

14 Sea Grant

14.1 Executive Summary



The University of Hawai'i Sea Grant College Program (UH Sea Grant) is a unit of the outstanding School of Ocean and Earth Science and Technology (SOEST) of the University of Hawai'i at Mānoa (UH Mānoa) in partnership with the National Oceanic and Atmospheric Administration (NOAA).

All of Hawai'i is within 29 miles of the ocean, and perhaps,

nowhere is the link between terrestrial and aquatic ecosystems more apparent. Moreover, the great majority of the challenges we face in the shoreline derive from what occurs on land. Isolation also makes Hawai'i especially vulnerable to changes in climate, sea level, ocean temperature and acidification, and severe storms.

UH Sea Grant is organized into five Centers of Excellence, a unique structure within the Sea Grant network. These centers include the Center for Smart Building and Community Design, Center for Sustainable Coastal Tourism, Center for Marine Science Education, Center for Island Climate Adaptation and Policy, and the Center for Sustainable Aquaculture. These centers foster the development of resilient, economically and socially inclusive, and sustainable coastal communities that function within the capacity of their habitats and ecosystems. By partnering with diverse schools and colleges through joint faculty positions and other synergistic relationships, UH Sea Grant brings the full force of the university's knowledge and human resources to serve Hawai'i's citizens and decision makers to a far greater degree than our federal funding alone can support. The centers are interdisciplinary and are a vehicle that build links throughout the university and engage the best and brightest to address the critical issues facing our state and region. The centers also play a central role in defining the UH Sea Grant research agenda by identifying knowledge gaps that directly impact a coastal community's wellbeing. Conversely, the centers are highly effective linking research results to community needs, challenges, and opportunities. The 2011 Site Review Team (SRT) recognized the Centers of Excellence as a National Best Management Practice.

Likewise, the University of Hawai'i (UH) has recognized the excellence of Sea Grant and its longstanding commitment to coastal sustainability by awarding it seven new general-funded faculty positions in a competition with 17 other departmental proposals. Over the next 30 years,

this will represent ~\$50 million investment in Sea Grant's outreach and research program. We believe that this is likely an unprecedented commitment on the part of a university to Sea Grant and its NOAA partner. This initiative greatly increases our ability to address diverse challenges, needs, and opportunities in a multifaceted fashion.

UH Sea Grant is consistently among the most highly leveraged programs in the Sea Grant network. For every \$1 we receive in core funding, we are able to generate much more than \$2 of other funds, placing UH Sea Grant as a \$6 million/year program. This includes institutional match provided by UH Mānoa, matching/leveraging generated by the researchers, and sponsor funds from county, state, private, and other federal entities. Our non-federal match will greatly increase as a result of our sustainability hires. This funding allows us to employ 54 faculty and staff. In 2011, the National Sea Grant Office reviewed all programs. UH Sea Grant is 8th in core funding from NOAA, but ranked #1 in total leveraged funds (\$9,980,841); #1 in leveraged funds managed by Sea Grant (\$4,843,628); #1 in Sea Grant-supported PhD graduate students; #2 in peer-reviewed journal articles, missing #1 by one journal article; #2 in volunteer hours (14,570); #3 for businesses created; #3 in leveraged funds influenced by Sea Grant (\$5,137,213), and #5 for jobs created.

UH Sea Grant operates a Graduate Trainee Program under the direction of the UH Sea Grant Director. This program provides graduate assistantships to support the research and extension training of graduate students who enter scientific, outreach, and policy careers at the local and federal levels including NOAA. Fifteen to twenty assistantships are awarded each biennium. Graduate trainees are required to: attend an orientation meeting, participate in outreach and teaching training, present their research findings to the public (e.g., presentations at the Hanauma Bay Nature Preserve), author an article in UH Sea Grant's quarterly magazine, and provide 40 hours per year of outreach to the community. The SRT identified this as a Best Management Practice.

