Laboratories:* Participants will have access to state-of-the-are laboratories operated by SOEST (http://www.soest.hawaii.edu/soest_web/soest.research.htm) and other UH academic and research units. HIMB will provide access to an NSF-funded laboratory-classroom, which can host about 20 students and has lab benches and seawater flow-through. Graduate student research is carried out in
the laboratories of the graduate faculty. These include home laboratories for the future MB faculty in the soon-to-be renovated Edmondson and Snyder Halls, the St. John Laboratory (botanical sciences), SOEST facilities in Marine Science Building and HIMB, the Bekesy Laboratory, and the Kewalo Marine Laboratory.

**Computing Facilities:** SOEST academic departments and research units have excellent computing facilities. In addition to equipment located in their offices and laboratories, faculty and staff have 24-hour access to work stations distributed among 3 computer labs. All are networked and have open access to the Internet and a number of free-use peripherals, such as postscript laser printers and digital scanners. SOEST faculty and research staff members have another 1000+ workstations of various types in their offices and laboratories, including several clusters in 2 datacenters. UH is also responsible for the Maui High-Performance Computing Center (http://www.mhpcc.hpc.mil/). Network connectivity is excellent. UH currently uses several channels to provide data, video and voice communications between campuses and research facilities. In addition, T-1 subchannels are also utilized for telemedicine projects, private branch exchange links (voice), general data, and distance learning. The Hawai‘i Interactive Television System (HITS) is on the state SONET network and provides continuous service. Some of this bandwidth is designated for distance learning.

**Office and Classroom Space.** Office space for participating faculty, students, and staff will be provided by their home units. The renovated Edmondson and Snyder Hall will be available and the planned repair of the Pauley residence into offices and small laboratories will also make space available for the program. UH will provide meeting places for the advisory council and for specialized workshops, as necessary. SOEST and CNS have A/V capable classroom facilities seating from 50 to 120 persons each on the University of Hawaii‘i at Mānoa Campus available for classroom instruction. At HIMB, the two Pauley classrooms are A/V capable and can host about 40 persons.

**Specialized Equipment.** HIMB has a fleet of Boston Whales, 17-ft small boats from which participants can conduct field activities. The larger 40-ft Honu Kai vessel, based on Coconut Island, which is used for transportation to and from the institute, can also be used for plankton tows. SOEST maintains a fleet of coastal and blue-water marine vessels, mini-submarines, ROVs and AUVs. Please refer to the web site for details http://www.soest.hawaii.edu/UMC/index.html. Most of the analytical equipment necessary for the program is currently available in shared-use facilities operated by SOEST, CNS, and PBRC on the UH Mānoa campus. Periodic upgrades to these facilities are funded by combined means of extramural and matching (UH) funds.

**9.0 Five – Year Business Plan**

In the initial phase of the program, the additional courses proposed here will be covered by the existing faculty with assistance from a Program Coordinator that will be requested from the supporting colleges/schools. We anticipate that once the program is established, the increased enrollment will required at least 3-5 new faculty positions. A competitive graduate program will also require resources that attract top student candidates (such as assistantships, grants and awards). We will work with
federal and private institutions to establish extramural resources for these needs. Any new faculty hires will be situated in existing departments/research units, and therefore, we are not budgeting for additional clerical staff for projected future hires.

a. **Annual costs to implement the program**
   In the first year of the program, we will hire a Program Coordinator. The Program Coordinator will be an APT position.

b. **Projected enrollment and estimated tuition revenue.**
   See below.

c. **How will the program be funded?**
   Existing faculty will be funded as they are currently. A Program Coordinator will be requested to assist in the implementation of the program. Graduate research assistants will be funded via extramural funds.

d. **Does the current or proposed budget (Department/College/Campus) include funds or a request for funds for the proposed program?**
   Costs for laboratory supplies, equipment usage and maintenance, and field trips will be borne by the laboratory fees. We will propose strategic hiring initiatives after completion of 4 years with growth and successful program review.

e. **Given a “flat budget” situation, how will the proposed program be funded?**
   No new resources are requested at this time. However, after completion of 4 years with growth and successful program review, the program director and supporting deans will need to reassign or request new positions as appropriate.

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<td>PROGRAM COSTS</td>
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<td><strong>TOTAL Expenses</strong></td>
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<td>$65,000</td>
<td>$70,000</td>
<td>$70,000</td>
<td>$75,000</td>
</tr>
</tbody>
</table>

| REVENUES                      |        |        |        |        |        |
| Projected Enrollment (2012 – 30 students) | 30   | 35     | 40     | 45     | 50     |
| No. of Courses                  | 2      | 4      | 6      | 6      | 6      |
| No. of Credits                  | 8      | 16     | 24     | 24     | 24     |
| SSH                              | 240    | 608    | 960    | 1,080  | 1,200  |
| Tuition Rate – 5% increase/   |        |        |        |        |        |
| *avg res & nonres                | $790   | $830   | $872   | $916   | $962   |
| Total Revenue from Tuition†      | $12,640| $26,560| $41,856| $43,968| $46,176|
| Other Sources of Income *extramural/priv | $200,000| $300,000| $400,000| $500,000| $600,000|
| **TOTAL Revenues**               | $212,640| $326,560| $441,856| $543,968| $646,176|
In 2012, we expect to hire one faculty member through a partnership with NOAA. In the grant awarded to HIMB, the faculty researcher has startup funds and two graduate research assistants. The salary listed here is for the Program Coordinator. Also, Biology will recruit a faculty member for the Chao Endowed Chair in Marine Biology. The College of Natural Sciences plans to hire faculty in Marine Biology and will continue to make investments in this program.

In 2013, the Program Coordinator continues.

In 2014, we expect to hire from reassigned positions through retirements.

In 2015, the table shows the continuing costs for the Program Coordinator.

In 2016, we expect to hire from reassigned positions through retirements.

Students currently enrolled in the program also will select courses from the following list of courses. Although five new courses have been designed for the Graduate program, we anticipate that the survey of course will be taught by existing faculty. We also anticipate that any newly hired faculty may wish to develop new courses in their particular sub-disciplines or that address new program needs.

- ANSC 450 Aquaculture Production (3)
- BOT 480 Algal Diversity and Evolution (4)
- BOT 680 Marine Macrophytes Seminar (2)
- OCN 450 Aquaculture Production (3) same as ANSC 450
- OCN 621 Biological Oceanography (3)
- OCN 626 Marine Microplankton Ecology (4)
- OCN 627 Ecology of Pelagic Marine Animals (4)
- OCN 628 Benthic Biological Oceanography (4)
- OCN 750 Topics in Biological Oceanography (V)
- ZOOL 466 Fisheries Science (3)
- ZOOL 467 Ecology of Fishes (3)
- ZOOL 475 Biology of Invertebrates (3)
- ZOOL 620 Marine Ecology (3)

Since graduate students will only be accepted into the program if research funding extramural resources for at least two years are available, the generation of tuition as a source of revenue will be limited. An estimated two students will not be supported on extramural funds and will pay full tuition.

**10.0 Impact on current courses or programs.**

The graduate degree program is expected to have a positive impact on programs at UHM because it will attract students who otherwise would not have selected the University of Hawai‘i. Presently several academic units receive graduate applications for studies in marine biology but these programs cannot support the large number of highly qualified applicants. Thus, this program should reduce unmet need of these programs. The program is designed to directly support the graduate education goals as identified by the University of Hawai‘i Strategic Plan. The home unit of each instructor that contributes to the program will receive the returned tuition as incentive for participation.
11.0 Proposed Graduate Faculty for Graduate Program in Marine Biology (See Appendix B for CVs and signatures).

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<th>Graduate Faculty</th>
<th>Department</th>
<th>College/School</th>
<th>Rank</th>
<th>email</th>
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</thead>
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<tr>
<td>Harry Ako</td>
<td>MMBE</td>
<td>CTAHR</td>
<td>Professor</td>
<td><a href="mailto:hako@hawaii.edu">hako@hawaii.edu</a></td>
</tr>
<tr>
<td>Marlin Atkinson</td>
<td>HIMB/Oceanog</td>
<td>SOEST</td>
<td>Professor</td>
<td><a href="mailto:mia@hawaii.edu">mia@hawaii.edu</a></td>
</tr>
<tr>
<td>Whitlow Au</td>
<td>HIMB/Oceanog</td>
<td>SOEST</td>
<td>Researcher</td>
<td><a href="mailto:wau@hawaii.edu">wau@hawaii.edu</a></td>
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<td>Robert Bidigare</td>
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<td>SOEST</td>
<td>Professor</td>
<td><a href="mailto:bidigare@hawaii.edu">bidigare@hawaii.edu</a></td>
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<tr>
<td>Paul Bienfang</td>
<td>Oceanography</td>
<td>SOEST</td>
<td>Researcher</td>
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<td>Brian Bowen</td>
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<td>SOEST</td>
<td>Researcher</td>
<td><a href="mailto:bbowen@hawaii.edu">bbowen@hawaii.edu</a></td>
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<tr>
<td>Sean Callahan</td>
<td>Microbiology</td>
<td>CNS</td>
<td>Professor</td>
<td><a href="mailto:scallaha@hawaii.edu">scallaha@hawaii.edu</a></td>
</tr>
<tr>
<td>Rebecca Cann</td>
<td>Cell Mol Biol</td>
<td>CNS</td>
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<td><a href="mailto:rcann@hawaii.edu">rcann@hawaii.edu</a></td>
</tr>
<tr>
<td>David Carlon</td>
<td>Biology</td>
<td>CNS</td>
<td>Assoc Prof</td>
<td><a href="mailto:carlon@hawaii.edu">carlon@hawaii.edu</a></td>
</tr>
<tr>
<td>Mathew Church</td>
<td>CMORE/Oceanog</td>
<td>SOEST</td>
<td>Asst Prof</td>
<td><a href="mailto:mchurch@hawaii.edu">mchurch@hawaii.edu</a></td>
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<tr>
<td>Kathleen Cole</td>
<td>Biology</td>
<td>CNS</td>
<td>Assoc Prof</td>
<td><a href="mailto:cole@hawaii.edu">cole@hawaii.edu</a></td>
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<tr>
<td>H. Gert de Coet</td>
<td>Biology</td>
<td>CNS</td>
<td>Professor</td>
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<tr>
<td>Megan Donahue</td>
<td>HIMB</td>
<td>SOEST</td>
<td>Asst. Researcher</td>
<td><a href="mailto:donahuem@hawaii.edu">donahuem@hawaii.edu</a></td>
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<tr>
<td>Stuart Donachie</td>
<td>Microbiology</td>
<td>CNS</td>
<td>Assoc. Prof</td>
<td><a href="mailto:donachie@hawaii.edu">donachie@hawaii.edu</a></td>
</tr>
<tr>
<td>Jeffrey Drazen</td>
<td>Oceanography</td>
<td>SOEST</td>
<td>Assoc. Prof</td>
<td><a href="mailto:jdrazan@hawaii.edu">jdrazan@hawaii.edu</a></td>
</tr>
<tr>
<td>Ruth Gates</td>
<td>HIMB</td>
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<td>Researcher</td>
<td><a href="mailto:rgates@hawaii.edu">rgates@hawaii.edu</a></td>
</tr>
<tr>
<td>Erica Goetze</td>
<td>Oceanography</td>
<td>SOEST</td>
<td>Asst Prof</td>
<td><a href="mailto:egoetze@hawaii.edu">egoetze@hawaii.edu</a></td>
</tr>
<tr>
<td>Gordon Grau</td>
<td>HIMB/Biology</td>
<td>SOEST/CNS</td>
<td>Professor</td>
<td><a href="mailto:grau@hawaii.edu">grau@hawaii.edu</a></td>
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<tr>
<td>Michael Hadfield</td>
<td>Kewalo/Biology</td>
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<td>Professor</td>
<td><a href="mailto:hadfield@hawaii.edu">hadfield@hawaii.edu</a></td>
</tr>
<tr>
<td>Kim Holland</td>
<td>HIMB</td>
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<td><a href="mailto:kholland@hawaii.edu">kholland@hawaii.edu</a></td>
</tr>
<tr>
<td>Cynthia Hunter</td>
<td>Biology</td>
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<td>Assoc. Prof</td>
<td><a href="mailto:cindyh@hawaii.edu">cindyh@hawaii.edu</a></td>
</tr>
<tr>
<td>David Karl</td>
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<td><a href="mailto:dkarl@hawaii.edu">dkarl@hawaii.edu</a></td>
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<tr>
<td>Stephen Karl</td>
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<td><a href="mailto:skarl@hawaii.edu">skarl@hawaii.edu</a></td>
</tr>
<tr>
<td>Jo-An Leong</td>
<td>HIMB</td>
<td>SOEST</td>
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<td><a href="mailto:joanneo@hawaii.edu">joanneo@hawaii.edu</a></td>
</tr>
<tr>
<td>Mark Martindale</td>
<td>Kewalo/Biology</td>
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<td><a href="mailto:mgmartin@hawaii.edu">mgmartin@hawaii.edu</a></td>
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<tr>
<td>Margaret McManus</td>
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<td><a href="mailto:marc@hawaii.edu">marc@hawaii.edu</a></td>
</tr>
<tr>
<td>Paul Nachtigall</td>
<td>HIMB</td>
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<td>Researcher</td>
<td><a href="mailto:nachti@hawaii.edu">nachti@hawaii.edu</a></td>
</tr>
<tr>
<td>Brian Popp</td>
<td>Geology &amp; Geophysics</td>
<td>SOEST</td>
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<td><a href="mailto:popp@hawaii.edu">popp@hawaii.edu</a></td>
</tr>
<tr>
<td>Michael Rappe</td>
<td>HIMB</td>
<td>SOEST</td>
<td>Assoc. Researcher</td>
<td><a href="mailto:rappe@hawaii.edu">rappe@hawaii.edu</a></td>
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<tr>
<td>Robert Richmond</td>
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<td><a href="mailto:richmond@hawaii.edu">richmond@hawaii.edu</a></td>
</tr>
<tr>
<td>Alison Rieser</td>
<td>Geography</td>
<td>CNS</td>
<td>Professor</td>
<td><a href="mailto:rieser@hawaii.edu">rieser@hawaii.edu</a></td>
</tr>
<tr>
<td>Name</td>
<td>Department</td>
<td>Program/Office</td>
<td>Title</td>
<td>Email</td>
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<tr>
<td>Tetsuzan Benny Ron</td>
<td>Chancellor's Office</td>
<td></td>
<td>Aquaculture Prog</td>
<td><a href="mailto:bennyron@hawaii.edu">bennyron@hawaii.edu</a></td>
</tr>
<tr>
<td>Elaine Seaver</td>
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<td>Assoc. Researcher</td>
<td><a href="mailto:seaver@hawaii.edu">seaver@hawaii.edu</a></td>
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<tr>
<td>Karen Selph</td>
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<td><a href="mailto:selph@hawaii.edu">selph@hawaii.edu</a></td>
</tr>
<tr>
<td>Alison Sherwood</td>
<td>Botany</td>
<td>CNS</td>
<td>Assoc. Prof.</td>
<td><a href="mailto:asherwoo@hawaii.edu">asherwoo@hawaii.edu</a></td>
</tr>
<tr>
<td>Craig Smith</td>
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<td>Professor</td>
<td><a href="mailto:craig.smith@hawaii.edu">craig.smith@hawaii.edu</a></td>
</tr>
<tr>
<td>Celia Smith</td>
<td>Botany</td>
<td>CNS</td>
<td>Professor</td>
<td><a href="mailto:limuwahine@gmail.com">limuwahine@gmail.com</a></td>
</tr>
<tr>
<td>Grieg Steward</td>
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<td><a href="mailto:grieg@hawaii.edu">grieg@hawaii.edu</a></td>
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<tr>
<td>Florence Thomas</td>
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<td>Assoc. Researcher</td>
<td><a href="mailto:fithomas@hawaii.edu">fithomas@hawaii.edu</a></td>
</tr>
<tr>
<td>Robert Toonen</td>
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<td><a href="mailto:toonen@hawaii.edu">toonen@hawaii.edu</a></td>
</tr>
<tr>
<td>Timothy Tricas</td>
<td>Biology</td>
<td>CNS</td>
<td>Professor</td>
<td><a href="mailto:tricas@hawaii.edu">tricas@hawaii.edu</a></td>
</tr>
<tr>
<td>Guangyi Wang</td>
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<td><a href="mailto:guangyi@hawaii.edu">guangyi@hawaii.edu</a></td>
</tr>
<tr>
<td>Les Watling</td>
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<td>CNS</td>
<td>Professor</td>
<td><a href="mailto:watling@hawaii.edu">watling@hawaii.edu</a></td>
</tr>
<tr>
<td>Kevin Weng</td>
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<td><a href="mailto:kevin.weng@hawaii.edu">kevin.weng@hawaii.edu</a></td>
</tr>
</tbody>
</table>

**Affiliate Graduate Faculty**

<table>
<thead>
<tr>
<th>Name</th>
<th>Program/Office</th>
<th>Title</th>
<th>Email</th>
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<tbody>
<tr>
<td>Greta Aebey</td>
<td>HIMB</td>
<td>SOEST</td>
<td>Asst. Researcher</td>
</tr>
<tr>
<td>Jonathann Brodzlak</td>
<td>PIFSC</td>
<td>NOAA</td>
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<tr>
<td>Gerard Dinardo</td>
<td>PIFSC</td>
<td>NOAA</td>
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<tr>
<td>Jeffrey Polovina</td>
<td>PIFSC</td>
<td>NOAA</td>
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<tr>
<td>Robert Nishimoto</td>
<td>DLNR</td>
<td>HI State Gov</td>
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</tr>
<tr>
<td>Alan Friedlander</td>
<td>Hawaii Coop Fish Unit</td>
<td>CNS</td>
<td>Professor</td>
</tr>
<tr>
<td>Daniel Polhemus</td>
<td>Papahanaumokuakea</td>
<td>USFWS</td>
<td>Prog. Mgr., USFWS</td>
</tr>
<tr>
<td>Randall Kosaki</td>
<td>Papahanaumokuakea</td>
<td>NOAA</td>
<td>Chief Scientist</td>
</tr>
<tr>
<td>Jim Beets</td>
<td>Marine Sciences</td>
<td>UH Hilo</td>
<td>Professor</td>
</tr>
<tr>
<td>Michael Seki</td>
<td>PIFSC</td>
<td>NOAA</td>
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<td>Thierry Work</td>
<td>USGS</td>
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<tr>
<td>Charles Birkeland</td>
<td>Hawaii Coop Fish Unit</td>
<td>CNS</td>
<td>Retired Prof</td>
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<tr>
<td>Samuel Pooley</td>
<td>PIFSC</td>
<td>NOAA</td>
<td>Director</td>
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</tbody>
</table>

**Abbreviations:** PIFSC, Pacific Islands Fisheries Science Center; PFRPC, Pelagic Fisheries Research Program Center; DLNR, Department of Land and Natural Resources.
12.0 Program Quality and Evaluation

Benchmarks in Program Assessment - The evaluation of the Program Quality for Graduate Training in Marine Biology will be conducted on a routine basis, with a preliminary program assessment in Year 3 of the program and a comprehensive assessment in Year 4, and every 5 years thereafter. In the National Research Council Assessment of the Research Doctorate Programs in the United States (2010), the data required for assessment included 20 characteristics for quality evaluation:

1. Publications per allocated faculty member
2. Citations per publication
3. Percent faculty with grants
4. Awards per allocated faculty member
5. Percent interdisciplinary faculty
6. Percent non-Asian minority faculty
7. Percent female faculty
8. Average GRE scores
9. Percent 1st year students with full support
10. Percent 1st year students with external funding
11. Percent non-Asian minority students
12. Percent female students
13. Percent international students
14. Average Ph.D. candidates in 2012-16. (This criterion might be too soon for this new program)
15. Average completion percentage
16. Median time to degree
17. Percent students with academic plans
18. Student workspace
19. Student health insurance
20. Number of student activities offered (internships, work experience, field experience)

Providing this information for an assessment of the program should be relatively easy and listing the components of the assessment at this early stage will provide graduate faculty members and students the measures to track the program’s development. However, the critical assessment of the program should consider the training of the graduate students that will include translation of their research findings into publications and professional presentations, and placement in postdoctoral programs and/or professional positions that include federal, state, and non-governmental research and regulatory agencies, academic education and research positions, and community organizations.

The program contains requirements that will ensure that the graduate students are adequately trained and prepared for professional employment opportunities (see 5.0 Program Description). The graduate program of study at the doctoral level will include:

   a. required research defense
b. required seminar presentations  
c. required teaching assistant experience  
d. comprehensive exam.  
e. dissertation defense.