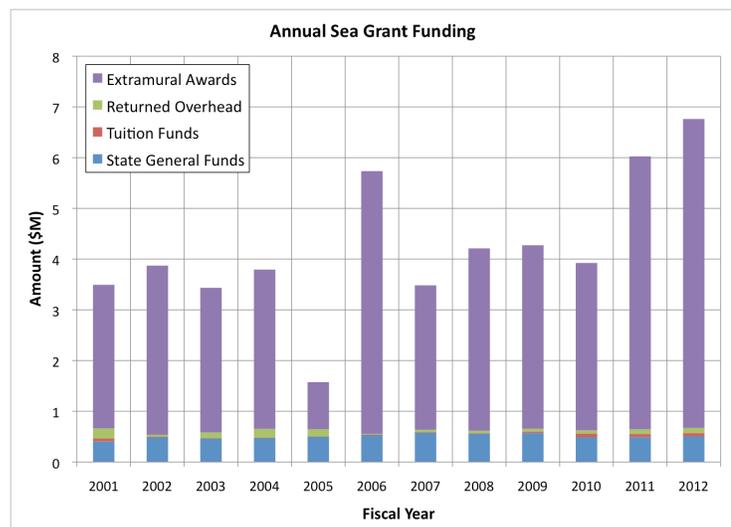
The strategic plans of the National Sea Grant Office (NSGO) and Hawai'i State Office of Planning form the basis for our Request for Proposals. A rigorous and transparent multi-tier peer review process, based on that of the National Science Foundation (NSF), is conducted. The Sea Grant Advisory Council, peer referees, and extension faculty advise a science preview panel on the relevance of proposed projects to UH Sea Grant's priorities. That panel recommends full proposals for development. These proposals are then evaluated by a minimum of three ad hoc (out-of-state) referees. That evaluation informs an external review panel of scholars in making project funding decisions. The NSGO program officer oversees the proposal process.

Each Sea Grant program is evaluated every four years. A component of this is evaluation by an external SRT, which is appointed by the NSGO Director. Included in the 2011 Review Team were James D. Murray (SRT Chair, NSGO Program Officer, NSGO Deputy Director), Richard West (SRT Co-Chair, National Sea Grant Advisory Board Member, and Past-President, Consortium for Oceanographic Research and Education), Paul Anderson (Director, Maine Sea Grant College Program), Dr. John V. Byrne (President Emeritus, Oregon State University,

former NOAA Administrator), and Paul N. Doremus (Deputy Assistant Administrator for Operations, National Marine Fisheries Service). Selected findings from the 2011 Site Review Report: “In general, Dr. Grau has created an environment that encourages success among his management team and encourages leaders from within and outside the University of Hawai‘i to want to associate with UH Sea Grant...The SRT noted a high degree of innovation at UH Sea Grant... (T)he SRT recognizes the Centers of Excellence model as an example of UH Sea Grant innovation. The five Centers of Excellence that have been created at UH provide a multi-disciplinary approach to issue oriented, coastal problem solving for the citizens of Hawai‘i...UH Sea Grant does an exceptional job of leveraging its relatively modest, core NOAA funding with a variety of other federal state, county, city and private funding sources...UH Sea Grant was first among the 33 Sea Grant programs in the amount of leveraged funds...UH Sea Grant provides stakeholders with an important relationship with the greater UH that enables efficient access to UH’s wealth of resources and information. In essence, UH Sea Grant provides the Hawaiian public a window into UH... The partnership list of federal, state and local governmental agencies (and associated boards and committees), industry groups, NGOs and community groups is extensive...UH Sea Grant has increased its capacity to conduct outreach programs by encouraging researchers to conduct extension-type activities and requiring graduate students to perform outreach activities. Citizen volunteers are trained by UH Sea Grant to conduct public education programs.”

Major initiatives reaching maturity:

Changed the design of the multi-billion dollar Ho‘opili project to a mixed-use, high-density, transit-oriented, smart growth development that will be home to 15,000 residents; design and outreach for the \$32 million, ultralow environmental impact Culinary Institute of the Pacific facility at Kapi‘olani Community College; project design and management oversight of a \$4+ million beach and habitat restoration at Waikīkī that maintains a critical social, cultural, environmental, and economic resource; developed new erosion-based construction setback rules for the County of Kaua‘i that are considered the most progressive in the nation; State Civil Defense implementation of new Sea Grant-developed tsunami run-up and evacuation maps for Hawai‘i and outreach by Sea Grant-supported researchers internationally to Chile, Italy, France, Korea, and China that utilize this model for research and forecasting purposes; and design, management, and financial support for \$4 million plus, photovoltaic facility and A/C renovation of the Hawai‘i Institute of Marine Biology that will reduce energy consumption, carbon footprint, and cost by half and provide a model that the whole campus will follow. UH Sea Grant is also conducting a feasibility study that contains a comprehensive, independent analysis of



implementing a district-wide seawater air conditioning system for Waikīkī as compared to business as usual that will reduce energy consumption of hotels and other businesses in the tourist district.

Our integrated research, extension, or education activities produce impacts and accomplishments that are realized both in the short and long-terms. Some are direct and planned, some are serendipitous, and some lead to new opportunities.

14.2 About the University of Hawai'i Sea Grant College Program

Hawai'i's islands are almost 2,500 miles from the nearest continental landmass and are unique aesthetically, geographically, culturally and biologically. This presents great opportunities and also challenges for residents and for those who visit our coastal communities. At present, the state's residents are largely reliant on imported food and energy and their distance from the contiguous states complicates the ability of federal resources to respond to natural hazards. Climate change impacts may require a modification to Hawai'i lifestyles and commerce both in urban Honolulu and the state's rural areas. In Hawai'i, the environment is the economy. Tourism, the dominant industry, is supported by attractive tropical marine and terrestrial ecosystems, but at significant cost in natural resource use (e.g. energy, water), underlining the need for long-term sustainable solutions to the issues facing Hawai'i's communities. While not unique among other states in this regard, Hawai'i's isolation makes the need to face these issues more urgent. As a microcosm for the nation's coastal communities, Hawai'i can serve both as a

healthy

Mission.
research,
faculty,

builds
citizens,
managers
the tools



lesson and model for building sustainable, resilient coastal communities supported by productive ecosystems.

UH Sea Grant integrates instructional and extension and staff who create and communicate knowledge that human resources, and allows decision makers and resource to create policy, and develop and means to address both the

challenges and unprecedented opportunities for building economically robust, and economically and socially inclusive coastal communities that work synergistically within the capacity of their marine and terrestrial habitats and ecosystems.

UH Sea Grant is part of a national network of 33 university-based programs associated with NOAA that promote better understanding, conservation, and use of coastal resources.

The program is part of the prestigious SOEST, a unit of the state's only Carnegie Doctoral institution at UH Mānoa, but the program's service is truly region wide, with responsibilities

spanning a greater geographic area than any other Sea Grant program. In addition to the Island of O'ahu, UH Sea Grant has a presence on each of the state's neighbor islands, as well as the U.S.-associated Republic of the Marshall Islands and the U.S. Territory of American Samoa.

UH Sea Grant was guided in its 2009-2013 strategic plan process by the UH Mānoa Strategic Plan and the UH Mānoa Institutional Proposal but informed by a diverse statewide constituency. The UH Sea Grant 2009-2013 Strategic Plan is thus a living roadmap resulting from the collective needs, opportunities, and wisdom of our coastal community constituents. The information included in the plan was derived from many sectors over several years using a variety of engagement models to ensure broad representation. UH Sea Grant extension and research faculty, administration, and staff all participated actively with our stakeholders and constituents to identify the most pressing challenges as well as the opportunities facing our island state. Formal and informal meetings were held to obtain input, and written comments and guidance were also solicited. This plan capitalizes on Sea Grant's unique capacities and strengths, allows for flexibility and creativity on the part of UH Sea Grant, and aligns with and supports many of the priorities of our parent NOAA NSGO strategic plan.

The Program has five focus areas, four of which are counterparts to the national focus areas: *Sustainable Coastal Development*, *Hazard Resilient Coastal Communities*, *Healthy Coastal Ecosystems*, and *Safe and Sustainable Seafood Supply*, as well as a fifth focus area, *Sustainable Coastal Tourism*. To address these foci, UH Sea Grant has established five Centers of Excellence whose leadership, structure, administration and scope of activities are unique within the Sea Grant Network.

The Centers of Excellence encompass the Sea Grant mission while providing the critical service of focusing program resources to optimize effectiveness. The Centers of Excellence include:

- **Center for Smart Building and Community Design**--creating and supporting economically viable, attractive communities that enhance their environment, economy, and culture; key partner, University of Hawai'i School of Architecture
- **Center for Sustainable Coastal Tourism**--conducting research and providing services to assist the state and the community in ameliorating visitor impact and diversifying targets for sustainable tourism growth; key partners, University of Hawai'i College of Social Sciences, Department of Economics, and School of Travel Industry Management
- **Center for Island Climate Adaptation and Policy**--committed to a sustainable, climate conscious future for island communities by delivering innovative interdisciplinary research and real-world solutions to decision-makers in the public and private sectors; key partners, University of Hawai'i William S. Richardson School of Law, College of Social Sciences, and Hawai'inuiākea School of Hawaiian Knowledge
- **Center for Marine Science Education**--providing leadership and support to formal and informal educational institutions and organizations to educate scientists, professionals, teachers and the public about the benefits of wise and sustainable stewardship of our

region's coastal and ocean resources that incorporates cultural values; key partner, University of Hawai'i College of Education