*Student Assessment of Program* – Graduates of the Marine Biology graduate program will be tracked and a survey instrument will be developed to monitor post-graduate professional activities and obtain feedback on satisfaction with the Ph. D. program.
APPENDIX A:

Current Marine Biology Courses Offered at the University of Hawai‘i at Mānoa. Note that 100 and 200 level courses cannot be used for a graduate degree except to remedy deficiencies.

| BIOLOGY UNDERGRAD |  |
|-------------------|-----------------|-------------------|
| Coastal systems   | Ecological Processes, Evolution, Nat History | **BIOL 301 Marine Ecology and Evolution** (3) Functional, ecological, and evolutionary problems faced by life in the sea. Draws from major marine habitats and associated communities, from the deep sea to the plankton. Impacts of overfishing, marine pollution, and land development on the ecology and evolution of marine organisms. Emphasis on developing problem solving and quantitative skills. A-F only. Pre: 265,265L; 275,275L (or concurrent); and OCN 201; or consent. Co-requisite: 301L. DB |
| Coastal systems   | Ecological Processes | **BIOL 301L Marine Ecology and Evolution Lab** (1) (1 3-hr Lab) Laboratory to accompany 301. A-F only. Pre: 265, 265L; 275, 275L (or concurrent); and OCN 201; or consent. Co-requisite: 301. DY |
|                   |                  | **BIOL 403 Field Problems in Marine Biology** (4) Integrated program of intensive lectures, laboratory experiments, and field surveys that focus on the biological processes that shape the lives of marine organisms at HIMB. A-F only. Pre: 301/301L or consent. DB |
|                   |                  | **BIOL 404 Advanced Topics in Marine Biology** (3) Current themes in marine biology and experience in scientific assessment. Repeatable two times. A-F only. Pre: 301/301L or consent. DB |

| BOTANY UNDERGRAD |  |
|-----------------|-----------------|-----------------|
| Nat history, Systematics, Evolution | **BOT 480 Algal Diversity and Evolution** (4) (3 Lec, 1 3-hr Lab) Principles of algal diversity, structure, and evolution. Identification of common Ha2006-2007ian algae. Pre: one of 101, BIOL 172, MICR 351, ZOOL 101; or consent. DB, DY |

<p>| BOTANY GRAD |  |</p>
<table>
<thead>
<tr>
<th>Coastal systems, Ocean systems</th>
<th>Ecological processes, Nat. history/ Systematics/ Evolution</th>
<th>MICR 401 Marine Microbiology (3) Evolution, ecology, biochemistry, genetics and physiology of marine bacteria by examining defined systems and organisms. Pre: BIOL 265/265L and 275/275L and 301/301L, and OCN 201; or 351/351L; or consent. DB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coastal systems, Ocean systems</td>
<td>Ecological processes, Nat. history/ Systematics/ Evolution</td>
<td>MICR 401L Marine Microbiology Laboratory (1) (1 3-hr Lab) Laboratory to accompany 401. Pre: BIOL 265/265L and BIOL 275/275L and BIOL 301/301L and OCN 201; or 351/351L; 401 or concurrent; or consent. DY</td>
</tr>
<tr>
<td>Coastal systems, Ocean systems</td>
<td>Ecological processes, Nat. history/ Systematics/ Evolution</td>
<td>MICR 485 Microbes and Their Environment (3) Distribution, diversity, and roles of microorganisms in terrestrial, freshwater, and marine ecosystems. Importance of bacteria in pesticide degradation, bioremediation of oil spills, sewage treatment, biocontrol, food fermentation. Pre: BIOL 172 and CHEM 272, or consent. DB</td>
</tr>
<tr>
<td>Coastal systems, Ocean systems</td>
<td>Ecological processes, Nat. history/ Systematics/ Evolution</td>
<td>MICR 485L Microbes and Their Environment Lab (2) (2 3-hr Lab) Techniques for study of interaction of microorganisms with and within their natural habitats; symbiosis between microorganisms and plants and animals; role of microorganisms in element cycling; food fermentation by bacteria. Pre: 485 (or concurrent) or consent. DY</td>
</tr>
</tbody>
</table>

**MICROBIOLOGY GRAD**

| Coastal systems, Ocean systems | Ecological processes, Nat. history/ Systematics/ Evolution | MICR 652 Advanced Marine Microbiology (3) Advanced studies of marine microorganisms in diverse habitats with consideration of applications of marine microbes, interactions with higher organisms, phylogeny and diversity, and past and current methods. A-F only. Pre: 351 and 401, or consent. (Alt. years) |
| Coastal systems, Ocean systems | Ecological processes, Nat. history/ Systematics/ Evolution | **MICR 680 Advances in Microbial Ecology (3)** Highlights in microbial ecology; interaction of microorganisms with abiotic and biotic components of their environments. Modern techniques for study of autecology and synecology of microorganisms. Pre: 485 or consent. (Alt. years: spring) |

**ZOOLOGY UNDERGRAD**

| Nat. Hist., Ecological processes | **ZOOL 200 Marine Biology (2)** Biology and ecology of marine plants and animals; coral reefs, the deep sea, rocky shores, marine mammals, fisheries, aquaculture, pollution, and conservation of marine resources. DB |
| Ecological processes, Nat. Hist. | **ZOOL 200L Marine Biology Lab (1) (1 3-hr Lab)** Laboratory, field trips to accompany 200. Pre: 200 (or concurrent). DY |

| Ecological processes, Nat. Hist. | **ZOOL 410 Corals and Coral Reefs (3)** A course in the biogeography, evolution, ecology, and physiology of corals and coral reefs, and the application of this information to the management of coral reefs. Emphasis will be placed on processes such as dispersal, the evolution and operation of mutualisms, calcification, reproduction, and the maintenance of diversity. Pre: BIOL 265. Spring only. |


| Fisheries | **ZOOL 465L General Ichthyology Lab (1) (2 2-hr Lab)** Overview of the major orders and families of fishes of the world; introduction to local Hawaiian fishes; coverage of basic fish anatomy; introduction to field and laboratory techniques in fish research. Pre: BIOL 265. Co-requisite: 465. DY |

<p>| Fisheries | <strong>ZOOL 466 Fisheries Science (3)</strong> General characteristics of fisheries; harvesting methods; principles and techniques to derive data and analyze fished populations. Field trips. Pre: one of the following: 410, 465, 470, 608, or 620; or consent. DB |</p>
<table>
<thead>
<tr>
<th>Fisheries</th>
<th>ZOOL 467 Ecology of Fishes (3) Reproduction, early life history, age and growth, feeding, niche specificity, competitive interactions, communities, and evolutionary mechanisms. Pre: 465 or consent. DB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecological Processes</td>
<td>ZOOL 470 Limnology (2) Biology, physics, chemistry of lakes, streams, estuaries. Pre: BIOL 172 or consent. Co-requisite: 470L. DB</td>
</tr>
<tr>
<td>Ecological Processes</td>
<td>ZOOL 470L Limnology Lab (1) (1 3-hr Lab) Experimental and descriptive field projects on the biology, chemistry, hydrology, and physics of lakes, streams, and estuaries. Pre: BIOL 172 or consent. Co-requisite: 470. (Alt. years) DY</td>
</tr>
<tr>
<td>Nat Hist, Systematics, Evolution</td>
<td>ZOOL 475L Biology of the Invertebrates Lab (2) (2 3-hr Lab) Pre: BIOL 172 and CHEM 161, or consent. Co-requisite: 475. DY</td>
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**ZOOGOGY GRAD COURSES**

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<tr>
<th>Fisheries</th>
<th>Fisheries, Evolution</th>
<th>ZOOL 608 Fish Behavior and Sensory Biology (2) Lectures, readings and presentations on sensory systems and behavior of fishes. A-F only. Pre: 306, 430, 465, or 606; or consent.</th>
</tr>
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<tbody>
<tr>
<td>Fisheries</td>
<td>Fisheries, Evolution</td>
<td>ZOOL 608L Fish Behavior and Sensory Biology Laboratory (1) (1 3-hr Lab) Laboratory study of fish sensory systems and behavior. A-F only. Pre: 306, 430, 465, or 606; or consent. Co-requisite: 608.</td>
</tr>
<tr>
<td>Ecological Processes</td>
<td>ZOOL 620 Marine Ecology (3) Principles of ecology of marine biota and environment. Pre: graduate standing in zoology, oceanography, or botany; or consent.</td>
<td></td>
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<tr>
<td>Ecological Processes</td>
<td>ZOOL 631 Biometry (4) (3 Lec, 1 2-hr Discussion) Basic statistical methods: design of studies; data exploration; probability; distributions; parametric and nonparametric one-sample, two-sample, multi-sample, regression, and correlation analyses; frequency tables. Pre: MATH 241 or consent.</td>
<td></td>
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<tr>
<td>Fisheries</td>
<td>Fisheries, Systematics</td>
<td><strong>ZOOL 632 Advanced Biometry</strong> (4) (3 Lec, 1 2-hr Discussion) Multivariate statistical methods: multiple regression and correlation; multiway anova; general linear models; repeated measures and multivariate anova; loglinear analysis and logistic regression. Pre: 631 and MATH 241, or consent.</td>
</tr>
<tr>
<td>Fisheries</td>
<td>Fisheries</td>
<td><strong>ZOOL 666 Systematic Ichthyology</strong> (3) Review of the higher classification of the fishes of the world. Pre: 465.</td>
</tr>
<tr>
<td>Fisheries</td>
<td>Fisheries</td>
<td><strong>ZOOL 690 Conservation Biology</strong> (3) Theories and concepts of ecology, evolution and genetics for conservation of biological diversity. Topics will include restoration ecology, management planning, laws and policies, biological invasions. Pre: 410, 439, 620 or 623; or BOT 453, 454, 456 or 482; and 480 or BOT 462 and BIOL 375; or consent. (Cross-listed as BOT 690)</td>
</tr>
<tr>
<td>OCEANOGRAPHY UNDERGRAD</td>
<td>Fisheries/Aquaculture Coastal Systems Ocean Systems</td>
<td>Fisheries/Aquaculture Ecological Processes Nat. Hist./Systemat./Evolution</td>
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<td>Fisheries/Aquaculture Coastal Systems Ocean Systems</td>
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<td>Fisheries/Aquaculture Coastal Systems Ocean Systems</td>
<td>Fisheries/Aquaculture Ecological Processes Nat. Hist./Systemat./Evolution</td>
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<tr>
<td>Fisheries/Aquaculture</td>
<td>Fisheries/Aquaculture</td>
<td><strong>OCN 201 Science of the Sea</strong> (3) Structure, formation, and features of ocean basins: seawater properties, and distributions; currents; waves; tides; characteristics of marine organisms; marine ecological principles; man and the sea. Field trip required.</td>
</tr>
<tr>
<td>Fisheries/Aquaculture</td>
<td>Fisheries/Aquaculture</td>
<td><strong>OCN 2011 Experiments</strong> Experiments, computer exercises and field trips demonstrating the geological, physical, chemical and biological principles of earth and ocean sciences. A-F only. Co-requisite OCN 201.</td>
</tr>
<tr>
<td>Fisheries/Aquaculture</td>
<td>Fisheries/Aquaculture</td>
<td><strong>OCN 331 Living Resources of the Sea</strong> (3) Marine fisheries, aquaculture, and law of the sea. Principles of management of renewable resources. Political and scientific constraints and limitations. Pre: OCN 201.</td>
</tr>
<tr>
<td>Coastal Systems Ocean Systems</td>
<td>Nat. Hist./Systemat./Evolution</td>
<td>OCN 402 Solar Nebula to the Human Brain (3)</td>
</tr>
<tr>
<td>Coastal Systems Ocean Systems</td>
<td>Nat. Hist./Systemat./Evolution</td>
<td>OCN 403 Marine Functional Genomics (3)</td>
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<tr>
<td>GG 101 Dynamic Earth (3)</td>
<td>GG 101 Dynamic Earth Lab (1) (1 3-hr Lab)</td>
<td>The natural physical environment; the landscape; rocks and minerals, rivers and oceans; volcanism, earthquakes, and other processes inside the earth; effects of human use of the Earth and its resources. Field trip. DP</td>
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<tr>
<td>GG 104 Volcanoes in the Sea (4)</td>
<td></td>
<td>Hawaiian geology and geologic processes: origin of Hawaiian islands, volcanism, rocks and minerals, landforms, stream and coastal processes, landslides, earthquakes and tsunamis, groundwater, geologic and environmental hazards. Frequent required field trips. Credit not given for both 103 and 104. DP</td>
</tr>
<tr>
<td>GG 325 Fundamentals of Geochemistry (3) Lecture course on theory and applications of geochemistry and environmental chemistry to Earth and ocean sciences. Topics: Chemistry of Hydrosphere-Geosphere-Biosphere system, origin/differentiation of Earth/Solar System. Pre: 200, 250, MATH 241 or MATH 251A, CHEM 162 (or concurrent); or consent. Fall only. DP</td>
<td></td>
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<tr>
<td>GG 423 Marine Geology (3) Sediments, structure, geophysics, geochemistry, history of ocean basins and margins. Pre: 302 and 308; or consent. (Cross-listed as OCN 423) DP</td>
<td></td>
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</tr>
<tr>
<td>GG 425 Environmental Geochemistry (3) Lecture course on theory and applications of geochemistry to contaminant/pollutant distribution in the Hydrosphere-Geosphere-Biosphere system. Topics include aqueous geochemistry, thermodynamics, kinetics, organic and isotope chemistry of environmental contaminants. Pre: 325 or consent. Fall only. DP</td>
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**OCEANOGRAPHY GRADUATE**

<p>| Coastal Systems Ocean Systems | 620 Physical Oceanography (4) Introduction to properties of sea water, oceanographic instruments and methods, heat budget, general ocean circulation, formation of water masses, dynamics of circulation, regional oceanography, waves, tides, sea level. Core course requirement. Pre: MATH 242 (or concurrent), or consent. |
| Coastal Systems Ocean Systems | Fisheries/Aquaculture Ecological Processes Nat. Hist./Systemat./Evolution |
| Coastal Systems Ocean Systems | 621 Biological Oceanography (3) Factors governing productivity, population dynamics, distribution of organisms in major ecosystems of the ocean, pelagic and benthic ecology. Core course requirement. Pre: OCN 620 or consent. |
| Coastal Systems Ocean Systems | 622 Geological Oceanography (3) Marine geological processes; ocean basin structure and tectonics; sedimentation. Core course requirement. Pre: GG 101 or consent. |</p>
<table>
<thead>
<tr>
<th>Coastal Systems Ocean Systems</th>
<th>Ecological Processes</th>
<th><strong>623 Chemical Oceanography</strong> (3) Chemical processes occurring in marine waters; why they occur and how they affect the oceanic environment. Core course requirement. Pre: CHEM 171 or equivalent.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coastal Systems Ocean Systems</td>
<td>Ecological Processes Nat. Hist./Systemat./Evolution</td>
<td><strong>628 Benthic Biological Oceanography</strong> (4) (3L, 3-hr Lb) Processes controlling the structure and function of benthic communities including organism-sediment-flow interactions, sediment geochemistry, feeding strategies, recruitment, succession and population interactions. Spring only. Pre: consent.</td>
</tr>
<tr>
<td></td>
<td>Ecological Processes</td>
<td><strong>635L Radiochemical Techniques</strong> (1) (3-hr Lb) Radiation detection and measurement, separation and manipulation of radionuclides, experimental design and use of tracers. Student project based on individual interest. Pre: OCN 635 (or concurrent) and consent.</td>
</tr>
<tr>
<td>Coastal Systems</td>
<td>Ocean Systems</td>
<td>Ecological Processes Nat. Hist./Systemat./Evolution</td>
</tr>
<tr>
<td>Coastal Systems</td>
<td>Ocean Systems</td>
<td>662 Marine Hydrodynamics (3) Introduction to classical hydrodynamics and continuum mechanics; techniques for solution of Navier-Stokes equations on various scales of oceanic motion; vorticity, potential theory, viscosity and boundary layers, laminar and turbulent flow, instability. Pre: MATH 403-404 or consent.</td>
</tr>
<tr>
<td>Coastal Systems</td>
<td>Ocean Systems</td>
<td>Ecological Processes</td>
</tr>
<tr>
<td>Coastal Systems</td>
<td>Ocean Systems</td>
<td>664 Oceanographic Instrumentation &amp; Technology (3) Measurement techniques in physical oceanography, including pressure, temperature, salinity, oxygen, optical sensors, current meters, navigation systems, ocean acoustics and mooring structures. Includes a laboratory research project. Pre: 620 or consent.</td>
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<tr>
<td>Nat. Hist./Systemat./Evolution</td>
<td>GG 615 Micropaleontology (3) (2 Lec, 1 3-hr Lab) Taxonomy and identification of microfossils and their recent representatives. Use in determining age, paleoecology, provenance of sedimentary rocks. Pre: 308 or consent.</td>
<td></td>
</tr>
<tr>
<td>Nat. Hist./Systemat./Evolution</td>
<td>GG 637 Macroevolution and Earth History (3) Evolutionary biology in the context of Earth history; fossil record of life; fundamentals of microevolution; speciation, molecular evolution and phylogeny; geologic history of the Earth; evolution of genomes, development, and behavior; and case studies in evolution. A-F only Pre: BIOL 171 or equivalent. (Alt. years)</td>
<td></td>
</tr>
<tr>
<td>Coastal Systems Ocean Systems</td>
<td>Ecological Processes</td>
<td>GG 639 Stable Isotope Biogeochemistry (3) Stable isotope geochemistry applied to questions of biogeochemical cycling in the oceans, sediment diagenesis, paleoceanography, environmental geochemistry and ecology. Pre: 325 or consent. (Alt. years)</td>
</tr>
<tr>
<td>Coastal Systems Ocean Systems</td>
<td>Ecological Processes</td>
<td>OEST 735 Ocean Policy Seminar (2) Interdisciplinary approach to problems relating to humans and their interactions with the world's oceans and coasts. Theme changes each semester. Repeatable eight times. (Cross-listed as SOCS 735)</td>
</tr>
<tr>
<td>Coastal Systems Ocean Systems</td>
<td>Ecological Processes</td>
<td>OEST 740 Marine Biofilms: Ecology and Impact (3) Intensive description of biofilms, their growth and their impact upon engineered processes in the marine environment. Basic principles of bioadhesion, corrosion, attachment and metamorphosis of larvae (i.e. biofouling), antifouling techniques and modeling of biofilms reactors will be presented. Focus on how biofilms impact research thesis topics will also be emphasized. A-F only. Pre: good standing in any science or engineering graduate program or consent. Fall only</td>
</tr>
</tbody>
</table>

OTHER Relevant Courses
| Coastal Systems  | Ecological Processes | ECON 358 Environmental Economics (3) | Nature and causes of environmental degradation and economic solutions. Topics include air and water pollution, toxic waste, deforestation, soil erosion, biodiversity, global warming and sustainable economic growth. Pre: 120, 130, or 131; or consent |
|-----------------|---------------------|-------------------------------------|
| Ocean Systems   | Nat. Hist./Systemat./Evolution |                                     |                                      |
Signatures of Affiliated Faculty Biology

We apologize for the look of these pages. To facilitate getting 52 signatures from 10 different units, separate signature pages were sent to teach unit and then collated. Some signatures and CVs are missing because the person was traveling. They have confirmed their interest in participating in the Marine Biology Graduate degree program via email.
<table>
<thead>
<tr>
<th>Graduate Faculty</th>
<th>Departmental</th>
<th>College/School</th>
<th>Signature</th>
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</thead>
<tbody>
<tr>
<td>Harry Ako</td>
<td>MMBE</td>
<td>CTAHR</td>
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</tr>
<tr>
<td>Marlin Atkinson</td>
<td>HIMB/Oceanog</td>
<td>SOEST</td>
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<tr>
<td>Whitlow Au</td>
<td>HIMB/Oceanog</td>
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<tr>
<td>Robert Bidigare</td>
<td>HIMB</td>
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<tr>
<td>Paul Bienfang</td>
<td>Oceanography</td>
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<tr>
<td>Brian Bowen</td>
<td>HIMB</td>
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<tr>
<td>Sean Callahan</td>
<td>Microbiology</td>
<td>CNS</td>
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<tr>
<td>David Carlon</td>
<td>Biology</td>
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<tr>
<td>Mathew Church</td>
<td>CMORE/Oceanog</td>
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<tr>
<td>Kathleen Cole</td>
<td>Biology</td>
<td>CNS</td>
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<tr>
<td>H. Gert de Coet</td>
<td>Biology</td>
<td>CNS</td>
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<tr>
<td>Stuart Donachie</td>
<td>Microbiology</td>
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<tr>
<td>Megan Donahue</td>
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<tr>
<td>Jeffrey Drazen</td>
<td>Oceangraphy</td>
<td>SOEST</td>
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<tr>
<td>Ruth Gates</td>
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<tr>
<td>Eric Goetze</td>
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<tr>
<td>Michael Hadfield</td>
<td>Kewalo/Biology</td>
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<tr>
<td>Kim Holland</td>
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<td>Cynthia Hunter</td>
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<td>David Karl</td>
<td>CMORE/Oceanog</td>
<td>SOEST</td>
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<tr>
<td>Name</td>
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<tr>
<td>Stephen Karl</td>
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<tr>
<td>Judy Leum</td>
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<td>Jo-Ann Leong</td>
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<td>Brian Popp</td>
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<tr>
<td>Elaine Seaver</td>
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<td>Karen Selph</td>
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<td>Alison Sherwood</td>
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<td>Craig Smith</td>
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<tr>
<td>Grieg Steward</td>
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<td>Florence Thomas</td>
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<tr>
<td>Robert Toonen</td>
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<td>Timothy Tricas</td>
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<tr>
<td>Guangyi Wang</td>
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<tr>
<td>Les Watling</td>
<td>Biology</td>
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<tr>
<td>Kevin Weng</td>
<td>Oceanography/JIMAR</td>
<td>SOEST</td>
<td></td>
</tr>
</tbody>
</table>
## Affiliate Graduate Faculty

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution Type</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greta Aeby</td>
<td>HIMB</td>
<td>SOEST</td>
</tr>
<tr>
<td>Charles Birkeland</td>
<td>Hawaii Coop Fish Unit</td>
<td>CNS</td>
</tr>
<tr>
<td>Jon Brodziak</td>
<td>PIFSC</td>
<td>NOAA</td>
</tr>
<tr>
<td>Gerard DiNardo</td>
<td>PIFSC</td>
<td>NOAA</td>
</tr>
<tr>
<td>Alan Friedlander</td>
<td>Hawaii Coop Fish Unit</td>
<td>CNS</td>
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<tr>
<td>Jeffrey Polovina</td>
<td>PIFSC</td>
<td>NOAA</td>
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<tr>
<td>Daniel Polhemus</td>
<td>Papahanaumokuakea</td>
<td>USFWS</td>
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<tr>
<td>Samuel Pooley</td>
<td>PIFSC</td>
<td>NOAA</td>
</tr>
<tr>
<td>Michael Seki</td>
<td>PIFSC</td>
<td>NOAA</td>
</tr>
<tr>
<td>Thierry Work</td>
<td>USGS</td>
<td>USGS</td>
</tr>
</tbody>
</table>
Greta Smith Aeby
Hawaii Institute of Marine Biology
Email: greta@hawaii.edu

Professional preparation
2000-2002 Post-doctoral research associate, University of West Florida
1998 Ph.D., University of Hawaii at Manoa
1981 B.S., University of New Mexico

Appointments
9/05- Assistant researcher, Hawaii Institute of Marine Biology.
9/02-9/05 NWHI Research Coordinator, Hawaii Dept. of Land and Nat.
Resources, Div. of Aquatic Resources.
7/00-8/02 Post-doctoral research associate, University of West Florida
1/98-6/00 Researcher, Hawaii Cooperative Fishery Research Unit

Publications (last 2 years)


Work, TM, Vignon, M and GS Aeby. 2010. Microparasite ecology and health status
of blue-lined snappers (Lutjanus kasmira) from the Pacific islands. Aquatic Biology 9:185-192.

Grants (last 2 years)
2010-2013 Host-environment-pathogen interactions in a model coral disease system (Co-PIs: F. Cox, S. Callahan, D. Gochfeld), $276,909.00. National Science Foundation

Students supervised within past 6 years
Graduate students
Current committee member for 3 PhD students and 3 Master's students

Undergraduate students
Minority Access to Research Careers (MARC) - 1 student; Undergraduate Research and Mentoring in the Biological Sciences (URM) – 4 students; Undergraduate mentoring in environmental biology (UMEB) – 2 students; Volunteer interns – 15 students

Synergistic activities
- Invited participant in NSF Ecology of Marine Infectious Diseases workshop. February 2011
- NSF grant panelist 2010
- NOAAAs Hawaii Undersea Research Lab grant panelist 2010
- Climate change and marine disease local action strategy coordinator for Hawaii Div. of Aquatic Resources (2005-2011)
- Development of Hawaii’s rapid response contingency plan for unusual events of coral bleaching and disease (2008)
- Development of Eyes of the Reef volunteer monitoring program for reporting events of coral bleaching, disease or crown of thorns starfish outbreaks (2009)
- NALU studies. Guest lecturer. Two week course serving at-risk and vulnerable youth in Hawaii (2008-2011)
- PACES program. Guest lecturer. High school summer program in environmental science (2008-2011)
- Bill Sager: Coral reefs in Hawaii. Olelo. Local educational television program.
Harry Ako

Training:
- Post-doctoral, 1973-1975, biochemistry, Univ. of Washington
- A.B., 1967, biochemistry, Univ. of California at Berkeley.

Professional experience (all at University of Hawaii):
- 2005-2011 Chair, Department of Molecular Biosciences and Bioengineering.
- 2003-5, 2001-2 Interim Chair, Department of Molecular Biosciences and Bioengineering
- 2000-present Professor
- 1997-1998 Chair, Department of Environmental Biochemistry
- 1994-1999, 2000-present Chair, Technical Committee, Center for Tropical and Subtropical Aquaculture (annual election); Board of Directors
- 1982 Associate Professor, tenured; Dept. of Environmental Biochemistry
- 1976-1982 Assistant Professor, Department of Agricultural Biochemistry

Honors:
- 2005 Merit award (salary adjustment)
- 1988 Teaching award, National Association of Colleges and Teachers of Agriculture

Teaching:
- 2001-present Major advisor to all Plant and Environmental Biotechnology students.
  Program coordinator.
- 1975-present Biochemistry lecture and laboratory courses at least once a year.

Grants (partial; in excess of $2,280,251):
- P.I., 2011 and 2012 Vietnam Educational Foundation Fellowship, $56,000, FMIS account # 662361, 08/01/07/31/13.
- co-P.I.*, Aquaculture of ophi, Dominy, W., A.Baker, A. Lawrence, C. Bird, and V. Sato, Center for Tropical and Subtropical Aquaculture, Grant #2009-210, $100,000, 8/1/2010-7/31/2012. * P.I., but could not be listed as such for CTSA grant.
- co-P.I.*, Adapting aquacomics systems for use in the American Pacific Islands, Center for Tropical and Subtropical Aquaculture (CTSA), $12,839. * P.I., but could not be listed as such for CTSA grant.
- P.I., Identifications of Shrimp Muscle Regulatory Genes, Tropical and Subtropical Agriculture Research (Pacific), 9/1/06-8-30/09, $230,751.

Refereed papers and books (partial, 54 in total):


Many extension publications and published international presentations
Whitlow W. L. Au

Hawaii Institute of Marine Biology       (808) 247-5026[work]
P.O. Box 1106                            (808) 262-4927[home]
Kailua, Hawaii 96734                    wau@hawaii.edu[e-mail]
                                            (808)-247-5831 (FAX)

EDUCATION
Ph.D. Electrical Science, Washington State University, 1970
M.S. Electrical Engineering, Washington State University, 1964
B.S. Electrical Engineering, University of Hawaii, 1962

PRESENT POSITION
Chief Scientist, Marine Mammal Research Program, Researcher Level 5 (full Professor)
Hawaii Institute of Marine Biology

RESEARCH AND/OR PROFESSIONAL EXPERIENCE

1993-present Chief Scientist-Marine Mammal Research Program
Hawaii Institute of Marine Biology

1971-1993 Senior Scientist, Naval Ocean Systems Center, Hawaii Laboratory


1964-1968 R&D Project Officer and Engineer, Air Force Weapons Lab., N.M.

PUBLICATION SUMMARY (191 papers in open literature, 4 books, 176 Published abstracts,
6 Technical Reports)

humpback whale (Megaptera novaeangliae) sound types for passive acoustic monitoring,”

(2011). “Humpback whale (Megaptera novaeangliae) wintering behavior in the
Northwestern Hawaiian Islands observed acoustically,” Mar. Ecol. Progress Series, 423,
261-268.

an Urban Center,” in Effects of Noise on Aquatic Life, (A. Popper and H. Hawkins, eds).
Springer + Busioness Media, N.Y. (in press).

of minke whale boings detected at the Station Aloha Cabled Observatory,” J. Acoust.
Soc. Am., 129, 3353-3360.
Whitlow W. L. Au


PROFESSIONAL ACTIVITIES

President, Acoustical Society of America, 2009-2010
President Elect, Acoustical Society of America, 2008
Vice President, Acoustical Society of America, 2006.
Council of Scientific Society Presidents, 2009-2010
Co-organizer, 2nd Conf on Animal Acoustics Communications, Aug, 2008, Corvallis, OR.
Associate Editor, J. Acoust. Soc. Am., Animal Bioacoustics, 1998-present
Chair, Technical Committee on Animal Bioacoustics, Acoustical Soc. Am., 1997-2000
Member of Technical Specialty Committee on Animal Bioacoustics,
Member of organizing committee of the 13th Biennial Conference on the Biology of Marine Mammals, Wailea, Maui, Hawaii, Nov. 28 – Dec 3, p. 9.
Member of organizing committee of the 3rd Joint Acoustical Society of America/Acoustical Society of Japan meeting in Honolulu, Dec 1-7, 1996.
Organizing Committee member and Session chairman, International symposium on sensory systems and behavior of aquatic mammals, Moscow, 1991.
Organizing Committee member, 3rd International symposium on animal sonar systems, Helsingor, Denmark, 1986.
Organizing Committee member and Session chairman, 2nd International symposium on animal sonar systems, Jersey Island, 1979.

PROFESSIONAL AWARDS

Silver Medal, Acoustical Society of America, October, 1998
Fellow, Acoustical Society of America, May, 1990
Navy Meritorious Civilian Service Award (3rd highest national award for Navy civilian employee), for contributions in dolphin bioacoustics, 1986
Award of Merit - Quality Step Increase - Dec. 1974; Nov. 1976; Dec. 1979
Robert R. Bidigare

Hawai‘i Institute of Marine Biology
University of Hawai‘i
P.O. Box 1346
Kane‘ohe, HI 96744

(808) 956-8146 (VOICE) (808) 956-5308 (FAX) e-mail: bidigare@hawaii.edu

Professional Preparation:

Ph.D. Department of Oceanography, Texas A&M University, 1977-1981.
Post-doctoral institution: Department of Biochemistry & Biophysics, Texas A&M University

Appointments:

*Cooperating Graduate Faculty:* July 2006 to present - Department of Oceanography, University of Hawai‘i

*CMMED Director:* 1 August 2004 to present - University of Hawai‘i

*Professor:* March 1999 to Present - Hawai‘i Institute of Marine Biology, University of Hawai‘i

*Professor:* July 1994 to June 2006 - Department of Oceanography, University of Hawai‘i

*Associate Professor:* October 1990 to June 1994 - Department of Oceanography, University of Hawai‘i

Research Interests:

Biological-optical interactions in the upper ocean, phytoplankton pigment biochemistry, intermediary metabolism in marine plankton, regulation of algal photosynthesis rates, controls on carbon isotopic fractionation by marine phytoplankton, and pelagic trophodynamics.

Membership in Professional Organizations:

American Geophysical Union (AGU)
American Society of Limnology and Oceanography, Inc. (ASLO)
The International Society for Optical Engineering (SPIE)
Phycological Society of America (PSA)
The Oceanography Society (TOS)

Selected Publications Relevant to Proposed Research:


Robert R. Bidigare


Five Other Publications:


Synergistic Activities:

Joint Task Group for Standard Methods for the Examination of Water and Wastewater (1985-)
Associate Editor, Limnology and Oceanography (2002-)
Member of the Hawai‘i Department of Agriculture Advisory Subcommittee on Algae (2002-)
Federal advisor, NOAA’s Ocean and Human Health Initiative (2006-)


Graduate/Post-graduate Advisors: D. C. Biggs, E. G. Sander, and J. M. Brooks


Post-graduate advisees: C. Leonard, K. Waters, M. Latasa, R. Scharek, M. Park, and A. Saino
Paul K. Bienfang

Oceanography Department, 1000 Pope Rd., MSB#205
Honolulu, HI 96822, (808) 956-7402, bienfang@soest.hawaii.edu

Professional Preparation
University of Hawaii, B. S. 1971. with Highest Honors in Biology
University of Hawaii, M.S. 1974. Biological Oceanography
University of Hawaii, Ph.D. 1977. Biological Oceanography
University of Hawaii, 1983. Business Management Program

Professional History/Appointments:
Associate Professor, Oceanography Dept., University of Hawaii-Manoa. September, 2004 - present
Senior Vice President, Catech USA Inc. February, 1997 - August, 2004
Senior Vice President, The Oceanic Institute, May, 1982 - February, 1997

Recent Research Publications
Paul K. Bienfang


Synergistic Activities
Academic and Employment History – I traveled a different career path than most faculty. My early research focused on nutrient uptake dynamics, phytoplankton sedimentation and biogenic transport flux, and fisheries dynamics. I learned much about aquaculture while serving as Sr. VP for The Oceanic Institute, an oceanographic and aquaculture research institution, from 1973-1997, overseeing all phases of applied aquaculture research, development, and operations management. Subsequently, I was Sr. VP for Catech USA, Inc., a publicly traded marine bio-tech company in shrimp aquaculture. In 2004, I was invited to join the Oceanography faculty to head the ciguatera research group. This was a logical fit because of my background in phytoplankton ecology and various in vitro algal culture techniques. I remain delighted to be affiliated with UH again. Currently, the ciguatera research constitutes most of my FTE; a smaller portion is split between research involving phosphate uptake dynamics in phytoplankton, teaching, and mentoring. My scientific interests include: environmental quality and compliance Issues regarding aquaculture, phytoplankton ecology, water quality, fisheries recruitment dynamics and management, marine aquaculture, and phytoplankton mass production and continuous culture technologies.

I formerly served on the Executive Committee for the USDA Center for Tropical and Subtropical Aquaculture, and the Board of Directors for the Western Association of Marine Laboratories, the Governor’s appointee to the Hawaii Aquaculture Advisory Council, Hawaii Chapter of the American Fisheries Society, and the Community Council of the Biosystems Technology Program. I am currently on the Boards of the Hawaii Aquaculture and Aquaponics Association, Ohu Ohu Koolau Inc., and the Hawaii Association of Environmental Professionals.

I teach an upper level undergraduate course (OCN331, Living Marine Resources), and present a number of invited lectures to various academic and community audiences. Course content has been expanded to an interactive video conferencing format, and I have participated in a collaborative activity to develop an electronic lecture series for a virtual curriculum on marine topics for UH. I have mentored Fulbright scholars, representatives of the Native Hawaiian Science Engineering Mentoring Program, graduate and undergraduate students. Recently I was an invited reviewer for the Consortium for Ocean Leadership to review Multi-Institutional Proposals for the Gulf of Mexico Initiative responding to the BP oil spill, and I was invited chairperson for the international meeting on Toxic Benthic Hazardous Algal Blooms, a core research program within GEOHAB (SCOR/UNESCO). I am a recognized authority and regular reviewer of research proposals and manuscripts for several government agencies and scientific journals.
Charles Birkeland

Ph.D., 1970, University of Washington, Seattle (advisor R.T. Paine)

Positions

1970-1975 Research Associate, Smithsonian Tropical Research Institute, Panama

1975-1979 Associate Professor, University of Guam Marine Laboratory

1979-1982 Director, University of Guam Marine Laboratory

1982-1999 Professor, University of Guam Marine Laboratory

2000-2011 Hawaii Cooperative Fishery Research Unit, USGS and Adjunct Professor, Department of Zoology, University of Hawaii at Manoa

Selected Awards

Academy of Underwater Arts & Sciences, Science Award for 2007

Award for Outstanding Scientific Advancement of Knowledge presented by the U.S. Coral Reef Task Force on 7 November 2005

Honorary Life Fellow of the Pacific Science Association, award presented at IX Pacific Science Intercongress, Taipei, 16 November 1998

First Excellence in Research Award, University of Guam

Selected International Society Appointments

International Society for Reef Studies
- President (1986-1989)
- Council Member (1984-1995)

Chairman, Organizing Committee, 7th International Coral Reef Symposium, 1990-1992

International Association of Biological Oceanographers, Coral Reef Committee - Chairman, 1990-1992

Books

Charles Birkeland


Selected Publications


2007  Smith, L.W., and C. Birkeland. Effects of intermittent flow and irradiance level on back reef *Porites* corals at elevated seawater temperatures. JEMBE 341: 282-294
Brian W. Bowen

Title  Research Professor  
Affiliation  Hawaii Institute of Marine Biology  University of Hawaii  
e-mail: bbowen@hawaii.edu  
office: 808-236-7426  

Web Sites  
http://www2.hawaii.edu/~loonen/bowen.htm  
http://www.hawaii.edu/HIMB/Faculty/bowen.html  

Education  
1980  Bachelor of Science, Biology, Providence College  
1987  Master of Science, Marine Biology, College of William and Mary  
1992  Doctor of Philosophy, Genetics, University of Georgia  
Advisor: John C. Avise  

Positions  
1992-1997  Researcher and Director, Conservation Genetics Core, Univ. of Florida  
1997-2002  Assistant Professor, Dept. of Fisheries and Aquatic Sciences, Univ. of Florida  
2003 – 2006  Assistant Research Professor, Hawaii Institute of Marine Biology, Univ. of Hawaii  
2006 – 2010  Associate Research Professor, Hawaii Institute of Marine Biology, Univ. of Hawaii  
2010 - present  Research Professor, Hawaii Institute of Marine Biology, Univ. of Hawaii  

Selected Professional Experiences  
1994 - present  IUCN Species Survival Commission, Marine Turtle Specialist  
2003 - present  International expeditions to collect specimens of reef organisms at Christmas Island  
(Pacific Ocean), American Samoa, Okinawa, Marshall Islands, Johnston Atoll, Palau,  
Cocos (Keeling), Christmas Island (Indian Ocean), Chagos, Saudi Arabia, and elsewhere  
2004 – present  Twenty two invited speaking engagements and keynote addresses in Japan, American Samoa,  
Panama (twice), Diego Garcia, Indonesia, India, Australia, Malaysia, Tahiti, and domestic  
forums.  
2005 – present  Chief HIMB scientist on the NOAA research vessel Hiialakai on three 24 – 30 day expeditions,  
to conduct scuba sampling in the remote Northwest Hawaiian Islands  
2005 - present  Advisory Council, NW Hawaiian Islands Marine Sanctuary  
2009-2010  National Research Council, Committee on the Review of Sea Turtle Population Assessments  
2010 – present  International Steering Committee, Indo-Pacific Fish Conference  
2010 – present  Genome 10K Associate, organization to produce 10,000 vertebrate genomes  

Editorial Positions  
1993-1999  Genetica, Associate Editor  
1996-2004  Herpetological Review, Associate Editor  
1998-2000  Evolution, Associate Editor  
2000-present  Molecular Ecology, Editorial Review Board  
2003-present  Journal of Heredity, Associate Editor  

Honors  
1990  American Society of Ichthyologists and Herpetologists, Stowe award for best student paper  
1991  Annual Marine Turtle Symposium, award for best student paper  
1992  University of Georgia, Charles C. Anderson Award for research excellence in dissertation  
1996  Elected Fellow, American Association for the Advancement of Science  

Selected Recent Publications (out of 150)  
Grant, W.S., and B.W. Bowen. 2006. Living in a tilted world: climate change and geography limit speciation in Old  
Bowen, B.W., W.S. Grant, Z. Hillis-Starr, et al. 2007. Mixed stock analysis reveals the migrations of juvenile hawksbill  
turtles (Eretmochelys imbricata) in the Caribbean Sea. Molecular Ecology 16:49-60.  
Coral Reefs 26: 501-512.  
4886-4907.  
fishes indicates both origin and accumulation of diversity in the Caribbean. BMC Evolutionary Biology 8:157.
Brian W. Bowen


Research Support


2009 – 2012 Hawaii Sea Grant: Introduced Fish as a Vector for Invasive Parasites (P.I.: $90,600)


2010 - 2012 National Marine Fisheries Service: Genetic Stock Resolution of the deepwater snappers Ehu and Onaga (P.I.: $139,275)

2011 -2012 Seaver Institute: Exploring meso-photic reefs of the Pacific Ocean (P.I.: $98,000)
Biographical Sketch – Brodziak

(a) Professional Preparation
University of California Davis  Applied Mathematics  PhD – 1990
University of California Davis  Applied Mathematics  MSc – 1987
University of Pennsylvania  Mathematics  BA – 1985

(b) Appointments

(c) Five Recent Publications (N=127)


(d) Synergistic Activities
Academic and Student training – My research on population dynamics and fisheries management has provided me with numerous opportunities for teaching and public speaking on fisheries issues. I served as an instructor for Fishery Stock Assessment Methods, a graduate course taught at Oregon State University in 1998. I was an instructor for the course Dynamics of Exploited Fish Populations, a graduate course taught at University of Massachusetts in 2003. I was also a lecturer for the Fishery Industry Catch Comparison Workshop for the Rhode Island Sea Grant College in 2004 and an instructor for Dynamics of Exploited Marine Populations, a graduate course taught at the University of Rhode Island in 2005. I served as Adjunct Professor, Department of Fisheries and Wildlife, at Oregon State University, 1996-1999 and as Adjunct Professor, Department of Fisheries and Wildlife, at the University of Massachusetts, Amherst, 2000 – 2006 and mentored two M.Sc. students. I have been an invited lecturer at Tokyo University (Abishiri 2008), Shanghai Ocean University (Shanghai 2009), and the Center for Sustainability Science, University of Hokkaido (Hakodate 2010).

Service to Academic Community – My research stock assessment methods and risk assessment has led to numerous publications and presentations at national and international scientific meetings. I served on the International Editorial Board of the South African Journal of Marine Science during 1998-2003 and have been an Associate Editor for Transactions of the American Fisheries Society since 2006. I am currently a member of the National Assessment Methods Working of NMFS and am also a member of the ICES Assessment Methods Working Group. I have served as a reviewer for the Canadian Regional Assessment Meetings, Maritimes Provinces. I have also served on the USA-
Biographical Sketch – Brodziak

Enhancing Underrepresented Groups – I helped develop the course curriculum and served as an instructor for Population Dynamics and Stock Assessment, a short course for underrepresented minorities in fisheries science, taught at Jackson State University during June 2002-2004.

(e) Collaborators and Other Affiliations

(i) Collaborators and Co-Editors in the Past 2 Years

<table>
<thead>
<tr>
<th>Link, J – NMFS NEFSC</th>
<th>Walter, J – NMFS SEFSC</th>
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<tbody>
<tr>
<td>Ihde, T – NOAA Chesapeake Bay Lab</td>
<td>Friedland, K – NMFS NEFSC</td>
</tr>
<tr>
<td>Townsend, H – NOAA Chesapeake Bay Lab</td>
<td>Dai, X – Shanghai Ocean U</td>
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<tr>
<td>Harvey, C – NMFS NWFSC</td>
<td>Kadota, M – Kinki U</td>
</tr>
<tr>
<td>Mangel, M – UC Santa Cruz</td>
<td>Kanaiwa, M – Tokyo Agriculture U</td>
</tr>
<tr>
<td>Peterman, R – Simon Fraser U</td>
<td>Kimoto, A – NRI Far Seas Fisheries</td>
</tr>
<tr>
<td>Lorenzen, K – U Florida</td>
<td>Yokawa, K – NRI Far Seas Fisheries</td>
</tr>
<tr>
<td>Lee, HH – U Hawaii JIMAR</td>
<td>Harley, S – SPC</td>
</tr>
<tr>
<td>MacCall, A – NMFS SWFSC</td>
<td>Murawski, S – U South Florida</td>
</tr>
<tr>
<td>Field, J – NMFS SWFSC</td>
<td>MacCall, A – NMFS SWFSC</td>
</tr>
<tr>
<td>Piner, K – NMFS SWFSC</td>
<td>Walsh, W – U Hawaii JIMAR</td>
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<tr>
<td>Methot, R – NMFS S&amp;T</td>
<td>Andrews, A – NMFS PIFSC</td>
</tr>
<tr>
<td>Ianelli, J – NMFS AFSC</td>
<td>Humphreys, R – NMFS PIFSC</td>
</tr>
<tr>
<td>Spencer, P – NMFS AFSC</td>
<td>DeMartini, E – NMFS PIFSC</td>
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<tr>
<td>Sun, CL – National Taiwan U</td>
<td>Richards, B – NMFS PIFSC</td>
</tr>
<tr>
<td>Yeh, SZ – National Taiwan U</td>
<td>O'Malley, J – NMFS PIFSC</td>
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<tr>
<td>Porch, C – NMFS SEFSC</td>
<td>Andrews, A – NMFS PIFSC</td>
</tr>
<tr>
<td>Gedamke, W – NMFS SEFSC</td>
<td>Ishimura, G – Hokkaido U</td>
</tr>
<tr>
<td>Courtney, D – NMFS SEFSC</td>
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</tbody>
</table>

(ii) Graduate Advisors

PhD Thesis Advisor  Marc Mangel  UC Santa Cruz

(iii) Graduate Advisor and Postgraduate-Scholar Sponsor (past 5 years)

None
Professional Preparation:

Princeton University  Molecular Biology  A.B., 1988
University of Chicago  Bacterial Genetics  1999 - 2002

Appointments:

Professor, University of Hawaii, Department of Microbiology  2007 - 2011
Associate Professor, University of Hawaii, Department of Microbiology  2007 - 2011
Assistant Professor, University of Hawaii, Department of Microbiology  2002 - 2007

Publications:

Related:

Other:

**Synergistic Activities:**

- Instructor, University of Hawaii 2002 - present
- Development and implementation of curricula for upper level undergraduate Bacterial Genetics lecture and laboratory courses. Laboratory curriculum incorporates the bacterial genetics of cyanobacteria based on PI's current research.

- Sponsor, MARC U-Star program 2004 - present
- Research support and mentoring for undergraduate students in programs designed to increase the participation of Pacific Islanders in PhD programs in the biological sciences.

- Sponsor, St. Andrews Priori High School Students 2004 - present
- Research support and mentoring for students participating in HI Science Fair.

- Sponsor, NSF UBM training grant 2008 - present
- Research support and mentoring for 2 students supported by a grant in Interdisciplinary Training for Undergraduates in Biological and Mathematical Sciences (UBM).

**Collaborators:**

- Buikema, William J. University of Chicago
- Dunlap, Paul V. University of Michigan
- Haselkorn, Robert University of Chicago
- Stevens, Ann M. Virginia Tech
- Allen, John University of Hawaii
- Zhu, Mei Pacific Lutheran University
- Kennedy, Michael Miami University

**Graduate and Postdoctoral Advisors**

- Graduate Advisor: Dunlap, Paul V. University of Michigan
- Postdoctoral Advisor: Haselkorn, Robert University of Chicago

**Thesis Advisor and Postgraduate-Scholar Sponsor**

- Orozco, Christine C.
- Yamaura, Hiroshi
- Nayar, Asha S.
- Borthakur, Pritty B.
- Risser, Douglas D.
- Rajagopalan, R.
- Young-Robbins, S. S.
BIORAPHRICAL SKETCH – David B. Carlon  
http://www2.hawaii.edu/~carlon/ 
Department of Zoology, University of Hawaii at Manoa, Honolulu, HI 96822

PROFESSIONAL PREPARATION:
University of New Hampshire, Ecology, Ph.D. 1995
University of Massachusetts, Ecology, M.S. 1991
Boston University, Biology/Marine Science (BUMP), B.A. 1987

APPOINTMENTS:
Associate Professor, Zoology, University of Hawaii 2008- Present
Assistant Professor, Zoology, University of Hawaii 2003-2008
Adjunct Professor, Las Positas College 2002
Postdoctoral researcher, University of California, Davis 2001-2003
Postdoctoral researcher, University of Southern California 1999-2001
NSF Postdoctoral Fellow, University of California, Davis 1997-1999

FIVE PUBLICATIONS RELATED TO THIS PROPOSAL:


FIVE OTHER SIGNIFICANT PUBLICATIONS:


SYNERGISTIC ACTIVITIES:

2011  Member- Marine Time Series Research Group (MTSRG). A collaboration of paleontologist, ecologists, and evolutionary biologists dedicated to uniting time series data to understanding evolutionary change in the Tropical Atlantic on Neogene time scales.

2009  NSF/DEB/DIG Panelist

2008-9 Convener of the Albert Tester Symposium, University of Hawaii. Three day meeting that features seminars by a distinguished speaker (Tyrone Hayes, ’08; Daniel Pauly, ’09) and graduate student presentations. Draws from the major physical and natural science departments/units on campus.