- **Center for Sustainable Aquaculture**--providing science-based information and supporting efforts toward sustainable aquaculture development, supporting workforce development for the aquaculture industry, and stimulating demand for local aquaculture products; key partner, University of Hawai'i at Hilo Pacific Aquaculture and Coastal Resources Center

These Centers of Excellence are composed of researchers, extension professionals, state and local government representatives, industry and community members as well as "non-traditional" Sea Grant partners such as the U.S. Environmental Protection Agency and the American Institute of Architects. The Centers build bridges among academics and those who can benefit from their scholarship. The Centers conduct meetings of participants as necessary; while such meetings provide many services, a key component is linking researchers and users, and allowing researchers to hear firsthand from their community what questions need to be answered. These centers also provide for inter-college, -school and -department collaboration, something not encouraged by the traditional academic structure. The center model has been embraced by the University of Hawai'i administration which recognizes its value to the university at-large and which has increased support for UH Sea Grant as a result in the form of contributing salary funds for UH Sea Grant Center Directors.

14.2.1 A. Program Management and Organization

1. Management Team Composition and Responsibilities

The UH Sea Grant Management Team provides leadership in the service of the people of Hawai'i through the development and implementation of the UH Sea Grant strategic plan. This mobilizes the assets of UH Sea Grant, the university, the state and the Sea Grant Network to address the strategic plan's objectives and performance measures, and engage stakeholders and partners in collaborative activities. The Management Team participates in a weekly meeting, in which they regularly engage their NSGO Program Officer, to update one another, resolve issues and identify opportunities for collaboration. Included is a partial list of responsibilities of each management team member.

- **Director:** Provides vision and overall direction for program, ensures program activities directly support the University of Hawai'i, UH Sea Grant, NSGO and NOAA strategic plans, identifies programmatic opportunities to management team.
- **Associate Director:** Assists the director in the above activities, manages day-to-day operations and ensures that the program meets the requirements of the NSGO; coordinates research from development of proposals through the final reporting stage.
- **Extension Leader:** Supervises extension faculty and staff and oversees all aspects of extension programming and activities, the UH Sea Grant Graduate Trainee Program, and John A. Knauss Fellowship Program.

- **Communications Leader:** Supervises communications staff, and develops and manages all media, website and social networking materials, seeks and identifies opportunities to share the work of Sea Grant locally, regionally, nationally and internationally and manages program databases (publication, alumni, eProjects, etc.).
- **Administrative/Fiscal Officer:** Supervises support staff and ensures execution of all administrative and fiscal matters consistent with federal, state and local regulations.
- **Executive Planning Coordinator:** Supervises office staff, provides executive and proposal support, and serves as the point of contact for Advisory Council and legislative activities and university administrator engagement.
- **Program Management Specialist:** Provides logistical and travel support for meetings, executive support services to UH Sea Grant Center of Excellence Directors, and assists the Executive Planning Coordinator.

2. Source of funding and amount of time UH Sea Grant staff devotes to Sea Grant as of October 23, 2012 (* denotes supported by University of Hawai'i operating funds; # denotes UH Sea Grant faculty hired by UH Mānoa with a start date in August 2013)

Staff Member	Title	SG Omnibus	Leveraged	Total
E. Gordon Grau	Director		1.00*	1.00
Darren T. Lerner	Associate Director		1.00*	1.00
Ruth Goldstein	Executive Planning Coordinator	1.00		1.00
Isis Bataluna	Program Management Specialist		1.00*	1.00
Lisa Heindl	Assistant Program Management Specialist	1.00		1.00
Communications				
Cindy Knapman	Communications Unit Leader		1.00*	1.00
Heather Dudock	Multimedia Specialist	0.60	0.40	1.00
N. Harold Richman	Information Technology Specialist	0.75	0.25*	1.00
Lyneth Peou	Data Management Specialist	0.80	0.20	1.00
Fiscal/Human Resources				
Bruce Hamakawa	Administrative/Fiscal Officer		1.00*	1.00
Joan Yamada	Administrative Officer	1.00		1.00
Diane Sakamoto	Administrative Officer	1.00		1.00
Jaime Hongo	Human Resources Specialist	1.00		1.00
Extension				
Darren Okimoto	Extension Leader		1.00*	1.00
Rosanna Alegado#	Assistant Researcher		0.25	0.25