2006- present Teach an inquiry based graduate course in Molecular Ecology at the University of Hawaii that emphasizes hypothesis testing with molecular data sets. Students develop basic bench skills in DNA extraction, PCR, genotyping, direct sequencing, in vitro cloning, and bioinformatics. Then address hypotheses with new genetic data. I have trained students from the college of Natural Sciences, the School of Ocean and Earth Sciences, and the College of Tropical Agriculture.

2003- present At the University of Hawaii I have focused on recruiting and training under-represented minorities with research projects in molecular evolution & ecology, field ecology, and marine biology. Past undergraduates have been supported by NSF REU supplements, the C-MORE training grant at the University of Hawaii, an NSF UMEB & NR award to the University of Hawaii.

COLLABORATORS & OTHER AFFILIATIONS:

E. Rolan Alvarez (University of Vigo, Spain), R. Andrew (University of British Columbia), A. Budd (University of Iowa), B. Bowen (University of Hawaii), J. H. Choat (James Cook University), K. Clements (University of Auckland), K. Clifton (Lewis and Clark College), P. Edmonds (Cal. State Northridge), P. Jarne (CEFE - CNRS France), N. Knowlton (Scripps Institutive of Oceanography), H. Lessios (STRI Panama), D. Levitan (Florida State, Tallahassee), A. O’Dea (STRI, Panama), D. R. Robertson (STRI, Panama), R. Toonen (University of Hawaii).

GRADUATE AND POSTDOCTORAL ADVISORS:

 Rick Grosberg, University of California, Davis (Postdoctoral advisor)
 Suzanne Edmands, University of Southern California (Postdoctoral advisor)
 Peter Sale, University of Windsor, Ontario (PhD, co-advisor)
 Michelle Scott, University of New Hampshire (PhD, co-advisor)
 John Ebersole, University of Massachusetts Boston (MS)

THESIS ADVISOR:

Current:
Aki Laursen, PhD expected 2016
John Fitzpatrick, PhD expected 2016
Pricila Alburquerque de Moura, PhD expected 2014
Kristin Halbert, MS expected 2012

Degrees awarded:
John Fitzpatrick, MS, 2009
Kimberly Tice, MS, 2009
Kathleen S Cole

Date, Place of Birth: September 6, 1950. London, Canada.
Nationality: Canadian
U.S. Status: Permanent U.S. Residency
Business Address: Department of Zoology, University of Hawaii at Manoa, Honolulu, HI, 70504-2451, USA
Business Telephone: (808) 956-8618  FAX Number: (808) 956-9812
E-mail address: colek@hawaii.edu

Education:
1973-1976 MSc University of Guelph, Guelph.
1969-1973 BSc (Honors) University of Western Ontario, London.

Thesis Titles:
Social behaviour and social organization of young rainbow trout, Salmo gairdneri of hatchery origin. MSc 1976.

Professional Positions:
2008-present Associate Professor, tenured, University of Hawaii at M- noa
2003-2008 Assistant Professor, University of Hawaii at M-noa
2002-2003 Associate Professor, tenured, University of Louisiana at Lafayette
1998-2002 Assistant Professor, University of Louisiana at Lafayette
1998-present Research Associate, Department of Vertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington
1993-1997 Associate Professor, tenured, Bishop's University, Quebec
1992 Visiting Fellow, Australian Museum, Sydney
1989-1993 Assistant Professor, Bishop's University, Quebec
1989 Visiting Scientist, Smithsonian Tropical Research Institute (STRI), Panama
1988 Smithsonian Short-term Fellow, STRI, Panama
1987 Invited Visiting Scientist, Pauli Foundation Summer Program, University of Hawaii, Honolulu
1985-1988 Research Associate, Department of Marine Sciences, University of Puerto Rico
1982-1984 Postdoctoral Fellow, Department of Biology, University of Saskatchewan, Saskatoon
1981 Smithsonian Short-term Fellow, Smithsonian Tropical Research Institute, Panama
1981 Exxon Short-term Research Recipient, Smithsonian Tropical Research Institute, Panama

Areas of Research Interest and Current Collaborations:
Reproductive biology of fishes
Evolution of hermaphroditism in fishes including the study of functional sex-change, phylogenetic patterns of occurrence and environmental factor correlations
Evolution of gobiodid fishes (with F. Pezold, University of Texas A&M - Corpus Christi)
Gonad ontogeny and developmental morphology, including effects of microgravity on skeletal development and spatial orientation (with: N. Pellis, Johnson Space Center, Houston; Y. Sakakura, Nagasaki University)
Effects of environmental factors on sexual differentiation in salmonids (with D.L.G. Noakes, Oregon State university)

Selected Recent Publications:


Books

Grants in Effect

Offices, board-committee positions and appointments held in international and national professional organizations:
Advisory Editor, Environmental Biology of Fishes (2008-present)
Board of Governors, Elected Member, American Society of Ichthyologists and Herpetologists (2008-2013)
Research Associate, Department of Vertebrate Zoology, National Museum of Natural History, Smithsonian Institution (1998 to present)
Board of Governors, Elected Member, American Society of Ichthyologists and Herpetologists (2001-2006)
Nominating Committee, Chair, American Society of Ichthyologists and Herpetologists (2002-2003)
Nominating Committee, Elected Member, American Society of Ichthyologists and Herpetologists (2001-2003)
Biographical Sketch – de Couet, H.G.

(a) Professional Preparation
Univ. Darmstadt Germany          Zoology                         Diploma – 1978
Univ. Darmstadt Germany          Cell Biology                    PhD – 1981

(b) Appointments
University of Hawaii              Professor                       09/1990 – present
National Science Foundation       Program Director                 08/2010 – 12/2011
University of NSW, Australia      Lecturer                        01/1987 – 08/1990

(c) Five Relevant Publications (N=53)

d) Five additional, significant publications

(d) Synergistic Activities
Biographical Sketch – de Couet, H.G.

Academic and Student training – My academic duties include upper division courses in Cellular- and Molecular Biology, and graduate courses in the areas of my specialization, such as gene organization, the evolution of developmental mechanisms, development.

Service to Academic Community –
2004-2007 Associate Director Center for Genomics, Proteomics, and Bioinformatics Initiative (CGPBRI) at the University of Hawaii
2005-2009 Director Outreach core, IdeA Networks for Biomedical Research Excellence Hawaii (INBRE)
2009-2011 Program Director, National Science Foundation. Developmental Systems Cluster in the Division of Integrative Organismal Systems.
Service as an ad hoc reviewer and panelists for the Australian Research Council, for the National Science Foundation, and for the American Heart Association
Service for Society for Integrative and Comparative Biology and American Society for Cell Biology as student presentation judge, congressional liaison

Service to the broader community –
2007-2008 Deputy Director for Aerospace Education United States Air Force Auxiliary, Civil Air Patrol, Hawaii Wing
Taught workshops at the annual joint meeting of the Hawaii branch of the AMERICAN SOCIETY OF CLINICAL LABORATORY SCIENCE (ASCLS) and CLINICAL LABORATORY MANAGEMENT ASSOCIATION (CLMA) in 2007

(e) Collaborators and Other Affiliations

(i) Collaborators and Co-Editors in the Past 48 Months
Margaret McFall-Ngai, U Madison, WI
Patrick Callaerts, Univ. Leuven, Belgium
S. Shigeno
Cliff Ragsdale, U Chicago

(ii) Graduate and Postdoctoral Advisors
PhD Thesis Advisor Ute Groeschel-Stewart Univ. Darmstadt Germany
Post doctoral Advisors David Blest RSBS, Austr. Natl. Univ.

(iii) Graduate Advisor and Postgraduate-Scholar Sponsor (past 5 years)
Marie-Therese Noedl
Jorik Loeffler
Therese Kremer
Claudia Blanca Farfan

Summary – Since 1990 I have advised 1 female Postdoctoral Scholar, 2 Ph.D. students (2 female, 1 male), 4 MS students (2 female, 2 male), and >12 undergraduate interns.
(a) Professional Preparation

University of California, Los Angeles  
Cybernetics  
B.S. 1995

University of California, Davis  
Ecology  
Ph.D. 2003

California State University, Los Angeles  
Ecological Modeling  
postdoc, 2004-2005

(b) Appointments

2008 – present  Assistant Researcher  
Hawai'i Institute of Marine Biology, University of Hawai'i

2006 – 2008  Assistant Professor  
Dept of Biological Sciences, Humboldt State University

2005  Lecturer  
Dept of Biological Sciences, California State University Los Angeles

2004, 2005  Faculty Coordinator  
Shoals Marine Laboratory

(c) Publications

(i) Five most relevant publications


(ii) Five additional publications


Megan J. Donahue

(d) Synergistic Activities

Research Opportunities for Undergraduates: Faculty Coordinator for NSF-REU at Shoals Marine Laboratory (2004-2005) coordinating twenty (including 3 under-represented) and directly advising three undergraduates resulting in four jointly authored publications. Advised five undergraduate research projects at Humboldt State University (2006-2008) resulting in three poster presentations. Currently advising two undergraduate students in an NSF-funded undergraduate Mathematics and Biology program at UH Manoa

Community Outreach: collaborative research with Paepae O He‘eia, a community group that oversees a traditional Hawaiian fishpond, an important cultural resource. In collaboration with natural and social scientists and in coordination with Paepae O He‘eia, we are studying the ecosystem dynamics of the fishpond and its watershed to improve understanding and management of the fishpond


(c) Collaborators & Other Affiliations

(i) Collaborators & Co-Editors
   Marcel Holyoak, University of California, Davis
   Peter Chesson, University of Arizona
   Charlotte Lee, Florida State University
   Jeb Byers, University of Georgia
   Kathryn Cottingham, Dartmouth College
   Myra Shulman, Cornell University
   Irit Altman, University of New Hampshire
   April Blakeslee, Smithsonian Environmental Research Center
   Carlos Santamaria, Texas A&M
   Megan Eastwood, University of Texas at Austin
   Cory Kredeit, University of Florida
   Amy Fowler, University of Auckland
   Carlos Robles, California State University, Los Angeles
   Robert Desharnais, California State University, Los Angeles
   Corey Garza, California State University, Monterey Bay
   Charles Birkeland, University of Hawaii
   Danielle Jayawardene, University of Hawaii
   Paul Jokiel, University of Hawaii
   Erik Franklin, University of Hawaii
   Florence Thomas, University of Hawaii
   Rob Toonen, University of Hawaii
   Steve Karl, University of Hawaii

(ii) Graduate Advisors and Postdoctoral Sponsors
   Peter Chesson, University of Arizona
   Robert Desharnais, California State University, Los Angeles

(iii) Thesis Advisees
   Nyssa Silbiger, Hawaii Institute of Marine Biology
   Margaret Siple, Hawaii Institute of Marine Biology
   Jamie Sziklay, Hawaii Institute of Marine Biology
   (total of 3 graduate students and 0 postdocs advised)
Jeffrey C. Drazen
University of Hawaii
Department of Oceanography
1000 Pope Rd., Honolulu, HI 96822
tel: (808) 956-6567
fax: (808) 956-9516
jdrazen@hawaii.edu

Professional Preparation
Monterey Bay Aquarium Research Institute, Postdoctoral Fellow, 2001-2004
Scripps Institution of Oceanography, Marine Biology, Ph.D., 2000
University of San Diego, Biology and Marine Science, B.A., 1994

Appointments
2007 – present Affiliate faculty, Hawaii Institute of Marine Biology, U. of Hawaii, Manoa
2009 – present Associate Professor, Dept. of Oceanography, University of Hawaii, Manoa
2004 – 2009 Assistant Professor, Dept. of Oceanography, University of Hawaii, Manoa
2001 – 2004 Postdoctoral Research Fellow, Monterey Bay Aquarium Research Institute
1999 – 2000 Part-time faculty member, Biology Department, University of San Diego
1994 – 2000 Graduate Research Assistant, Scripps Institution of Oceanography

Courses Taught at UH Manoa
OCN627 Ecology of Pelagic Marine Animals
OCN630 Deep-Sea Biology

Select Recent Publications


**Synergistic Activities**
1. Guest speaker for public and educational venues including San Diego Tropical Fish Society, Honolulu Aquarium Society, MBARI and UH open houses, SeaCamp, various K-12 schools in Hawaii
2. NSF RET program with Hawaii K-12 educators helping them with curriculum on the deep sea and fisheries, this program involves students from groups underrepresented in the sciences

**Collaborators**
Collaborators: Jeff Polovina (NOAA), Don Kobayashi (NOAA), Ben Richards (NOAA), Paul Yancey (Whitman), Brian Popp (University of Hawaii), Craig Smith (University of Hawaii), Erica Goetze (University of Hawaii), Chris Kelley (NOAA-HURL), Charles Phleger (CSIRO), Peter Nichols (CSIRO), Reka Domokos (NOAA-NMFS), Kevin Weng (PFRP, UH), Robert Olson (IATTC), Carolyn Holl (Oceanic Institute), Mike Landry (SIO)
Alan M. Friedlander

Assistant Leader, USGS-Hawaii Cooperative Fishery Research Unit, Department of Zoology, University of Hawaii at Manoa, alan.friedlander@hawaii.edu
Phone: 808-956-8350, FAX: 808-956-8300

a) Professional Preparation

Roanoke College, Salem, Virginia Biology B.S. 1980
Old Dominion University, Norfolk, Virginia Oceanography M.S. 1987
University of Hawaii, Manoa, Hawaii Zoology (Marine Biology) Ph.D. 1996

(b) Appointments

2010- Collaborating Scientist, Charles Darwin Foundation, Galapagos
2010- Affiliate Faculty, Marine Sciences, University of Hawaii at Hilo
2009- Assistant leader and Adjunct Associate Professor, USGS-Hawaii Cooperative Fishery Research Unit, Department of Zoology, University of Hawaii at Manoa
2008- Affiliate Faculty, Marine Studies, Univ. of the South Pacific
2008- Affiliate Faculty, Marine Science, Hawaii Pacific University
2004- Affiliate Faculty, Hawaii Institute of Marine Biology, Univ. of Hawaii at Manoa.
2002-08 Pacific Coral Reef Science Coordinator, NOAA/NOS/ Biogeography Branch.
2001- Adjunct Faculty, Ecology, Evolution, and Conservation Biology, Univ. of Hawaii
1998-08 Research Scientist, Fisheries Ecologist, The Oceanic Institute, Waimanalo, Hawaii
1987 Marine Fisheries Biologist, Dept of Fisheries and Aquaculture, University of Florida.
1982-84 Fisheries Extension Officer, U.S. Peace Corps, Kingdom of Tonga.

(c) Publications

Five publications most closely related to proposal project

Five other significant publications


(d) **Synergistic Activities**

- French Foundation for Research on Biodiversity, Center for Synthesis and Analysis on Biodiversity - Modeling Species-Abundance working group (2011-13)
- NSF Biosystems review panel (2010)
- The Nature Conservancy of Hawaii – Board of Trustees Conservation Committee (2007-)
- Duke University Distinguished Conservation Scholar (2006)

(e) **Collaborators & Other Affiliations**

**Collaborators and Co-Editors:** T. Anderson (San Diego State Univ), J. Beets (U. Hawaii Hilo), J. Caselle (UC Santa Barbara), B. Costa (NOAA), E. DeMartini (NOAA), S. Hamilton (Moss Landing Marine Lab), C. Lepeczyk (U. Hawaii), C. Lowe (Cal. State Long Beach), M. Monaco (NOAA), C. Mora (Univ. Hawaii). Y. Papastamatiou (Univ. Florida), D. Raffaelli (U. York), F. Rohwer (San Diego State Univ), B. Ruttenberg (NMFS), E Sala (Nat. Geo.), S. Sandin (UCSD), A. Schumbauer (Charles Darwin Foundation), S. Walsh (Brown U), L. Wedding (NOAA)

**Graduate Advisors and Postdoctoral Sponsors:** D. Feigenbaum (M.S. - ODU- deceased), J. Parrish (Ph.D. - U. Hawaii), G. Boehlert (Postdoc - Oregon State U)

**Thesis Advisor and Postgraduate-Scholar Sponsor:** Tim Clark Ph.D. (NPS Samoa), Mary Donovan M.S. (U Hawaii), Haruko Koike Ph.D. (UH), Bret Schumacker Ph.D. (Hawaii DAR), Paolo Usseglio Ph.D. (UH). Total graduate students advised = 14.
RUTH D. GATES

Hawaii Institute of Marine Biology
School of Ocean and Earth Science and Technology, University of Hawaii at Manoa, HI
Phone: (808) 236-7420, FAX: (808) 236-7443, email: rgates@hawaii.edu
http://www2.hawaii.edu/~rgates/Gates_Lab_Website/Gates_Lab.html

(a) Professional Preparation

University of Newcastle upon Tyne, UK  Marine Biology  B.S. 1984
University of Newcastle upon Tyne, UK  Zoology  Ph.D. 1990
University of California, Los Angeles  Coral Biology  Postdoc 1990 - 2001

(b) Appointments

Researcher, Hawaii Institute of Marine Biology, University of Hawaii, 2011 -
Sabbatical Fellow, National Center for Ecological Analysis and Synthesis, UCSB, 2010
Associate Researcher, Hawaii Institute of Marine Biology, University of Hawaii, 2007 - present
Assistant Researcher, Hawaii Institute of Marine Biology, University of Hawaii, 2003 - 2007

(c) Selected Publications


(d) Synergistic Activities
Invited Participant
Invited member, Great Barrier Reef Foundation Reef Future Genomics 20/20 initiative (2011 -
Invited member of the Scientific Advisory board for the 12th International Coral Reef Symposium (Cairns
2012)
Biology Editor, Coral Reefs 2007 – present
Associate Investigator Moorea Coral Reef LTER, involved in time series analysis of Symbiodinium
communities
Co-Lead of NCEAS Working Group with Peter Edmunds titled “Tropical coral reefs of the future: modeling
ecological outcomes from the analyses of current and historical trends”
Core member of the World Bank funded Coral Reef Targeted Research Program (CRTR)
Lead faculty for the 2007 and 2009 Edwin Pauley Summer Programs in Marine Biology at the Hawaii
Institute of Marine Biology (www.hawaii.edu/HIMB/Education/Pauley.html)

(e) Postdoctoral Scholars Mentored
2011 - Dr. Thomas Oliver
2010 - Dr. Denise Yost
2008 - Dr. Michelle Phillips
2007 - Dr. Xavier Pochon
2006 – 2009 Dr. Laetitia Hedouin, currently a permanent Researcher with CNRS based in Moorea,
French Polynesia and Perpignan, France
2005 - 2011 Dr. Michael Stat, currently Researcher Assistant Professor, University of Western
Australia

(f) Graduate Students Currently Advised (start date noted, UH Manoa unless stated)
2011 John Burns, Ph.D. candidate, Zoology
2010 Nicole Ferguson, Ph.D. candidate, Zoology
2009 Emilia Sogin, Ph.D. candidate, Zoology
2008 Hollie Putnam, Ph.D. candidate, Zoology
2007 Rebecca Prescott, Ph.D. candidate, Zoology

(g) Graduate Students Graduated (graduation date noted, UH Manoa unless stated)
2011 Jackie Padilla Gamino (Ph.D. Oceanography) currently a NSF funded postdoc at the
Marine Science Institute, University of California at Santa Barbara (with Prof G. E.
Hofmann)
2010 Derek Smith (M.S. Zoology), currently a PhD student, Department of Biology, University
of Washington
2010 Thomas Krueger (M.S. Biology) University of Bremen, currently a PhD student, School of
Biological Sciences, U Wellington NZ
2009 Anderson Mayfield (Ph.D. Zoology), currently a National Science Foundation International
Postdoctoral Research Fellow, National Museum of Marine Biology and Aquarium (with
Prof C. S. Chen)
2008 Dan Reineman (M.S. Zoology), currently a PhD student Stanford’s Emmett
Interdisciplinary Program in Environment and Resources
2008 Marissa Hirst (M.S.), currently a PhD student, Department of Microbiology, UC Davis
2006 Mackenzie Manning (M.S. Zoology), currently a Lecturer at Kapiolani Community
College, University of Hawaii
2006 Emily Morris (M.S. Biology 2006) Humboldt State University (co-advised with Sean Craig)

Graduate Advisor and Postdoctoral Sponsors
Barbara E. University of Newcastle upon Tyne, UK Brown (Ph.D.) Leonard Muscatine, Jeanne Erickson,
Peggy Fong, David K. Jacobs, UCLA (postdoctoral)
Biographical Sketch – Erica Goetze  
Department of Oceanography, School of Ocean and Earth Science and Technology,  
University of Hawai'i at Manoa, Honolulu, HI 96822  egoetze@hawaii.edu

(a) Professional Preparation: 

Education:  
Wesleyan University  Biology  BA, 1995  
University of California, San Diego  Oceanography  PhD, Dec. 2004  

Postdoctoral training:  
Natural History Museum, London, UK  Phylogeography  2005  

(b) Appointments:  
University of Hawaii  Assistant Professor  04/08 – present  
Postdoctoral Researcher  Danish Instit. Fisheries Research  2005-2008  
Postdoctoral Researcher  Natural History Museum, London  2005

(c) Five recent publications:  


(d) Five additional publications:  


(e) Synergistic Activities:
- Steering and DNA Barcoding Committee Group member, Census of Marine Zooplankton, 2008 – 2010
- Executive Council member, World Association of Copepodologists, 2008 – current
- Instructor in Global Environmental Change (OCN310, undergraduate) and the Ecology of Pelagic Marine Animals (OCN627, graduate), UH Manoa, 2008 – current
- Current mentor for four female undergraduate and graduate student researchers. Since 2008, I have mentored 5 students from under-represented backgrounds in my laboratory (undergraduate & graduate).

(f) Collaborators & Other Affiliations:

Graduate Advisor: M. D. Ohman (Scripps Institution of Oceanography, UCSD)
Postdoctoral Advisors: T. Kiørboe (Danish Institute for Fisheries Research, Denmark), A.G. Glover (Natural History Museum, London, UK).
Biographical Sketch - Michael G. Hadfield, Principal Investigator

(i) Professional Preparation:
University of Washington, Seattle, A.B., 1959, Zoology
University of Washington, Seattle, M.S., 1961, Zoology
University of Copenhagen, 1961-1962, Marine Biology (Fulbright Fellow)
Stanford University, California, Ph.D., 1967, Biological Sciences

(ii) Appointments:
Director, Kewalo Marine Laboratory, University of Hawaii, 1996-2007.
Research Affiliate, Museum of Comparative Zoology, Harvard University, 1994-present
Research Associate, Bernice P. Bishop Museum, 1983-present.
Assistant to Full Professor of Zoology, Pacific Biomedical Research Center and Department of Zoology, University of Hawaii, 1968-present.
Assistant Professor of Zoology, Pomona College, Claremont, California, 1966-1968.

(iii) Five recent publications most closely related to larval settlement:

Five other significant publications from last 10 years (total in this period = 50):
(iv) Synergistic activities:
1. I have served for eleven years as Project Director for a NSF-supported programs in Undergraduate Mentoring in Environmental Biology. I have actively recruited students from community colleges in Micronesia, Guam and American Samoa to travel to the University of Hawaii for summer internships in faculty labs. Thus far, the program has trained more than 90 students, many of whom have gone on to earn baccalaureate and graduate degrees.

2. In 2004 I helped to organize the Pacific Institutes of Marine Sciences (PIMS), an association with members institutions in the U.S., Canada, China, and Singapore. The purpose of PIMS is to foster collaborative research across the Pacific Ocean, and to provide support for students and postdoctoral fellows to travel to other member institutes for research or training. In early 2007, I assumed the presidency of PIMS for a 3-year period.


(v) Collaborators & other affiliations (last 48 months):

Graduate students advised (last 5 years; total graduate students advised = 27):
Completed: Eugenio J. Carpizo-Ituarte, Ph.D. 1999 (Assistant Professor, Autonomous University of Baja California, Mexico); Lisa Hadway, M.S. 1998 (Field Biologist, Hawaii State Dept. of Land & Natural Resources); Shu-yi Huang, M.S. 2001 (doctoral student, University of Texas Austin); Brian McCauley, Ph.D. 1997 (Assistant Professor, DeAnza College, California); Kimberly del Carmen, Ph.D. 2003 (Instructor, Hawaii Pacific University); Nicholas Shikuma, M.S. 2007 (Ph.D. student, University of California Santa Cruz); Anuschka Faucci, Ph.D. 2007 (Instructor, University of Hawaii at Manoa), Timothy Dubuc, M.S. 2009 (Ph.D. cand., Univ. Hawaii), Kevin T. Hall, Ph.D. 2009 (AAAS Policy Postdoc). Current: Ying Huang, Brian Nedved, Matthew Shipley, David Sischo, Cawa Tran.

Postdoctoral scholars sponsored (last 5 years; total postdoctoral fellows = 16): Kristian Parker (The Oak Foundation, Geneva, Switzerland); Brenden Holland (Assist. Researcher, Ctr. for Conservation Research & Training, University of Hawaii); John Zardus (Asst. Prof., The Citadel); Cory Bishop (Asst. Prof., St. Francis Xavier Univ.); Megan Huggett (Postdoc, Hawaiian Institute of Marine Biology). Current: Elizabeth Perotti.
Biographical Sketch – Kim N Holland

(a) Professional Preparation

<table>
<thead>
<tr>
<th>Institution</th>
<th>Degree/Role</th>
<th>Years</th>
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<tbody>
<tr>
<td>Monell Chemical Senses Center</td>
<td>NIH Postdoctoral Scholar</td>
<td>1980 - 1981</td>
</tr>
<tr>
<td>University of Pennsylvania</td>
<td>Biology</td>
<td>Ph.D. 1980</td>
</tr>
<tr>
<td>University of Hawaii</td>
<td>Zoology</td>
<td>M.S. 1975</td>
</tr>
<tr>
<td>University of Hawaii</td>
<td>Zoology</td>
<td>B.A. (Hons). 1971</td>
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</table>

(b) Appointments

<table>
<thead>
<tr>
<th>Institution</th>
<th>Position</th>
<th>Years</th>
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</thead>
<tbody>
<tr>
<td>University of Hawaii (HIMB)</td>
<td>Researcher (tenured)</td>
<td>2001 - Present</td>
</tr>
<tr>
<td>Joint Institute of Marine and Atmospheric Research (UH) Senior Fellow</td>
<td>2004 - Present</td>
<td></td>
</tr>
<tr>
<td>University of Hawaii (HIMB)</td>
<td>Associate Researcher</td>
<td>1981 - 2001</td>
</tr>
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</table>

(c) Five Recent Publications (N = 70)


(d) Synergistic Activities

My academic activities focus on investigating the physiology and ecology of top predators such as tunas and sharks. My research group has been in the forefront of developing and deploying electronic tags that elucidate the biology of these species as they move through their natural habitats. In the case of tunas, I pioneered the study of how floating objects such as fish aggregating devices (FADs) influence their behavior and distribution. As the use of electronic tags has expanded and FADs have become a pivotal (and controversial) component of the world’s fisheries, I have been fortunate to be asked to collaborate with many diverse groups around the world, to be able to obtain consistent levels of extramural funding and attract a steady stream of highly capable graduate students. Our results have been published in a wide variety of highly respected journals and presented at many international and international meetings.
Academic and Student training – I have been a member of 27 graduate student committees – for 19 of which I was (or am) committee Chair. Further, I have mentored three post-Doctoral Fellows. My research group annually welcomes about 20 undergraduate interns into our lab.

Service to Academic Community – I have served on multiple tenure and promotion and search committees. I was the Principle Guest Editor for the Proceedings of the Fourth International Billfish Symposium. I served two terms as a member of the University of Hawaii Faculty Senate. I serve on the steering committees of the Pacific Ocean Observing System (PacIOOS) and the Animal Tracking Network (NOAA), on the Global Guidance Committee of the Ocean Tracking Network and the Bycatch Reduction Subcommittee of the International Sustainable Seafood Foundation. I am an Expert Consultant for several international research projects funded by the European Union.

Service to the Broader Community – I am a member of the Shark Specialist Group, International Union for Conservation of Nature (IUCN) which lobbies for improved management of the world’s natural resources and, as member of the State of Hawaii Governor’s Shark Task Force, I try to apply scientific knowledge to matters of local importance to Hawaii. Similarly, I serve as the Principle Investigator (i.e., Manager) of the State of Hawaii fish aggregation device (FAD) program which promotes sport fishing and fishery-related science in Hawaii.

Fostering Interdisciplinary Interactions – As an official advisor to PacIOOS, OTN and ATN, I facilitate the interaction between biologists interested in the behavior of marine animals and oceanographers who can benefit from the environmental data being collected by the electronic tags being carried by various fish species. In my role of PI for the Hawaii FAD program I actively pursue opportunities to bring science to Hawaii’s fishing community.

(e) Collaborators and Other Affiliations
(i) Collaborators and Co-Editors in the Past 48 Months

- Laurent Dagorn, IRD, Montpelier, France
- Dean Grubbs, Florida State University
- Gil Iolsilevski, Technion University, Israel
- David Itano, University of Hawaii
- Carl Meyer, University of Hawaii
- Yannis Papastamatiou, University of Hawaii

(ii) Graduate and Postdoctoral Advisors

- John Bardach (deceased), University of Hawaii
- John Teeter, University of Pennsylvania

(iii) Graduate Advisor and Postgraduate-Scholar Sponsor (past 5 years)

- Jonathan Dale, Postdoctoral Fellow, Stanford Hopkins Marine Lab
- Yannis Papastamatiou, Post-doctoral fellow, University of Florida
- Toby Daley Engle, Post-doctoral Fellow, University of Arizona
- Nick Whitney, Post doctoral Fellow, Mote Marine Lab
- Ling Ong, Wildlife Scientist, SWCA Environmental Consultants
Biographical Sketch – Hunter

(a) Professional Preparation
University of Hawaii  Zoology  PhD – 1988
University of South Florida  Zoology  MS – 1980
Cal State Long Beach  Zoology  BS – 1975

(b) Appointments
University of Hawaii  Associate Professor  2007 – present
UH Marine Option Program  Director  2007 – present
University of Hawaii  Assistant Professor  2003-2007
Waikiki Aquarium  Curator/Director  1998-2004

(c) Five Recent Publications (N=26)
Forsman, Z.H., D. Barshis, and C.L. Hunter. 2009. Shape-shifting corals: Molecular markers show morphology is evolutionarily plastic in Porites. BMC Evolutionary Biology 9:45-54

(d) Synergistic Activities
Academic and Student training – My research focuses on fundamental questions in coral reef ecology within the larger context of conservation ecology. Broadly, I am interested in contributing to a better understanding of how coral reef ecosystems function and sustain themselves, particularly within the context of natural and anthropogenic stressors. More specifically, I am interested in forces that affect the biodiversity of coral reef species, and how this diversity may be influenced through time, space and under various physical and anthropogenic regimes. Most recently, my research endeavors have explored and determined ways to inform and improve management of coral reef resources through characterization of genetic diversity and propagation potential of corals for reef restoration and research and development of methods and management strategies to control alien algae and restore coral reefs degraded by algal invasions. A recent aspect of this work involves student-led surveys of the distribution and abundance of two NOAA Species of Concern (Montipora dilatata and Lingula reevii).
Since 2003, I have advised two postdoctoral scholars, nine Ph.D. students (4 female, 5 male), five MS students (4 female, 1 male), and 62 undergraduate interns (31 female, 31 male).

Biographical Sketch – Hunter

Service to the Broader Community – Since 2000, I have sat as both Educational (2000-2006) and Research (2006-present) representative on the Advisory Council for the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve, and on the Executive Boards of the local chapters of Sigma Xi and ARCS (Achievement Rewards for College Scientists).

Enhancing Underrepresented Groups – From 2003-2007, in collaboration with four other faculty, I worked to develop the Hui Konohiki program at University of Hawaii, involving students from Hawaiian Studies in a culminating degree certificate.

Fostering Interdisciplinary Interactions – As Director of the UH Marine Option Program since 2007, I have supervised students from all majors in hands-on experiences in marine careers. I mentor an average of 10 student internships each semester.

(e) Collaborators and Other Affiliations
(i) Collaborators in the Past 48 Months
Zac Forsman (University of Hawaii), Celia Smith (University of Hawaii), J.E. Smith (University of California, San Diego), Eric Conklin (The Nature Conservancy), Tony Montgomery (Hawaii Department of Land and Natural Resources), Baruch Rinkevich (Tel Aviv University)

(ii) Graduate and Postdoctoral Advisors
PhD Thesis Advisor Robert A. Kinzie III University of Hawaii
Postdoctoral Advisors Robert Richmond University of Guam
Steven Palumbi University of Hawaii
Celia Smith University of Hawaii

(iii) Graduate Advisor and Postgraduate-Scholar Sponsor (past 5 years)
Rachel Dacks Zoology Ph.D. current
Maya Walton Zoology M.S. current
David Spafford Botany Ph.D. current
Jonathan Martinez Botany Ph.D. current
Joanna Philippoff Zoology M.S. (2011)
Daniel Amato Botany M.S. (2010); Ph. D. current
Danielle Jaywardene Zoology Ph. D. (2009)
Megan Daehler Botany M.S. (2006); Ph. D. (2010)

Postgraduate-Scholar Sponsor in the Past 5 Years
Zac Forsman—University of Hawaii
Shai Shafir—University of Hawaii
Biographical Sketch – Karl

(a) Professional Preparation

UC Santa Barbara  
University of Georgia  
Rutgers University  
Marine Biology  
Genetics  
Postdoctoral Scholar, Genetics  
BA – 1980  
PhD – 1992  
05/1992 – 12/1993

(b) Appointments

University of Hawaii  
University of South Florida  
Associate Research Professor  
Associate Professor  
Assistant Professor  
09/2005 – present  
08/1999 – 08/2005  
12/1993 – 08/1999

(c) Five Recent Publications (N=64)


(d) Synergistic Activities

Academic and Student training – My graduate research was key in spearheading the rapid assessment of nuclear molecular variation for ecological applications. The results of this and subsequent research have been published in a variety of journals and presented at over 48 conferences both nationally and internationally. I have trained 1 Postdoctoral Scholar, 13 PhD students, 6 MS students, 24 graduate student committees, 2 undergraduate honors committees, 22 undergraduate interns (34 semesters total).

Service to Academic Community – I have been an Associate Editor for Evolution 2000 – 2003, Associate Editor Journal of Heredity 2007 – present, NSF grant panelist in 1998, and 2001, NSF National Ecological Observatory Network workshop participant in 2000, and an ad hoc reviewer for numerous national and international journals.

Service to the Broader Community – organized and co-taught Hillsborough County Workshop for High school teacher preparedness in teaching Evolution 2002. This was a three-day summer training for high school biology teachers to better prepare them to teach Evolution. Co-organized workshop for high school teachers for inquiry based learning in Ocean Sciences.

Enhancing Underrepresented Groups – At USF, I was involved in the Educational Outreach program making my laboratory available to minority students (primarily Mexican migrant farm workers) earning their high school GED. Students generally work in the laboratory for a day and discuss with me a career in biology. At UH, I involve underrepresented groups in all aspects of our research.

- 1 -
Biographical Sketch – Karl

Fostering Interdisciplinary Interactions – I participated in three Genetic and Evolutionary Computation Conference workshops. These conferences were focused on developing mathematical and computation methods that incorporate evolutionary thinking. I also have published research on using DNA molecules as computer central processors.

(e) Collaborators and Other Affiliations

(i) Collaborators and Co-Editors in the Past 48 Months

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<tr>
<th>Bass, AL</th>
<th>U South Florida</th>
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<td>Baranets, V</td>
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<td>Charvet, P</td>
<td>SENAI-PR, Brazil</td>
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<td>U of Miami</td>
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<td>Rice, KA</td>
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<td>U Iowa, Aims</td>
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<td>Szumant, AM</td>
<td>U North Carolina, Wilmington</td>
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<td>Huetter RH</td>
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<td>Westneat, MW</td>
<td>U Chicago, Field Museum</td>
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<td>Johnson, S</td>
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<td>Am. Mus. Nat. Hist., CBC</td>
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<td>Lopez, JA</td>
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(ii) Graduate and Postdoctoral Advisors

PhD Thesis Advisor | John C. Avise | UC Irvine
Postdoctoral Advisor | Robert C. Vrijenhoek | MBARI, CA

(iii) Graduate Advisor and Postgraduate-Scholar Sponsor (past 5 years)

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<td>Severance, EG</td>
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<td>Wainright, B</td>
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<td>Gorospe, K</td>
<td>U Hawaii</td>
<td>Whitney, J</td>
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<td>U South Florida</td>
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Postgraduate-Scholar Sponsor in the Past 5 Years
None

Summary – Since 1994 I have advised 1 female Postdoctoral Scholar, 12 Ph.D. students (6 female, 6 male), 6 MS students (2 female, 4 male), and 22 undergraduate interns (14 female, 8 male).
Jo-Ann C. Leong, Ph. D., Professor & Director
Hawaii Institute of Marine Biology,
School of Ocean & Earth Sciences Technology, University of Hawaii
PO Box 1346, Kaneohe, Hawaii 96744
FEDEX: 46-007 Lilipuna Road, Kaneohe, Hawaii 96744
808-236-7401 PH 808-236-7443 FX
joannleo@hawaii.edu

Education:
University of California, Berkeley Zoology B.A. 1964
University of California, San Francisco Med.Sch. Microbiology Ph.D. 1971
University of California, San Francisco Med.Sch. Biochemistry Postdoc 1971-74
University of California, San Francisco Med.Sch. Cancer Res. Postdoc 1974-75

Appointments:
Director, Hawaii Institute of Marine Biology, University of Hawaii 2001-
Professor, School of Ocean & Earth Sciences Technology, Univ. Hawaii 2001-
Asst., Assoc., Full Professor of Microbiology, Oregon State University 1975-1992
Distinguished Professor of Microbiology, Oregon State Univ. 1993-2003
Chairperson, Dept. of Microbiology, Oregon State Univ. 1996-2001
Emile Permut Endowed Professor of Microbiology 1998-2003
Editor, Viral Diseases of Fish, Diseases of Aquatic Organisms 1996-2006
Editorial Board, Marine Biotechnology 1991-2006
USDA/NSF Microbial Genome Sequence 2001, 2003, 2004
President, Board of Governors, Center for Tropical and Subtropical Aquaculture 2001-
Myron B. Thompson Academy School Board, Vice Chair 2002-2011
President, Western Association of Marine Laboratories 2011-2012
Co-Chair, Ecosystem Science and Management Working Group, a standing committee of the NOAA Scientific Advisory Board 2008-2012
President, National Association of Marine Laboratories 2012-2014
Chairman, Public Policy Committee of NAMLC 2010-2012
National Climate Assessment Development and Advisory Committee (NCADAC) 2011-2014
Secretariat, NCADAC 2011-2014

Selected Refered Publications (2006-2011):


Thesis Advisor & Postgraduate Scholar Sponsor:
Marta Alonso NEIKER- Tecnalia, Spain malonso@neiker.net
Eric Anderson Maine Bio-tek, VP eric@mainebioteck.com
Rosemary Barrie Newberg, Oregon 503-538-5901
Linda Bootland Novartis, retired lboottland@pei.sympatico.ca
Peter PinWen Chiu Academia Sinica Marine Station, Ilan ppchiou@gate.sinica.tw
John D. Drennan Schering-Plough Animal Health Corp john.drennan@spcorp.com
Barbara A. Drolet Agricultural Res. Servic, Laramie, WY Barbara Drolet@ars.usda.gov
Linda Durrin Beckman Research Institute, CA. ldurrin@coh.org
H. Mark Engelking Oregon Dept. of Fish & Wildlife engelkh@bcc.orst.edu
Manley Huang Panorama Research Institute mhuang55@yahoo.com
Robert D. Gilmore Jr CDC, Fort Collins, Co rbg5@cdc.gov
Yali Hsu Academia Sinica – Zoology zoohsu@ccvax.sinica.edu.tw
Marc Johnson University of Missouri Med Sch marcjohnson@missouri.edu
Carol Kim University of Maine at Orono carolkim@maine.edu
Jennifer Kishimori USAMRIID jkishmo@hawaii.edu
Gael Kurath USGS, Seattle, WA gael_kurath@usgs.gov
Carla Mason Endres College of Eastern Utah, San Juan carlaendres@ceu.sc.edu
Ichiro Misumi University of North Carolina Sch Med imisumi@email.unc.edu
Dan V. Mourich Antivirals, Inc. dan.mourich@antivirals.com
Jay A. Nelson Oregon Health Sciences Univ., Portland nelsonj@ohsu.edu
Benjamin Simon Evergreen State College simonbe@evergreenstate.edu
Leslie A. Tengelsen Epidemiology Services, State of Idaho tengelse@idhsw.state.id.us
Grant D. Trobridge University of Washington gtrobridge@u.washington.edu
Scott W. Wong Gene Therapy Institute, OHSU wongs@ohsu.edu
Dawn Jordan Hayes Calif, Animal Health & Food Safety Lab Li Xu Sea Lane Biotehnologies, Menlo Park Li.Xu@sealanebio.com
Jennifer Kishimori US Army Medical Research Institute for Infectious Diseases jkishmo@hawaii.edu

Postdoctoral Fellows/Sabbatical Visitors
Mathias Ackerman University of Zurich, Institute for Virology mathias.ackermann@vetvir.uzh.ch
Faculty of Veterinary Med, Switzerland
Colin Munn University of Plymouth, UK Colin.Munn@plymouth.ac.uk
Satoru Suzuki Ehime University, Lab Molec. Ecology sssuzuki@agr.ehime-u.ac.jp

Testimony and speeches:
March 19, 2008: Written and Oral Testimony before the Committee on Commerce, Science and Transportation, U.S. Senate, Hearing on Climate Change Impacts and Responses in Island Communities. Honolulu, Hawaii.
Biographical Sketch – Mark Q. Martindale

(i) Professional Preparation:
New College of the Univ. of South Florida, Major: Natural Sciences, B.A., 1981
The University of Texas at Austin, Major: Zoology, Ph.D., 1985
The University of Texas at Austin, Postdoctoral Fellow, 1985-86
Harvard Medical School, Postdoctoral Fellow, 1986-1990

(ii) Appointments:
Director-Kewalo Marine Lab, University of Hawai‘i, April 1, 2007-present
Professor-Kewalo Marine Lab, University of Hawai‘i, August 2005-present
Associate Professor-Kewalo Marine Lab, University of Hawai‘i, 1999-July 2005
Assistant Professor-Kewalo Marine Lab, University of Hawai‘i, 1998-July 1999
Associate Professor-Dept. of Organismal Biol. and Anatomy, Univ. of Chicago, 1997-1998
Assistant Professor-Dept. of Organismal Biol. and Anatomy, Univ. of Chicago, 1990-1997

(iii) Publications (N=123 peer reviewed; 20 invited):
Most closely related papers:

Other significant publications:
(iv) Synergistic Activities:
-Society for Integrative and Comparative Biology:
-Member at Large, 1997-2000
-Program Officer, Division of Evolutionary Developmental Biology, 1999-2002
-Chair, Division of Evolutionary Developmental Biology, 2010-2012
-Instructor, summer Embryology Course, Woods Hole, MA, 1998-present
-Editor in Chief: started EvoDevo, Open Access Journal through BMC 7/1/2010
-Editor: Developmental Biology; Development, Genes, and Evolution; Evolution of Development; J.E.Z. Part B, Molecular and Developmental Evolution; Zoology
-Sponsor of Discovery Children’s Center Marine Biology Program at Kewalo Marine Lab

(v) Collaborators and Other Affiliations:
Collaborators
Dr. Jonathan Q. Henry, University of Illinois, Urbana
Dr. Elaine Seaver, University of Hawaii
Dr. Athula Wikramanayake, University of Miami
Dr. Andy Baxevanis, NIH

My Graduate and Post-Graduate Advisors:
Dr. Gary Freeman (dissertation advisor), Dept. of Zoology, Univ. of Texas at Austin (retired)
Dr. Stephen Meier (postdoc adviser), Dept. of Zoology, Univ. of Texas at Austin (deceased)
Dr. Marty Shankland (postdoc adviser), currently at Univ. of Texas at Austin

Thesis Advisor and Postgraduate-Scholar Sponsor:
Postdoctoral Advisees:
Dr. Jaishankar Nautiyal, M.D. currently: Associate Professor, Univ. of Chicago
Dr. John Finnerty, Ph.D., currently: Associate Professor, Boston University
Dr. Atsuko Yamada, Ph.D., c currently: Research Scientist, Japan
Dr. Elaine Seaver, Ph.D., currently: Associate Professor, Univ. Hawai‘i
Dr. Stephen Schneider, Ph.D., currently: Assistant Professor, Iowa State University
Dr. Calvin Nii, Ph.D., currently: Instructor, Physical Education (Tennis Coach)
Dr. Alexander Nederbragt currently: Research Scientist, Biotech in Norway
Dr. Casey Dunn currently: Assistant Professor, Brown University
Dr. Craig Magie currently: Assistant Professor, Fresno State University (1/1/09)
Dr. William Browne currently: Assistant Professor, University of Miami (6/1/09)
Dr. Andreas Hejnol c currently: Senior Group Leader, SARS, Bergen, Norway
Dr. Mattias Ormestad currently: Biotech Company, Stockholm, Sweden
Dr. Patricia Lee currently: postdoc, Univ. Hawai‘i (current)
Dr. Eric Rottinger currently: postdoc, Univ. Hawai‘i (current)
Dr. Yale Passamanack currently: postdoc, Univ. Hawai‘i (current)
Dr. Michael Layden currently: postdoc, Univ. Hawai‘i (current)

Ph.D. Advisees: (8 as Chair, 23 total)
Viraj Master, M.S.T.P. Ph.D. 9/1995, M.D. currently: Associate Professor Emory Univ.
Steve Irvine, Univ. of Chicago currently: Associate Professor, Univ. Rhode Island
Matthew Kourakis, Univ. of Chicago currently: post doc at U.C. Santa Barbara
Dave Matus, Univ. of Hawai‘i currently: Damon Runyon post doc at Duke Univ.
Heather Marlow, Univ. of Hawai‘i currently: post doc at EMBO Heidelberg, Germany
Kevin Pang, Univ. Hawai‘i currently: post doc at SARS, Bergen, Norway (9/2008-present)
Tim DuBuc, Univ. Hawai‘i (3/2010-present) (native Hawaiian ancestry)
David Kainoa Simmons, Univ. Hawaii
BIOGRAPHICAL SKETCH
Paul E. Nachigall, Ph.D

EDUCATION
San Jose State University, San Jose California, Psychology BA 1967
San Jose State University, San Jose California, Experimental Psychology MA 1970
University of Hawaii, Honolulu Hawaii, Experimental Psychology Ph.D 1976

APPOINTMENTS
10/01 – present Researcher Level 5 (Equivalent to Full Professor), School of Ocean Science and Technology, Hawaii Institute of Marine Biology and Director Marine Mammal Research Program.
06/00-10/01 Interim Director, Hawaii Institute of Marine Biology, University of Hawaii.
10/97-06/00 Researcher Level 5 (Equivalent to Full Professor), School of Ocean Science and Technology, Hawaii Institute of Marine Biology and Director Marine Mammal Research Program.
12/97- present Cooperating Graduate Faculty, Zoology Department, University of Hawaii.
10/83- present Cooperating Graduate Faculty, Psychology Department, University of Hawaii.
10/93-10/97 Visiting Scientist and Director Marine Mammal Research Program (Intergovernmental Personnel Act Assignment), University of Hawaii, Hawaii Institute of Marine Biology
10/82-10/93 Head Research Branch and Division, Naval Command Control and Ocean Systems Center, Kailua Hawaii
6/72-10/82 Bioscientist, Naval Ocean Systems Center, Kailua Hawaii

FIVE RECENT PUBLICATIONS (N=121, + 5 Books)


SYNERGISTIC ACTIVITIES
1. Visiting Professor, Velux Scholar, Institute of Biology University of Southern Denmark Spring/Summer 2010
2. Invited Panel Reviewer, VolkswagenStiftung Foundation. Reviewing the Marine Mammal Science Center’s Lichtenberg Professorship program, Rostock University, Rostock Germany, Summer 2010.
3. Invited Doctoral Examiner, University of Aarhus, Denmark, Spring, 2011.
6. Invited Member: Taras Foundation - Scientific Advisory Board 2002-present
8. Vice Chair, University of Hawaii Institutional Animal Care and Utilization Committee 2005-present
9. Honorary Member, European Association for Aquatic Mammals, Fellow Acoustical Society of America
10. Editor Emeritus, current associate editor: Aquatic Mammals.
11. Charter member, past president, Society for Marine Mammalogy

COLLABORATORS AND OTHER AFFILIATES (PAST 4 YEARS)

GRADUATE ADVISORS
C.A. Thomson – M.A. Thesis Advisor
M.E. Bitterman- Ph. D Doctoral Advisor

GRADUATE STUDENT ADVISOR (PAST 5 YEARS)
Laura Kloepper – Zoology
Kristen Taylor– Zoology
Meike Linneschmidt – University of S. Denmark
Aliza Milette – Psychology
Ali Bayless- Zoology
Sanami Nakyama- Zoology

Aude Pacini – Zoology
Aran Mooney -Zoology
Brian Branstetter Psychology
Michelle Yuen – Zoology
Adam Smith - Zoology

POST GRADUATE SPONSOR
Songhai Li
Aude Pacini
Biographical Sketch - Polhemus

Professional Preparation

Undergraduate Institution: Colorado State University, Fort Collins, CO
Entomology B.S. 1980

Graduate Institution: University of Utah, Salt Lake City, UT
Biology Ph.D., 1984

Postdoctoral Institution: Smithsonian Institution, Washington, DC
Entomology 1988-1990

Appointments

2010–present Program Manager, Coastal Conservation Program, U. S. Fish & Wildlife Service, Honolulu, HI
2005–2010 Administrator, Division of Aquatic Resources, State of Hawaii, Honolulu, HI
1996–2005 Research Entomologist, Smithsonian Institution, Washington, DC
1990–1996 Associate Entomologist, Bishop Museum, Honolulu, HI.

Publications (over 160 peer-reviewed publications; examples listed below)

Selected publications related to marine biology:


Biographical Sketch - Polhemus


**Synergistic Activities**

1993 Hawaii Tropical Forest Recovery Task Force member.
1995 Technical advisor, "Alien Empire" television series, for BBC.
1995–present Editorial board member, *Aquatic Insects*
1993–present Editorial board member, *Tijdschrift voor Entomologie*

**Collaborators**

_Collaborators and Co-Editors_

Dr. Herbert Zettel, Vienna Museum, Vienna, Austria
Dr. Nico Nieser, Tiel, The Netherlands
Dr. Michael D. Schwartz, Agriculture Canada, Ottawa, Canada
Dr. John T. Polhemus, Englewood, Colorado, USA
Dr. Steve Miller, U. S. Fish and Wildlife Service, Honolulu, Hawaii, USA
Thomas Artiss, Clark University, Worcester, Massachusetts, USA
Dr. Ted R. Schultz, Smithsonian Institution, Washington, DC
Dr. Chris Simon, University of Connecticut, Storrs, Connecticut, USA
Ronald L. Englund, Bishop Museum, Honolulu, Hawaii, USA
Dr. Steve Richards, South Australian Museum, Adelaide, Australia
Mark G. Wright, University of Hawaii, Honolulu, Hawaii, USA

_Graduate and Postdoctoral Advisors_

Ph.D. Dr. George F. Edmunds, University of Utah (deceased).
Postdoctoral Dr. Richard C. Froeschner, Smithsonian Institution (deceased).

_Thesis Advisor and Post-graduate-Scholar Sponsor Activities_

Dr. Steve Jordan, University of Connecticut, Storrs, Connecticut, USA
Ronald Englund, University of Hawaii, Honolulu, Hawaii, USA
Jesse Eibben, University of Hawaii, Honolulu, Hawaii, USA
Brad Balukjian, University of California Berkeley, California, USA
Total number of graduate students advised = 4

Post-doctoral scholar sponsor:

Thomas Artiss, Lakeside Upper School, Seattle, Washington, USA

Post-doctoral scholars sponsored = 1
(a) Professional Preparation
B.S., Mathematics, Carnegie-Mellon University, 1970
Ph.D., Statistics, University of California, Berkeley, 1974

(b) Recent Appointments
National Oceanic & Atmospheric Administration
National Marine Fisheries Service
Pacific Island Fisheries Science Center

Chief, Ecosystem & Oceanography Division, 2004 - Present

National Oceanic & Atmospheric Administration
National Marine Fisheries Service
Pacific Island Fisheries Science Center

Acting Science Center Director
2003 - 2004

National Oceanic & Atmospheric Administration
National Marine Fisheries Service
SWFSC, Honolulu Laboratory


(c) 10 RECENT REFEREED PUBLICATIONS (N=113)


**Polovina, J. J., M. Abecassis, E. A. Howell, and P. Woodworth.** 2009. Increases in the relative abundance of mid-trophic level fishes concurrent with declines in apex predators
Jeffrey J. Polovina


(d) Served on 13 graduate student committees (MS and PhD), Supervised 2 postdocs

(e) Recent Awards/Honors

- North Pacific Marine Science Organization (PICES) Wooster Award, 2010
- *Fishery Bulletin* Best Paper, 2009
- Opening keynote talk at ECOPATH 25 Years Symposium, University of British Columbia, September, 2009
- University of Alaska Meek Scholar lectures, November 2007
- Department of Commerce Group Silver Medal, 2007
- ECOPATH selected as one of NOAA’s Top Ten breakthroughs at its Centennial celebration January 2007.
- Hatfield Marine Science Center (Oregon State University) Distinguish Lecturer, December 2005
- Duke University Marine Lab Super Speaker, September 2004
- Fulbright Research Scholar Fellowship to Galapagos, 1998
- Department of Commerce Silver Medal, 1997
- Fulbright Research Scholar Fellowship to Kenya, 1992
SAMUEL G. POOLEY

Director, Pacific Islands Fisheries Science Center

2004 - present
National Marine Fisheries Service (NMFS)
National Oceanic & Atmospheric Administration (NOAA)
U.S. Department of Commerce
Honolulu, Hawaii

EDUCATION:
Ph.D., Political Science, University of Hawaii, 1987
M.S., Economics, University of Birmingham, U.K. 1977
B.A., Economics, Dartmouth College, 1970

EXPERIENCE:
2011 (Spring)
Acting chief scientist, NOAA Fisheries
Silver Spring, MD

2009 (Spring)
Senior policy advisor, NOAA Fisheries
Office of Science and Technology
Silver Spring, MD

2003
Acting Regional Administrator
NMFS Pacific Islands Regional Office
Honolulu, Hawaii

2002
Director, NMFS Honolulu Laboratory

1987 - 2001
Chief, Fishery Management and Performance Investigation
NMFS Honolulu Laboratory

1994 (Summer)
NMFS Office of International Affairs, Silver Spring, MD.

1981 - 1986
Industry Economist
NMFS Honolulu Laboratory

1977 - 1980
Chairperson, Department of Social Science, and
Instructor of Economics
Honolulu Community College & West Oahu College
Honolulu, Hawaii
1978-1979  Economist/Planner  
            Hawaii Fisheries Development Plan Project  
            Hawaii Department of Land & Natural Resources  
            Honolulu, Hawaii  

1976-1977  Economist & Research Statistician  
            Pacific Tuna Development Foundation  
            Hawaii Department of Planning & Economic Development  
            Honolulu, Hawaii  

RESEARCH INTERESTS:  
Applied microeconomic theory, property rights, community development, macroeconomic decision-making, policy analysis  

PROFESSIONAL AFFILIATIONS:  
Affiliate Graduate Faculty, University of Hawaii - Manoa  
    including membership of graduate committees  
    Department of Agricultural & Resource Economics  
    Department of Economics  
    Department of Natural Resources and Environmental Management  
    Department of Political Science  
    Center on Globalization  
    Ocean Policy Center  
    Joint Institute for Marine and Atmospheric Research  

U.S. delegate, PICES (North Pacific Marine Science Organization)  
    -- 2004 to 2010  

U.S. head of delegation, ISC (International Scientific Committee on Tuna and Tuna-like Species)  
    -- 2011 (host of plenary, San Francisco, CA)  

Contributing Editor (past), Marine Resource Economics
Brian N. Popp

Present Position: Professor, University of Hawaii, Department of Geology and Geophysics, 1680 East-West Road, Honolulu, Hawaii 96822, USA (808) 956-6206; e-mail: popp@hawaii.edu


Professional Experience: Department of Geology and Geophysics, University of Hawaii Professor 1999 – present Department of Geology and Geophysics, University of Hawaii Associate Professor 1994 – 1999 Department of Oceanography, University of Hawaii Graduate Faculty, 1991 - present Department of Geology and Geophysics, University of Hawaii Assistant Professor, 1990-1994 Department of Geology and of Chemistry, Indiana University Assistant Scientist (DOE, NASA and ACS-PRF supported), 1989-1990 Department of Geology and of Chemistry, Indiana University Postdoctoral Scholar (NASA supported), 1986-1989

Membership in Professional Societies: American Geophysical Union American Society of Limnology and Oceanography Geochmical Society (Organic Geochemistry Division) Geological Society of America

Principal Areas of Expertise: Stable isotope biogeochemistry and organic geochemistry Isotopic biogeochemistry of individual biomarkers and gases Isotope ecology of tropical tunas and other fishes

Awards: Best Paper of the Year 1995, Organic Geochemistry Division, Geochemical Society Fellow Geochemical Society and European Association for Geochemistry

Synergistic Activities: Teaching/Curriculum Development: instructor on 3 graduate and 3 undergraduate classes National and International Service: panel member NSF Chemical Oceanography, active mail reviewer for NSF-OCE, EAR, MRI proposals Transfer of knowledge: Author or co-author of >75 peer-reviewed articles (see http://www.soest.hawaii.edu/GG/FACULTY/POPP/bpopp-publ.html). Hosted Teachers-at-Sea on four different oceanographic cruises: July '04 ARAMADA Project (www.armadaproject.org); February, July, August '05 Adult Literacy Project (literacyworks.org/ocean/reports.html).

Publications Relevant to Proposed Research:
Brian N. Popp


Other Significant Publications:


Postdoctoral Scholars/SOEST Young Investigators:  Dr. L.M. Tupas (1991-92), Dr. F. Kenig (1994-95), Dr. J.E. Dore (1995-96), Dr. M.E. Holmes (1996-97), Dr. D. Yee (1996-1999); Dr. M.D. McCarthy (1999-2001); Dr. J.M. Beman (2008-09), Dr. K. Arthur (2009-present); Graduate Students Graduated – Last 5 student theses – Lisa Oswald (M.S. 2009), Brittany S. Graham (Ph.D. 2008), Cecelia C. S. Hannides (Ph.D. 2007), Marrian B. Westley (Ph.D. 2006), Phyllis Lam (Ph.D. 2004); (22 total; 2 current graduate students); Undergraduate Student Theses Advised - 5 (total)

Biographical Sketch
Michael S. Rappé

Hawaii Institute of Marine Biology
SOEST, University of Hawaii
PO Box 1346
Kaneohe, HI 96744 U.S.A.

Telephone: (808) 236-7464
Fax: (808) 236-7443
E-mail: rappe@hawaii.edu

(a) Professional Preparation
Oregon State University, Department of Microbiology, Postdoctoral Research Associate. 2000-2003
Oregon State University, College of Veterinary Medicine, Postdoctoral Research Associate. 1999-2000
Centre National de la Recherche Scientifique, Station Biologique de Roscoff, France, Postdoctoral Research Associate. 1997-1999
Oregon State University, Genetics Program and Department of Microbiology, Ph.D. 1992-1997
Washington State University, Biology and University Honors Program, B.S. 1987-1991

(b) Appointments
Associate Research Professor, Hawaii Institute of Marine Biology, SOEST, University of Hawaii. 2009-present
Assistant Research Professor, Hawaii Institute of Marine Biology, SOEST, University of Hawaii. 2003-2009
Postdoctoral Research Associate, High Throughput Culturing Facility, Department of Microbiology, Oregon State University. Advisor: Dr. Stephen Giovannoni. 1999-2003
Postdoctoral Research Associate, Phytoplankton Group, Centre National de la Recherche Scientifique, Station Biologique de Roscoff, France. Advisor: Dr. Daniel Vaulot. 1997-1999

(c) Publications (n=42)


(d) Synergistic Activities
1. Invited participation: US National Oceanographic Partnership Program, Ocean Ecogenomics Meeting; American Academy of Microbiology, Marine Microbial Diversity: The Key to Earth’s Habitability Colloquium; Alfred P. Sloan Foundation, International Census of Marine Microbes Open Oceans and Coastal Systems Workshop

2. Ongoing contributions to hands-on research training and education of K-12 and undergraduate students of native Pacific Islanders in Hawaii

3. Ongoing technical contributions in microbial ecology including novel cultivation methods, high throughput microbe screening, fluorescence in situ hybridization, and non-culture-based detection and characterization of microbial diversity

4. Investigator and Theme Leader in NSF Science and Technology Center for Excellence “Center for Microbial Oceanography: Research and Education (C-MORE)

5. Core Instructor, 2006-present: C-MORE Agouron Summer Course “Microbial Oceanography: Genomes to Biomes”

(e) Collaborators and Other Affiliations
(i) Collaborators and Co-Editors Not at the University of Hawaii

(ii) Graduate and Postdoctoral Advisors
Graduate and postdoctoral advisor: Stephen Giovannoni (OSU); postdoctoral advisors: A. Morrie Craig (OSU), Daniel Vaulot (Station Biologique de Roscoff, France)

(iii) Thesis Advisor and Postgraduate-Scholar Sponsor
Thesis advisor: Marina Brandon (UH, 2006), Sara Yeo, (UH, 2008), Amy Apprill (UH, 2009), Tracy Campbell (2010)
Robert H. Richmond

**Address:** Kewalo Marine Laboratory, University of Hawai‘i, 41 Ahui St., Honolulu, HI 96813  Phone: 808-539-7331  Fax: 808-599-4817  e-mail: richmond@hawaii.edu

**Professional Preparation:**

University of Rochester, N.Y., B.S. in Biology/Geology with High Distinction, 1976.  
SUNY at Stony Brook, Marine Sciences Research Center, M.S. in Marine Environmental Sciences, 1982.  
SUNY at Stony Brook, Dept. of Ecology and Evolution, Ph.D. in Biological Sciences, 1983.  
Smithsonian Tropical Research Inst., Naos Marine Lab, Postdoctoral Fellow, 1984 - 6

**Appointments:**

Research Professor, Kewalo Marine Lab, Univ. of Hawaii at Manoa, 1/04 – present  
Acting Director, Kewalo Marine Lab, Univ. of Hawaii at Manoa, 9/05 – 3/06  
Professor of Marine Biology, Univ. of Guam Marine Laboratory, 5/92 – 1/04  
Visiting Professional Colleague, Pacific Biomedical Research Center, Kewalo Marine Laboratory, University of Hawaii 1/92 - 6/92 (Sabbatical Leave)  
Director, University of Guam Marine Laboratory, 10/88 - 9/91  
Associate Professor of Marine Biology, Univ. of Guam Marine Laboratory 1/89 - 4/92  
Assistant Professor of Marine Biology, Univ. of Guam Marine Laboratory 1/86 - 12/88  
Postdoctoral Fellow, Smithsonian Institution, 5/85 - 1/86  
Postdoctoral Fellow, Smithsonian Tropical Research Inst. 1/84 - 5/85

**Selected Publications:**


Richmond, R.H. 2005. Coral reproduction and recruitment as tools for studying the ecotoxicology of coral reef ecosystems. Pp. 331-338 In G. Ostrander, ed. Techniques
Robert H. Richmond

in Aquatic Toxicology, Vol. II. CRC Press.

Synergistic Activities:

President, International Society for Reef Studies, January 2011 - December 2014
Science Advisor, Micronesia Conservation Trust, January 2010 - present
Science Advisor, U.S. Coral Reef Task Force, All Islands Committee 10/98 - present
Elected Council Member, International Society for Reef Studies, 1/99 - 12/02
Invited Participant, NSF Asian American Pacific Islander (AAPI) workshop, 11/03
Member, Science and Policy Advisory Committee, Palau International Coral Reef Center
Aldo Leopold Fellow in Environmental Leadership, 2004
Co-P.I., NSF URM Grant: Environmental Biology in the Pacific Islands, 2009-2014
P.I., NSF ATE Grant: Partnership for advanced marine and environmental science training for Pacific Islanders 2009-2012
Pew Fellow in Marine Conservation, 2006-2008

Collaborators & Other Affiliations:
Y. Golbuu, (Palau International Coral Reef Center), M. Hadfield (Univ. of Hawaii), M.
Hamnett (Univ. of Hawaii), G. Ostrander (Univ. of Hawaii), E. Wolanski (Australian
Inst. of Marine Science), C. Downs (Haereticus Envir. Lab.), A. Collier (UH Med.
School), R. Van Woesik, (Florida Inst. Tech.)

Graduate and Postdoctoral Sponsors:
P.M.J. Woodhead (SUNY Stony Brook, M.S.), J. Levinton (SUNY at Stony Brook,
Ph.D.), H. Lessios (Smithsonian Tropical Research Inst., Postdoc), J.B.C. Jackson
(STRI, Postdoc).

Thesis Advisor and Postgraduate-Scholar Sponsor:
Graduate Students: S. Victor & Yimnang Golbuu (Palau International Coral Reef
Center), Teina Rongo (Cook Islands Gov.), L. Rougee, L. Franco, J. Martinez, S.
MacDuff, A. Shelton (Univ. of Hawaii). Total: 18

Postdoctoral researchers. C. Hunter (Univ. of Hawaii), S. Romano (Univ. of the Virgin
Islands) S. MacKenna (Conservation International), S MacCafferty, V. Vuki (Univ. of
Guam) V. Kannappan (India), Y. Golbuu (Palau), Luc Rougee (US) Total: 8
Biographical Sketch – Ron

(a) Professional Preparation

<table>
<thead>
<tr>
<th>Institution</th>
<th>Major</th>
<th>Degree</th>
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<tbody>
<tr>
<td>The Hebrew University of Jerusalem</td>
<td>Animal Sciences</td>
<td>B.Sc. – 1987</td>
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<tr>
<td>University of Hawaiʻi at Mānoa</td>
<td>Zoology</td>
<td>M.S. – 1991</td>
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<tr>
<td>University of Hawaiʻi at Mānoa</td>
<td>Zoology</td>
<td>Ph.D. – 1995</td>
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(b) Appointments

<table>
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<th>Institution</th>
<th>Position</th>
<th>Dates</th>
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<tbody>
<tr>
<td>University of Hawaii</td>
<td>Aquaculture Coordinator</td>
<td>01/2009 – present</td>
</tr>
</tbody>
</table>

(c) Five Selected Publications (N=54)


(d) Synergistic Activities

Academic and Student training – My graduate research was key in fish physiology aquaculture and mariculture applications. The results of this and subsequent research have been published in a variety of journals and presented at over 40 conferences both nationally and internationally. I have trained 5 Postdoctoral Scholar, 10 PhD students, 11 MS students, 15 graduate student committees, 5 undergraduate honors committees, 13 undergraduate interns.

Service to Academic Community – I have been an Associate Editor for Proceedings of the 6th, 7th, 8th, 9th and 10th Annual Dan Popper Symposia for Mariculture and Marine Biotechnology; Proceedings of the BARD Workshop 2006: “Aquaculture Genetics – Status and Prospects”, Eilat, Israel; Proceedings of the "Rhythms in Fishes Symposium", In: VI International Congress of the Biology of Fish 2004, Manaus, Brazil, and reviewer for Aquaculture; Aquaculture Nutrition; Comparative Biochemistry and Physiology; Fish Physiology and Biochemistry; Fish Biology; General and Comparative Endocrinology; Journal of the World Aquaculture Society; and The Israeli Journal of Aquaculture - Bamidgeh. Affiliated Faculty of the Graduate Program – Department of Animal Sciences, CTAHR, University of Hawaiʻi at Mānoa. Organized, co-taught the UH2O lecture series
Biographical Sketch – Ron

for the Water Resources Research Center (WRRC), University of Hawai‘i at Mānoa. Creator and Administrator. “Hui Aina Lahui” – a Hawaiian community network website Hawai‘inuiakae School of Hawaiian Knowledge and Kamakakuokalani Center for Hawaiian Studies, University of Hawai‘i at Mānoa. Administrator and Sponsor – Second Life Islands of the University of Hawai‘i at Mānoa. Member – Second Life Council. University of Hawai‘i at Mānoa.

Service to the Broader Community – Coordinator and Advisory Council Member of the NOAA Hawaiian Islands Humpback Whale National Marine Sanctuary – Aquaculture Constituents Facilitation Workshop at the University of Hawai‘i at Mānoa. Organizer and sponsors of the Hawai‘i Aquaculture and Aquaponics Association Annual Conference (HAAA 2010) at the University of Hawai‘i at Hilo, Hawai‘i, USA. Judge of Students research presentations at the Aquaculture 2010 international conference, San Diego, California, USA. Member – Ad Hoc Advisory Committee of the Center for Tropical and Subtropical Aquaculture (CTSA/USDA). Hawai‘i. Member – USDA-NOAA National Aquaculture Extension Steering Committee, USA. Administrator and Sponsor – Second Life Islands of the University of Hawai‘i at Mānoa. Judge of Students research presentations at the World Aquaculture Society 2010 international conference, Veracruz, Veracruz, Mexico. Creator and Administrator. AquacultureHub – a community network website (http://www.aquaculturehub.org) University of Hawai‘i at Mānoa. Member - Technical Committee of the Center for Tropical and Subtropical Aquaculture (CTSA/USDA). Waimanalo, Hawai‘i. Founder and President of the Israeli Society of Aquaculture and Marine Biotechnology. Member of the International Advisory Committee, the International Conference on Recent Trends in Biodiversity and Biotechnology at the Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, Maharashtra, India. Co-organizer of the “Aquaculture Genetics” BARD international workshop 2006. Member of the Marine Biotechnology Advisory Committee, the European Commission, European Union, Brussels, Belgium. Organizer and teacher of three Food Security and Aquaponics Workshops in the Philippines. Organizer and teacher of two Food Security and Aquaculture workshops in American Samoa. Organizer and sponsor of the International Workshop on Aquaponics and Tilapia, Hilo, Hawai‘i. Sponsor of numerous aquaculture lectures and workshops in Hawai‘i. Member of the Board of Directors of the Hawai‘i Aquaculture Association. Hawai‘i. Chairman of the Middle East Working Group of Biology of Life/DNA Barcoding.

(e) Collaborators and Other Affiliations

(i) Collaborators and Co-Editors in the Past 48 Months

Andrade, C – UHM
Beinfang, P – UHM
Benham, M – UHM
Filiming, G – Rutgers
Gothlif, Y – U Tel Aviv
Howerton, R – UH Maui
Hulata, G – ARO
Khedkar, GD – DBAM U
Larson, W – Stirling U
McLain – UHM
Miller-Morgan, T – OSU

Mires, D – IJA- SIAMB
Morelli, P – UHM
Otha, A – UHM
Ron, A – Wharton, U Penn
Shafir, S – Hebrew U of Jerusalem
Temple, E – ASCC
Biographical Sketch - Elaine C. Seaver

(i) **Professional Preparation:**
McGill University, Major: Biology, B.Sc. 1986
University of Utah, Major: Biology, Ph.D., 1995
University of Texas at Austin, Postdoctoral Researcher, 1997-1999
University of Hawaii, Postdoctoral Researcher, 1999-2001

(ii) **Appointments:**
Junior Researcher, Kewalo Marine Lab, University of Hawaii, Aug. 2001 - May 2002
Assistant Professor, Kewalo Marine Lab, University of Hawaii, May 2002 - present
Associate Professor, Kewalo Marine Lab, University of Hawaii, July 2007 - present

(iii) **Five Recent Publications (n=34)**

(iv) **Synergistic activities:**
Co-organizer, West Coast Regional Developmental Biology Meeting, Honolulu, HI, 2011
Editorial Board Member, EvoDevo, 2010–present
Secretary for the Division of Evolutionary Developmental Biology, Society for Comparative and Integrative Biology, 2009-2011
Invited Workshop Participant, ‘Evolutionary Transitions in Marine Invertebrate LarvaForms’, Colgate University, NY, 2010
Contact person for DOE Joint Genome Institute Capitella sp. I genome project, provider of high quality genomic DNA and cDNA libraries for approved 8x coverage complete genome sequencing project, 2006.
Expert Consultant, Lophotrochozoan Genome Selection Workshop, Joint Genome Institute, Walnut Creek, CA, 2003.
Biographical Sketch - Elaine C. Seaver

(v) Collaborators & other affiliations (last 24 months):
Collaborators: Dr. Robert Burke, University of Victoria; Dr. Jonathon Henry, University of Illinois; Dr. Bernie Deggan, University of Queensland; Dr. Daniel Jackson, University of Gottingen; Dr. Mark Martindale, University of Hawaii; Dr. Kevin Peterson, Dartmouth University; Dr. Nik Putnam, Rice University; Dr. Dan Rockshar, University of California, Berkeley; Dr. Sebastian Schimeld, Oxford University; Dr. David Weisblat, University of California, Berkeley.

Graduate Students and Post-Graduate Advisees:
Current:
   Postdoctoral Advisees: Aldine Amiel, Danielle de Jong
   Graduate Students: Emi Yamaguchi
Past:
   Postdoctoral Advisees: Andreas Froebius, Kariena Dill, Neva Meyer
   Graduate Students: Katrin Thamm, Michael Boyle

Undergraduate students and postgraduate scholars:
Since 2003, I have trained 10 undergraduate students and 9 postgraduate scholars.

Graduate and Post-Graduate Advisors:
Dr. Michael Bastiani, University of Utah
Dr. Marty Shankland, University of Texas
Dr. Mark Q. Martindale, University of Hawaii
Biographical Sketch – Michael P. Seki

(a) Professional Preparation
University of Oregon
University of Hawaii
Hokkaido University

Biology
Oceanography
Marine Environment & Resources
BS – 1979
MS – 2001
PHD – 2003

(b) Occupational Positions
NOAA Fisheries
Deputy Director,
Pac. Is. Fisheries Science Ctr
Leader, Ecosystems & Habitat
Program
Research Fishery Biologist
NOAA Fisheries,
Honolulu Laboratory
1986 - present
NOAA Fisheries,
Honolulu Laboratory
1994 - 2003
07/2003-present

(c) Five Recent Publications (N=44)


(d) Synergistic Activities
Academic and Student training – My role as Deputy Director of the Pacific Islands Fisheries Science Center offers many opportunities to support student training and graduate research over a wide breadth of ecosystem topics. My research experience and interests over my career include physical-biological coupling at oceanic fronts and mesoscale oceanographic features, biogeography and trophic relationships of pelagic fishes and cephalopods, and open ocean (pelagic) food webs and have led to collaborations with international and US colleagues and partners, and particularly those with interest in the North Pacific. I serve on the Biological Oceanography Committee for the North Pacific Marine Science Organization (PICES) where I continue to actively engage in addressing key issues facing the marine science community.

(e) Collaborators and Other Affiliations
Biographical Sketch – Michael P. Seki

(i) Collaborators and Co-Editors in the Past 48 Months

Balazs, G – NOAA PIFSC
Benoit-Byrd, K - OSU
Bidigare, R – Univ Hawaii
Bograd, S – NOAA Pac. Fish. Env. Lab
Bowen, BW – U Hawaii, Manoa
Brodeur, R – NOAA NWFSC
Drazen, J – Univ Hawaii
Essington, T. – Univ. Wash
Ferriss, B – U Wash, NOAA NWFSC
Foley, DG – NOAA Pac. Fish. Env. Lab
Holland, K. – U Hawaii, HIMB
Hyrenbach, D – Hawaii Pacific Univ.
Kahng, S. – Hawaii Pac Univ
Kaneko, J – Hawaii Seafood
Leonard, C – BAE Systems

McKinnell, S – PICES
Meekan, MG – AIMS
Motta, PJ – U South Florida
Murawski, S – U of South Florida
Musyl, M – UHawaii JIMAR
Nakano, H – Japan Fisheries Agency
Polovina, JJ – NOAA PIFSC
Saito, S. – Hokkaido Univ.
Sakurai, Y. – Hokkaido Univ.
Vecchione, M – USMNH, Smithsonian Inst.
Weng, K. – Univ. Hawaii JIMAR
Wilson, CD – NOAA, AKFSC
Winn, C. – Hawaii Pacific Univ.
Yatsu, A – Japan Fisheries Agency

(ii) Graduate and Postdoctoral Advisors

MS Thesis Advisor  Richard E. Young  Univ. Hawaii
Ph.D. Advisor*  Yasunori Sakurai  Hokkaido Univ.,
                Grad. School Fish. Sci.

- 2 -
Biographic Sketch
Karen Erica Selph

Department of Oceanography
University of Hawaii at Manoa, Honolulu, HI 96822
808 956-7941 (office) 808 956-9516 (fax) facility website: www.soest.hawaii.edu/sf

Biography
email: selph@hawaii.edu

Education
San Francisco State University Biology, emphasis in Marine Biology B.S. 1985
University of Hawaii at Manoa Oceanography M.S. 1992, PhD. 1999
University of Hawaii at Manoa Oceanography Post-doctoral Appt. 1998-2002

Appointments
Associate Specialist, Department of Oceanography, UH Manoa, 9/2007 to present.
Assistant Specialist, Department of Oceanography, UH Manoa, 12/2002 to 7/2007.
Director of SOEST Flow Cytometry Facility, UH Manoa, 12/2002 to present.
Associate Graduate Faculty member, Department of Oceanography, UH Manoa, 11/2004 to present.
Instructor, Department of Oceanography, UH Manoa, Fall 2000, 2003/2004 Academic Years to present. Co-teach OCN 621 & OCN 633, currently co-teaching OCN 201. Note: formerly taught in OCN 626, prior to budget cuts.
Post-doctoral Associate, Department of Oceanography, UH Manoa, 8/2001 to 12/2002.

Publications – last 4 years only


Synergistic Activities
UH School of Ocean, Earth, Sciences and Technology Open House ‘02 & ‘03, coordinator for the Oceanography Department exhibits. Also participated in ‘05, ‘07, ‘09, ‘11.
Pacific Science Symposium, East-West Center, Honolulu, ‘02, ‘09, ‘10 (Moderator), ‘06 & ‘07 (Judge). This symposium consists of talks given by Pacific Island high school students regarding science projects and/or research they have completed.
2010 Governor’s Awards: Employee of the Year, Manager of the Year, and Team of the Year. Member of selection committee.

Collaborators & Other Affiliations (last 48 months)
Collaborators: A Apprill (WHOI), SB Baines (Stony Brook), WM Balch (Bigelow), K Barbeau (UCSD), CR Benitez-Nelson (U. So. Carolina), KJ Benoit-Bird (OSU), MA Brzezinski (UCSB), K Buck (Bermuda BIOS), F Chai (UMaine), RC Dugdale (SFSU), O Holm-Hansen (SIO), BM Hopkinson (Princeton), JW Krause (UCSB), G. Mitchell (UCSD), D. Nelson (OSU), A Parker (SFSU), RA Reynolds (NOAA), P Strutton (U Tasmania), M Stukel (Horn Point), BS Twining (Bigelow), H Wang (Xiamen Univ., China), EJ Yang (KORDI, S. Korea), M Zhou (UMass Boston)
Graduate Advisor/Post-doctoral Sponsor: Michael R. Landry, SIO
Thesis Advisor (member of committee): Lauren Kaupp, Amanda Timmerman
Biographical Sketch:  ALISON R. SHERWOOD

Professional Preparation:

<table>
<thead>
<tr>
<th>Institution</th>
<th>Major / Area</th>
<th>Degree &amp; Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalhousie University, Canada</td>
<td>Marine Biology</td>
<td>Bachelor of Science (1996)</td>
</tr>
<tr>
<td>University of Guelph, Canada</td>
<td>Botany</td>
<td>Doctor of Philosophy (2001)</td>
</tr>
</tbody>
</table>

Appointments:
August 2008 – present: Associate Professor, Botany Department, University of Hawaii
August 2004 – July 2008: Assistant Professor, Botany Department, University of Hawaii
Spring 2005 – present: Associate in Science (Affiliate), Bernice P. Bishop Museum

Five Recent Publications:

Five other significant publications:

**Synergistic Activities:**
- Establishment of the Hawaiian Algal DNA library (HADL) – an archival resource of total genomic DNA samples from collections of Hawaiian algae. HADL currently houses ca. 3,000 extracts of marine, freshwater and subaerial algae (subsamples of the DNA extracts are available to researchers who wish to include Hawaiian representatives in studies of phylogeny, biogeography and systematics).
- Establishment of the Hawaiian Algal Database (HADB), which displays data from the NSF-funded Rhodophyta Biodiversity Project (with co-PI Gernot Presting), and the Hawaiian Freshwater Algal Database (HfADB), from the NSF-funded Biodiversity Survey of Hawaiian Freshwater Algae (with co-PIs Pat Kociolek, Jeff Johansen, Rex Lowe and Gernot Presting)
- Mentor for Pacific Islander undergraduate student summer research experiences (through NSF UMEB program) each summer since 2005
- Associate Editor for the journal *Botany* (formerly the *Canadian Journal of Botany*) and the *European Journal of Phycology*

**Collaborators & Other Affiliations:**

_Collaborators (last 48 months):_
Abe, Tsuyoshi – Hokkaido University Museum, Japan; Carlile, Amy - University of Hawai‘i, Honolulu, Hawai‘i; Chan, Yvonne – University of Hawai‘i, Honolulu, Hawai‘i; Conklin, Kimberly - University of Hawai‘i, Honolulu, Hawai‘i; deClerck, Olivier – Ghent University, Blegium; Entwisle, Timothy – Royal Botanic Gardens, Sydney, Australia; Guiry, Michael – National University of Ireland, Galway, Ireland; Huisman, John – Murdoch University, Australia; Kurihara, Akira – Kobe University, Japan; López-Bautista, Juan – University of Alabama at Tuscaloosa, Tuscaloosa, Alabama; Lowe, Rex – Bowling Green State University; Necchi, Orlando, Jr. – São Paulo State University; O’Kelly, Charles – Friday Harbor Labs, Washington; Presting, Gernot – University of Hawai‘i at Manoa; Rindi, Fabio – National University of Ireland, Galway, Ireland; Saunders, Gary – University of New Brunswick; Sauvage, Thomas – University of Louisiana; Sheath, Robert – California State University at San Marcos; Tani, Masaya – Hokkaido University, Japan; Verbruggen, Heroen – Ghent University, Belgium; Vis, Morgan – Ohio University, Athens, Ohio

_Graduate and postdoctoral advisors:_
Morden, Clifford (postdoctoral advisor) – Botany, University of Hawai‘i
Sheath, Robert (PhD advisor) – California State University at San Marcos

_Thesis advisor and postgraduate-scholar sponsor:_
Postdoctoral fellows – Amy Carlile (former), Akira Kurihara (former), Yvonne Chan (former)
Biographical Sketch - Celia M. Smith

(a) Professional Preparation
Mt. Holyoke College  Biology  A.B. – 1976
University of Hawai‘i @ Mānoa  Botanical Sciences  M.S. – 1979
Stanford University  Biological Sciences  Ph.D. - 1983
University of California @ Berkeley  Miller Fellow, Botany  1983- 1985
Smithsonian Institution  Postdoctoral Fellow, Botany  1986- 1987

(b) Appointments
University of Hawai‘i  Professor of Botany  1999 - present
University of Hawai‘i  Associate Professor  1993 - 1999
University of Hawai‘i  Assistant Professor  1988 - 1993

(c) Five Recent Publications (N=79)

(d) Synergistic Activities:
1998 - present Member, Management Committee, Hawai‘i Coral Reef Initiative.
2008 - 2013 Co-PI with M. Hadfield, NSF Undergraduate Research and Mentoring (URM) Program, "Environmental Biology in Pacific Islands."
2006 - 2012 Member, two, three-year term appointments, Invasive Species Advisory Council (ISAC), a FACA panel hosted by the US Department of Interior. (www.invasivespecies.gov).
2009 - 2011 Member, Scientific Advisory Team, ARR A Mualala Bay Project to remove Avrainvillea amadelpha hosted by The Nature Conservancy, Hawai‘i.
(e) Collaborators and other Affiliations

(i) Collaborators in the past 48 months
Kevin Beach (Tampa University)  Andrew Rossiter (Waikiki Aquarium)
Otto Doring (Purdue University)  Robert Richmond (University of Hawai‘i)
Lucius Eldredge (Bishop Museum)  John Runcie (University of Sydney)
MaryLou Foley (Waikiki Aquarium)  Alison Sherwood (University of Hawai‘i)
Kevin Foster (US FWS Pacific Islands)  Jennifer Smith (Scripps Institution)
Ann Gibbs (Maine Dept of Agriculture)  Robert Toonen (University of Hawai‘i)
Craig Glenn (University of Hawai‘i)  Kyle Van Houtan (NOAA Pacific Island Turtle Program)
Gail Grabowsky (Chaminade)  Mark Vermeij (University of Amsterdam)
Michael Hadfield (University of Hawai‘i)  Peter Vroom (NOAA Fisheries CRED);
John Huisman (Murdock University)  Linda Walters (U Central Florida).
Cynthia Hunter (University of Hawai‘i)  
Robert Nishimoto (Hawai‘i, Department of Land and Natural Resources)

(ii) Graduate and Postdoctoral Advisors
PhD Dissertation Advisor  Isabella Abbott  Stanford
Junior Faculty, Miller Fellow  John West  UCalifornia @ Berkeley
Post doctoral Advisor  James Norris, Smithsonian, National Museum of Natural History. Wash DC

(iii) Graduate Advisor and Postgraduate-Scholar Sponsor (past 5 years)
Daniel Amato  M. S.  Kimberly Page  M. S.
Christopher Bird  Ph. D  Linda Preskitt  M. S.
Erin Cox  Ph. D.  Ryan Okano  Ph. D.
Kate Cullison  M. S.  Kimberly Peyton  Ph. D.
Meghan Dailer  M. S.  David Spafford  M. S.

(iv) Postgraduate-Scholar Sponsor in the Past 5 Years
Dr. Y. Umezawa, Kyoto University
Dr. Mark Vermeij, University of Amsterdam
Craig R. Smith

Address:  
Department of Oceanography  
University of Hawaii at Manoa  
1000 Pope Road  
Honolulu, HI 96822  
Telephone: 808-956-7776

Birthplace:  
Bay Shore, NY

Date:  
28 Aug 1954

email: craigsni@hawaii.edu

Education:  
B.S., 1977, with high honors, Biological Science, Michigan State University  
Ph.D., Dec 1983, Biological Oceanography, University of California at San Diego, Scripps Institution of Oceanography

Professional Experience:  
1995-present: Professor, Department of Oceanography, University of Hawaii at Manoa  
1995-1998, 2004-2007: Chair, Biological Oceanography Division, University of Hawaii at Manoa  
1988-1995: Associate Professor, Department of Oceanography, University of Hawaii at Manoa  
1986-1988: Research Assistant Professor, School of Oceanography, University of Washington  
1985-1986: Postdoctoral Res. Associate, School of Oceanography, University of Washington  
1983-1984: Postdoctoral Scholar, Woods Hole Oceanographic Institution

Major Research Interests:  
Seafloor ecology and oceanography including processes of disturbance, colonization and community succession, deep-sea reducing habitats, pelagic-benthic coupling and anthropogenic impacts on the ocean, climate change in Antarctica

Ten Recent Publications (out of 123 published, H Index = 34):


Craig R. Smith


Graduate Students and Postdoctoral Advisees (7 female): Steven Brumsickle (M.S. 1989), Bruce Bennett (M.S. 1990), Helmut Kukert (M.S. 1990), Shawn Doan (M.S. 1994), Paul Parnell (M.S. 1992, Ph.D. 2000), Daniel Hoover (M.S. 1995), Amy Baco (PhD 2002), Robert Miller (M.S. 1997), Amanda Demopoulos (M.S. 2000, PhD 2004), Sarah Mincks (PhD 2005), Bryan Nakahara (M.S. 2007), Angelo Bernardino (PhD 2009), Pavica Sršen, Fabio Cabrera de Leo, Dr. Paulo Sumida, Dr. Adrian Glover, Dr. Leniack Menot, Dr. Elizabeth Galley, Dr. Sarah Mincks, Dr. Andrew Sweetman, Dr. Victor Evrard, Dr. Laura Grange.

Additional Collaborators and Co-authors in Last Five Years: Amy Baco, Lisa Levin, Paul Tyler, Eva Ramirez, Eugene Domack, Scott Ishman, Amy Leventer, Bruce Huber, Rhian Waller
Biographical Sketch - Grieg F. Steward

Professional Preparation:

Education

Cornell University, Ithaca, New York  Biology  B.A.  1986
University of California, San Diego  Marine Biology  Ph.D.  1996

Post-doctoral Training

Scripps Institution of Oceanography  Oceanography  1996-1998
Monterey Bay Aquarium Research Institute  Molecular Microbial Ecology  1998-2000
University of California, Santa Cruz  Molecular Microbial Ecology  2000-2001

Appointments:

Associate Professor, Department of Oceanography, University of Hawaii, 2008-present
Assistant Professor, Department of Oceanography, University of Hawaii, 2002-2008

Publications 2010-2011 only (graduate students and post-docs under my supervision underlined):


2011 Farnelid H, AF Andersson, S Bertilsson, WA Al-Soud, LH Hansen, S Serensen, GF Steward, Å Hagström, and L Riemann. The nitrogenase gene pool in surface waters of the global ocean is dominated by genes of non-cyanobacteria PLoS One 6(1) e19223. doi:10.1371/journal.pone.0019223


Synergistic activities:
1. Assist in planning, logistics and teaching for an annual summer course entitled “Microbial Oceanography: from Genomes to Biomes” held at University of Hawaii (2006-present)
2. Investigator in the Center for Microbial Oceanography – Research and Education, a multi-institutional, collaborative science and technology center focused on bridging research from molecular diversity, to microbial ecology, to biogeochemistry, to ecosystem modeling.
3. Contribute annually to presentations and activities at SOEST open house attended by thousands of school children, teachers, parents and other members of the general public.
4. Contributions to technical advancements in a number of areas of microbial ecology including measurement of viral productivity, development of a non-radioactive method for estimating bacterial productivity, novel approaches to studying viral diversity and adaptation of DNA array technology to the study of functional gene diversity.

Collaborators and other affiliations (last 48 months):

Collaborators:
Sallie W. Chisholm (Massachusetts Institute of Technology), Edward F. Delong (Massachusetts Institute of Technology), Robert Jellison (UC Santa Barbara), Ricardo Letelier (Oregon State University), Lasse Riemann (Kalmar University, Kalmar, SWEDEN), Christina Preston (MBARI), Jonathan Zehr (UC, Santa Cruz).

Graduate and Postdoctoral Advisors:
Farooq Azam (University of California, San Diego)
Ed Delong (Massachusetts Institute of Technology)
Jonathan Zehr (University of California, Santa Cruz)

Undergraduate Student Research Mentor:
Honors Thesis (committee chair in bold) – Christopher Rothschild (2004), Sally White (2004), La’Toya James (present)
CMORE Scholars – Sarah Chang, Brett Marchant, La’Toya James

Graduate student thesis and dissertation committees (Chairperson of those in bold):
Completed - Carli Bober, M.S.; Brian Boeing, M.S.; Marina Brandon, M.S.; Jennifer Brum, M.S., Ph.D.; Alex Culley, M.S. (Moss Landing Marine Laboratories); Phyllis Lam, Ph.D.; Binglin Li, Ph.D., Sarah Mincks, Ph.D.; Kristina Mojica, M.S.; Brian Stalder, Ph.D.; Jillian Ward, M.S.; Sara Yeo, M.S.,

Current – Ph.D. Candidates: Darin Hayakawa, Jaclyn Mueller, Olivia Nigro, Jennifer Salerno, Christopher Schvarcz, M.S. Candidates: Gordon Walker, Abigail Johnson

Post-doc advising:
Current – Alex Culley, Elisha Wood-Charlson
Biographical Sketch – Thomas

(a) Professional Preparation

<table>
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<th>Degree</th>
<th>Year</th>
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<tr>
<td>U. of Washington</td>
<td>Biology</td>
<td>BS – 1985</td>
</tr>
<tr>
<td>Brown University</td>
<td>Ecology and Evolution</td>
<td>MS - 1987</td>
</tr>
<tr>
<td>U. of California Berkeley</td>
<td>Integrative Biology</td>
<td>PhD – 1992</td>
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</table>

(b) Appointments

<table>
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<th>Institution</th>
<th>Position</th>
<th>Year</th>
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</thead>
<tbody>
<tr>
<td>University of Hawaii</td>
<td>Assoc. Research Prof. (tenured)</td>
<td>2006 – present</td>
</tr>
<tr>
<td>University of South Florida</td>
<td>Assoc. Professor (tenured)</td>
<td>2000 – 2006</td>
</tr>
<tr>
<td>University of South Florida</td>
<td>Assistant Professor</td>
<td>1999 – 2000</td>
</tr>
<tr>
<td>Dauphin Island Sea Lab</td>
<td>Marine Scientists</td>
<td>1996 – 1999</td>
</tr>
</tbody>
</table>

(c) Five Recent Publications (students and post-docs in bold)


http://www.ottokinne.de/articles/feature/m312p001.pdf

(d) Synergistic Activities

Academic and Student training – Through my research I have developed tools for analysis of flow dependent processes in the lab and field. The results of this work have resulted in 20 student and 16 post-doctoral lead papers and presentations 37 invited presentations and 42 contributed presentations nationally and internationally. I have trained 7 Postdoctoral Scholars, 6 PhD students, 2 MS students, 22 graduate student committees, 2 undergraduate honors committees, 22 undergraduate interns.

Service to Academic Community – I have served as an NSF panelist 10 times on four different panels. Been a member of the ERF steering committee. Judged student papers at 6 meetings of the American Society of Zoologists and the American Society of Limnology and Oceanography meetings. Been an invited participant in 3 international workshops. Reviewed numerous papers and proposal for journals and funding agencies.

Service to the Broader Community – I am involved with programs linking science and the local community. I work with two community groups involved with restoration of taro (kalo) growing and an ancient Hawaiian fishpond. I developed 3 television programs for educational television and have supported a Hawaii youth Conservation Corp scholar.

Enhancing Underrepresented Groups – I have been very involved with programs to increase involvement of underrepresented groups in science. I conducted a minority recruitment internship while at the Dauphin Island Sea Lab in collaboration with Deans from four
Biographical Sketch – Thomas

HBCU’s in Alabama and continued this program in Florida. I received the Presidential Early Career Award for Scientists and Engineers for the proposal of this work. I trained a total of 13 interns through this program. Presently I am Co-PI on an Opportunities for Enhancing Diversity (OEDG-NSF) grant working with native Hawaiian interns linking science with community based restoration programs and am working actively with two community groups to obtain additional funding and create new educational programs through collaboration among teams.

Fostering Interdisciplinary Interactions – I lead a group of researchers at the University of Hawaii that are striving to link natural and social sciences in our approach to research. We have two programs linking ecology, biogeochemistry, political science, hydrology, and Hawaiian studies in a number of complex programs. We have obtained some funding and are looking to expand these interdisciplinary programs.

(e) Collaborators and Other Affiliations

(i) Collaborators and Co-Editors in the Past 48 Months

Aikau, H. – U of Hawaii, Manoa
Badgley B.D.– U of Minnesota
Bell S.A. – U of South Florida
Cornelissen C.D. – Cawthron Institute, NZ
Dulaiova, H. – U Hawaii, Manoa
Fukunaga A. – U Hawaii, Manoa
Harwood V.J. – U of South Florida
Meyers, A – U Konstanz, Germany
Kewalo, H. – Pae Pae O He’eia
Koseff J.R. – Stanford

Kukea-Shultz, P. – U. of Hawaii, Manoa
Metian, M. – U Hawaii, Manoa
Meyers A. – U South Florida
Peyton K. – U of Hawaii
Ruttenberg, K.C. – U Hawaii, Manoa
Shultz, K. – Kāko‘o Ōiwi
Toonen R. – U. of Hawaii, Manoa
Weitzman J.S. – Stanford
Ward, B.B. – Princeton

(ii) Graduate and Postdoctoral Advisors

PhD Thesis Advisor, Mimi Koehl, UC Berkeley

(iii) Graduate Advisor and Postgraduate-Scholar Sponsor

Badgley B.D. – U South Florida
Cornelissen C.D.– U South Florida
Driscoll M.D.– U South Florida

Fong J. – U Hawaii, Manoa
Kinane S. – U South Florida
Meyers A. – U South Florida

Postgraduate-Scholars Sponsored ears

Dr. Oscar Guaydol, 2010 – present. Ph.D. University of Barcelona.
Dr. Kim Peyton 2009-present. Ph.D. University of Hawaii.
Dr. Marc Metian, 2008 - 2010.

Dr. Kyle Aveni Deforge 2006- 2010. Ph.D. University of South Carolina.
Robert John Toonen

University of Hawai`i at Mānoa, School of Ocean and Earth Science and Technology, Hawai`i Institute of Marine Biology, Moku o Lo`e
Coconut Island, P.O. Box 1346, Kāne`ohe, Hawai`i 96744
Phone: (808) 236-7401  Fax: (808) 236-7443  Email: toonen@hawaii.edu

Education:

Professional Appointments:
Associate Research Faculty: July 2008 – present, Hawai`i Institute of Marine Biology, School of Ocean and Earth Sciences and Technology, University of Hawai`i at Mānoa
Assistant Research Faculty: June 2003 – June 2008, Hawai`i Institute of Marine Biology, School of Ocean and Earth Sciences and Technology, University of Hawai`i at Mānoa
Research Associate: 2002 – 2003, Center for Population Biology, Section of Evolution & Ecology, University of California, Davis.

10 Selected Relevant Publications (N = 94):
Collaborators & other affiliations:

- **Graduate and Postdoctoral Advisors:**
  M.S.: Joe Pawlik (chair), Martin Posey & Larry Cahoun
  Ph.D.: Rick Grosberg (chair), Gary Vermeij, Dennis Hedgecock, Brad Shaffer, Ron Burton

- **Scientific Collaborators (Past 5 years):**
  Jason Addison (University of New Brunswick), Jason Baker (National Marine Fisheries Service), Paul Barber (Boston University), Iliana Baums (Penn. State University), Tal Ben-Horin (University of California, Santa Barbara), Maria Byrne (University of Sydney), Steve Coles (Bishop Museum), Mike Dawson (University of California, Merced), Scott Godwin (NOAA-PMNM), Rick Grosberg (UC Davis), Dean Grubbs (Virginia Institute of Marine Sciences), Ben Halpern (NCEAS), Kim Selkoe (UC Santa Barbara), Mike Hart (Simon Fraser University), Sam Kahng (Hawaii Pacific University), Monica Medina (UC Merced), Serge Planes (Perpignan, France), Ross Robertson (Smithsonian Tropical Research Institute), Dave Siegel (UC Santa Barbara), Jonathon Stillman (San Francisco State University), Drew Tyre (University of Nebraska, Lincoln), John Wares (University of Georgia), James Watson (UC Santa Barbara), Crow White (UC Santa Barbara), Danielle Zacherl (California State University, Fullerton).

- **Graduate Student and Post-Doctoral Aides, past 5 years:**
*denotes former lab members now moved on

Synergistic & Outreach Activities:

- **Broadening the Participation of Underrepresented Groups in STEM:**
  Minority students supervised to date (name, nationality, dates in our lab):

- **Representative Invited Presentations to the Public (Last 5 years, N=31):**
  Ocean Awareness Training, 2011, Kihei & Lahaina, Maui, HI.
  Marine Aquarium Conference of North America, 2009. Atlanta, GA.

- **Popular Literature Publications:**
  Over 100 popular literature articles for Advanced Aquarist Online Magazine, Freshwater & Marine Aquarium (FAMA) Magazine, Tropical Fish Hobbyist, Marine Fish & Reef USA Annual, Korrä (German), Les Lettres Récifales (French), Practical Fishkeeping (UK), and ReefArt (Italian) - complete list online at [http://www2.hawaii.edu/~toonen/publications.html#aquarium](http://www2.hawaii.edu/~toonen/publications.html#aquarium)
Leslie Edward Watling

Education:
University of Calgary, Zoology, B.Sc., 1965
University of the Pacific, Marine Science, M.S., 1969
University of Delaware, Marine Studies, Ph.D., 1970-1974

Professional Experience:
Professor, Dept. of Zoology, University of Hawaii at Manoa, 2006-
Emeritus Professor, University of Maine, 2008-
Professor, School of Marine Sciences, University of Maine, 1981-2008
Member, National Research Council Committee on Marine Biodiversity, 1994
President, The Crustacean Society, 1994-95
Director, Darling Marine Center, University of Maine, 1985-1990
Member, Governing Board, The Crustacean Society, 1980-84; President-Elect, 1992-94
Acting Chairman, Dept. of Oceanography, University of Maine, 1980-81

Awards and Honors:
Smithsonian Senior Postdoctoral Fellowship, January to May, 1990.
Pew Fellow in Marine Conservation, 1998-2001
Three amphipods, one isopod, two cunaceans, and one octocoral named in my honor.

Recent Cruise Experience:
Watling has had extensive at-sea experience with both submersibles and remotely operated vehicles (ROVs) in the North Atlantic and North Pacific Oceans. He has made more than 30 submersible dives and logged more than 500 hours of bottom time with ROVs. Relevant recent cruise experience includes:

2001: R/V Atlantis and submersible Alvin, Chief Scientist, continental slope south of Georges Bank and inner New England Seamount Chain, funded by NOAA Ocean Exploration program, 1 dive.
2003: R/V Atlantis and submersible Alvin, Chief Scientist, New England seamount chain, funded by NOAA Ocean Exploration program, 3 dives.
2004: R/V Ronald H. Brown and ROV Hercules, Chief Scientist, New England Seamounts, funded by NOAA Ocean Exploration program, 12 days, 6 seamounts.
2004: R/V Roger Revelle and ROV Jason. Sr. Scientist, Aleutian Islands outer Aleutian Ridge, funded by NOAA-NURP West Coast program, R. Stone, Chief Scientist, 17 days.
2005: R/V Atlantis and submersible Alvin, Co-Chief Scientist, Georges Bank Canyons and western New England Seamount Chain, funded by NOAA-NURC NAAGL program, 1 dive.
2006: R/V Ka`imikai-o-Kanaloa and Pisces submersibles, Senior Scientist, North side of Molokai, 2 dives.
2009: R/V Walton Smith and ROV Global Explorer, Co-Chief Scientist, Bahamas, 15 dives
2009: R/V Ka`imikai-o-Kanaloa and Pisces submersibles, Senior Scientist, NW Hawaiian Islands, 1 dive.

Publications
Watling has published 132 scientific papers, of which the following are the most recent:


EDUCATION

Stanford University, Stanford, CA
PhD in Biology
May 2007

University of Hawaii at Manoa, Honolulu, HI
MSc in Oceanography
August 1999

Williams College, Williamstown, MA
BA in Geology, Cum Laude
June 1993

PROFESSIONAL HISTORY

Manager, Pelagic Fisheries Research Program, University of Hawaii
2010-present

Interim Manager, Pelagic Fisheries Research Program, University of Hawaii
2009

SOEST Young Investigator, University of Hawaii, Honolulu, HI
2007-2008

PhD Candidate, Biological Sciences Department, Stanford University, Stanford, CA
2000-2007

Technician, Hopkins Marine Station of Stanford University, Pacific Grove, CA
1999-2000

MSC Candidate, Oceanography Department, University of Hawaii, Honolulu, HI
1996-1999

Environmental Consultant, ERM-Hong Kong, Limited, Hong Kong
1994-1996

Intern, Union of Concerned Scientists, Cambridge, MA
1993

PUBLICATIONS

SCIENCE/NATURE: 2    SPECIALTY JOURNAL: 12    BOOK/THESIS: 4    CITATIONS: 553

Journal Articles


Book Chapter


Thesis


RESEARCH SUPPORT

PENDING: 1
AWARDED: 17
UNFUNDED: 8

PENDING

National Science Foundation, $854,667
Pending

Predator Landscape of the Central Tropical Pacific: Across Species and Scales
Scott Shaffer, Sarah Maxwell, Hillary Young, Betty Anne Schreiber, Kevin Weng

CURRENT

NOAA Pacific Islands Regional Office, $86,600
Understanding Key Habitats of Commercial Demersal Fishes - The Deep Seven Bottomfish Complex in Hawaii. Kevin Weng and Alan Everson
2010-2012

NOAA Coral Reef, $156,716
Essential biological data to inform marine reserve design and management: Home range of keystone fish species may exceed the scale of most reserves. Kevin Weng
2009-2011

NOAA Pacific Islands Fisheries Science Center, $100,000
Movement and habitat use of monchong at Cross Seamount. Kevin Weng
2009-2010

Pelagic Fisheries Research Program, $188,388
Impacts of Fishing on Vulnerable Non-target Species at Seamounts. Kevin Weng
2009-2011

Pelagic Fisheries Research Program, $301,343
Hawaii Tuna Tagging Project II. Kim Holland, David Itano, Kevin Weng
2008-2010

NOAA Pacific Islands Regional Office, $71,000
Bottomfish Habitat Survey and Movement: Value and Effectiveness of State Restricted Fishing Areas and Fishery Effects on Precious Corals. Chris Kelley, Kevin Weng, Jeff Drazen
2010-2012

US DOE Marine Renewable Energy Center, ~$1e5
Marine Renewable Energy Center, Rick Rocheleau and various other including Kevin Weng
2009-2013

Kevin Weng - CV
Thierry Work

(a) Professional Preparation

<table>
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<tr>
<th>Institution</th>
<th>Department</th>
<th>Degree</th>
<th>Year</th>
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<tr>
<td>Texas A&amp;M University</td>
<td>Entomology</td>
<td>B.S.</td>
<td>1983</td>
</tr>
<tr>
<td>University of California, Davis</td>
<td>Entomology</td>
<td>M.S.</td>
<td>1985</td>
</tr>
<tr>
<td>University of California, Davis</td>
<td>Veterinary Medicine</td>
<td>DVM</td>
<td>1988</td>
</tr>
<tr>
<td>University of California, Davis</td>
<td>Epidemiology</td>
<td>MPVM</td>
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(b) Appointments

1989-91  Wildlife Veterinarian, California Fish & Game

(c) Five Recent Publications (N=85)


(d) Synergistic Activities

Collaborative research on diseases of terrestrial and marine wildlife in the Pacific Basin and overseas. Service to the conservation community includes providing technical assistance and training on elucidating mortalities of wild endangered and endemic marine and terrestrial birds, reptiles, mammals, and marine fish and invertebrates from Hawaii, Samoa, Tahiti, Costa Rica, Mexico, Papua New Guinea, Ecuador, Venezuela, Australia, Brazil, Palau, Guatemala, and Bermuda.

Vice President-Wildlife Disease Association
Assistant Editor: Journal of Wildlife Diseases
Member-International Union for the Conservation of Nature (IUCN) Marine Turtle Specialist Group
Member-IUCN Wildlife Health Specialist Group
Member-Sigma Xi
Provide veterinary assistance to state and federal agencies for translocation and reintroduction of endangered avifauna in Hawaii to their native range.
Carry out disease outbreak investigations in marine and terrestrial wildlife in Pacific Basin.

(e) Collaborators and Other Affiliations
Thierry Work

Adjunct faculty-Cornell University, Hawaii Institute of Marine Biology

(i) Collaborators and Co-Editors in the Past 48 Months

US Fish & Wildlife Service
National Oceanic and Atmospheric Administration
State of Hawaii Department of Land & Natural Resources
Hawaii Institute of Marine Biology
US Marine Corps
George Balazs (NOAA)
Greta Aeby (HIMB)
Kevin Foster (USFWS)
Cheryl Woodley (NOAA)
Daniele Corsaro (University of Neuchatel, Switzerland)
Matthias Ackermann (University of Zurich, Switzerland)
Robson Santos (Sao Paulo University, Brazil)
Santiago Merino (National Museum of Natural History, Spain)
Zac Forsman (HIMB)

Rob Toonen (HIMB)
Matthias Vignon (University of Perpignan, France)
Bry Wilson (Australian Institute of Marine Science)
David Bourne (Australian Institute of Marine Science)
Todd Russell (USMC)
Gareth Williams (Scripps Institute of Oceanography)
Eric Conklin (The Nature Conservancy)
Teresa Lewis (USFWS)
Mark Flint (University of Queensland)
Jim Casey (Cornell University)
I-Jiunn Cheng (Taiwan National University)
John Berestecky (Kapiolani Community College)
Jo-Ann Leong (HIMB)
Ebrahim Zandi (University of Southern California)

(ii) Graduate and Postdoctoral Advisors

MS Thesis Advisor

Robert K. Washino

UC Davis

Summary – Since 1992 I have advised 24 veterinary or graduate students who have done internships at the HFS. These students have come from University of California, Pennsylvania State University, North Carolina State University, University of Canary Islands (Spain), Tufts University, Cornell University, Taiwan University, Colorado State University, University of Costa Rica.
October 26, 2011

MEMORANDUM

TO: Jo-Ann Leong
    Professor and Director
    Hawaii Institute of Marine Biology
    Coconut Island

FROM: Paula Mochida
      University Librarian

SUBJECT: Review of Library Marine Biology Resources

The Library has reviewed its subscriptions to, and acquisitions of, major resources in all formats that support graduate research in Marine Biology. I have enclosed a copy of that list with this memorandum. We think that these resources can adequately support Masters and PhD level research in Marine Biology and related disciplines.

The University of Hawaii at Manoa Library is a member of the Association of Research Libraries, a highly selective group of the top 126 leading research libraries in North America. The Library is also a member of several consortia which include institutions with institutes of marine biology and who participate in resource-sharing between the libraries. These resources can complement the holdings of the UH Manoa Library.

If you have questions, please contact me at: paula@hawaii.edu

Enclosed
University of Hawaii at Manoa Library Resources in Support of
Graduate Education in Marine Biology

The library has long collected books, journals, and videos to support research related to
marine sciences, both biological and physical sciences.

RESOURCES CATALOGED IN HAWAII VOYAGER

A search on Marine Biology as a Library of Congress subject heading retrieves 406
separate titles held in the UHM Library and in the other nine UH campus libraries.

A search on Oceanography as an LC subject heading retrieves 635 titles from our system
holdings.

GUIDE TO THE RESOURCES

A Marine Sciences guide presents selected library resources, e.g. journals, databases, and
encyclopedias for literature searches in marine biology. See
<guides.library.manoa.hawaii.edu/marine>

DATABASES TO FIND ARTICLES

Aquatic Sciences & Fisheries Five indexes of aquatic biology, policy, and books. The
indexing has an international scope and is a great source for articles and for harder to find
materials (policy papers, book chapters)

Biological Abstracts A premier index of biological literature from 1926--the online
version covers biological journal literature from 1969 to present. Make your search better
by using the descriptors and selecting a field such as organism rather than using keyword
anywhere.

BioOne1 and BioOne2

A collection of full-text online journals published by scientific societies, strong in
conservation and environmental studies.

Geobase

Citations for journal articles, books, monographs, conference proceedings, and reports,
many with abstracts, in environmental sciences and geology.

JSTOR Arts & Sciences

srutter@hawaii.edu
2011 Oct 24
A collection of full-text online core ecology and science journals that can be searched for literature back to the first issues of key scientific journals such as Ecology, Science, Copeia.

**Oceanic Abstracts**

Citations and abstracts covering worldwide technical literature on the marine and brackish-water environments.

**Web of Science**

Three indexes/databases Science, Social Sciences, Arts & Humanities. Covers the core scholarly journal literature of all disciplines from 1980 to the present. The most up-to-date of the indexes. Select General Search to search on a topic. You can sort the retrieved papers by the number of citations; this is a good way to find older papers that have contributed to more current research. Select Cited Reference Search to search for papers that cite a particular author or reference.

**Zoological Record**

An index that goes back to 1864—the online version covers zoological literature from 1978 to present. Some overlap with Biological Abstracts, but better coverage of international literature, and articles on insects and birds. Includes coverage of books and meetings that Biological Abstracts does not cover.

**JOURNALS**

From a search in Journal Citation Report to create a list of journals in Marine Biology with the highest impact factors I selected the top 28 journals in marine biology. The UHM Library holdings are indicated in the attached table.

**COLLECTION POLICIES RELATED TO MARINE BIOLOGY**

**Biology**

**Botany**

**Oceanography**
http://library.manoa.hawaii.edu/about/collection/ocean/oceanography.html

**Zoology**
http://library.manoa.hawaii.edu/about/collection/natural/zoo.html

srutter@hawaii.edu
2011 Oct 24
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To: Whom it may concern, 11/11/11

From: Brian Taylor, Dean of SOEST

Re: Graduate Degree in Marine Biology at UH Manoa

I write to express my strong support for the proposed graduate degree program (M.S. and Ph.D.) in Marine Biology at the University of Hawaii at Manoa (UHM).

UHM, through its College of Natural Sciences (CNS) and School of Ocean and Earth Science and Technology (SOEST), is well positioned and equipped to offer this graduate program through the faculty and facilities in the relevant units (Department of Oceanography and Hawaii Institute of Marine Biology, in the case of SOEST), and further supported by numerous affiliate graduate faculty in units other than CNS and SOEST.

There is considerable interest in this graduate degree, as witnessed by the existing graduate faculty and students in the Marine Biology graduate field of study. There is growing demand for graduates with a Marine Biology advanced degree from employers in industry, government as well as academe. A graduate degree in Marine Biology at UHM will support the aspirations and further training of graduates of the UH undergraduate programs (BS in Marine Sciences at UH Hilo, AS in Marine Sciences at Maui College, and BS in Marine Biology as well as Global Environmental Sciences at UHM).

The planned graduate program calls for representatives from DLNR, DBEDT and the contributing colleges to serve on an advisory council, and I hereby commit SOEST, through the office of the Associate Dean for Academic Affairs, to serve on said council.
November 7, 2011

Professor Jo-Ann C. Leong, Ph. D.
Director
Hawai‘i Institute of Marine Biology,
School of Ocean & Earth Sciences Technology, University of Hawaii
PO Box 1346, Kaneohe, Hawaii 96744

Re: Proposed MARINE BIOLOGY GRADUATE PROGRAM

Dear Dr. Leong:

NOAA’s Pacific Islands Fisheries Science Center strongly supports the development of an advanced degree program in Marine Biology at the University of Hawaii at Manoa. Such a program would build on the excellent work of the Hawaii Institute of Marine Biology (as well as parallel work at UH Hilo) by extending it to a formal graduate degree granting program. We have been continually surprised at the absence of such a program at the University of Hawaii which has made recruiting high level scientists to our center, particularly those with quantitative skills in ecological assessments and population dynamics related to fisheries, cetaceans, and coral reef ecosystems, difficult.

In 2000 NOAA requested the National Research Council to convene a workshop to discuss avenues the agency could take to ensure an adequate supply of experts in fisheries stock assessment (and social sciences).\(^1\) Subsequently NMFS and the U.S. Department of Education conducted an analysis of the supply and demand for such scientists and found a considerable gap\(^2\). As one step to assist, we have recently made a commitment to such education by funding, through the NOAA grants process, a graduate level faculty position at SOEST/HIMB with an emphasis on quantitative ecological assessment and population dynamics. We expect this to be an on-going commitment and hopefully one that will lead to further opportunities for collaboration between our science center and the university.

\(^1\) Recruiting Fishery Scientists: Workshop on Stock Assessment and Social Science Careers (2000). Ocean Studies Board, National Research Council, National Academy Press. Washington, D.C.


2570 Dole Street Honolulu, HI 96822

Samuel.Pooley@NOAA.gov
Development of a formal graduate level degree program would enhance this commitment substantially and we would be happy and enthusiastic about having our scientific staff participate.

Please feel free to call me if you have any questions (808-983-5301).

Sincerely,

[Signature]

Samuel G. Pooley, PhD.
Director