Adam Asquith	Extension Specialist	0.10		0.10
Andrew Bohlander	Coastal Processes and Hazards Agent		1.00	1.00
John Carey	Sustainability Coordinator	0.49		0.49
Shawn Carrier	Outreach Coordinator Hanauma Bay Education Program		1.00	1.00
Chantal Chung	Sea Grant Office Assistant		0.50	0.50
John Corbin	Affiliate Faculty			N/A
Eric Crispin	Affiliate Faculty			N/A
Mary J. Donohue	Program Specialist	0.20	0.30	0.50
Dolan Eversole	NOAA Coastal Storms Program Coordinator Pacific Region		1.00	1.00
Oceana Francis	Assistant Professor		0.25	0.25
Matthew Gonser	Extension Agent, Community Planning and Design		1.00	1.00
Kristen Gundersen	Fluid Earth Project Manager		1.00	1.00
Kimberly Harding	Fisheries Extension Agent		0.50	0.50
Christopher Hawkins	Affiliate Faculty			N/A
Maria Haws	Affiliate Faculty			N/A
Kevin Hopkins	Director, Center for Sustainable Aquaculture			N/A
Robert Howerton	Aquaculture Extension Specialist		1.00	1.00
Dennis Hwang	Coastal Hazard Mitigation Specialist		0.20	0.20
Gavin Iwai	Hanauma Bay Education Program Coordinator		1.00	1.00
Denise Konan	Director, Center for Sustainable Coastal Tourism			N/A
Jonathan Lilley	Postdoctoral Research Fellow	0.33	0.66	1.00
Morgan Mamizuka	Volunteer Coordinator Hanauma Bay Education Program		1.00	1.00
Elizabeth Kumabe Maynard	Regional Environmental Education Specialist		1.00	1.00
Stephen Meder	Director, Center for Smart Building and Community Design			N/A
Craig Nelson#	Assistant Researcher		0.25	0.25
Tara Miller Owens	Coastal Processes Extension Agent		1.00	1.00
Ruby Pap	Coastal Land Use Extension Agent	0.10	0.90	1.00
Stephen M. Pauley	Affiliate Faculty			N/A
Eileen Peppard	Sustainability Specialist	0.15	0.85	1.00

Michael Roberts	Associate Professor		0.25	0.25
Bradley Romine	Coastal Management Specialist		1.00	1.00
Anne Rosa	Marine Park Education Specialist		1.00	1.00
Dale Sartor	Affiliate Faculty			N/A
Kanesa Duncan Seraphin	Director, Center for Marine Science Education		0.30	0.30
Daniele Spirandelli	Acting Assistant Professor		0.25	0.25
Ephraim Temple	American Samoa Aquaculture Agent	1.00		1.00
Florence Thomas	Affiliate Faculty			N/A
Mehana Vaughan#	Assistant Professor		0.25	0.25
Phillip Wirdzek	Affiliate Faculty			N/A
Total		9.52	24.36	33.89

A listing of two-page curricula vitae for UH Sea Grant Faculty can be found in Appendix 14.7.

3. Leadership by UH Sea Grant Staff on Boards and Committees (2007-2012)

UH Sea Grant faculty have held well over 100 leadership and committee positions on various international, national, regional, state, local organizations and agencies. Selected examples can be found in Appendix 14.1.

4. The UH Sea Grant Advisory Council

The UH Sea Grant Advisory Council (SGAC) plays a vital role in guiding the UH Sea Grant management team in program operation. The SGAC members bring broad expertise, advice and diverse viewpoints to the program and include senior officials and community leaders from business and industry, state and federal government, and private foundations and organizations. The SGAC members serve two-year terms but may be reappointed to sequential terms dependent upon the needs of UH Sea Grant, our stakeholders and constituents. The SGAC meets as frequently as needed by UH Sea Grant, on average about once per year. Centers of Excellence and extension specialists also receive input from their own advisory bodies composed of stakeholders specific to their work. A listing of SGAC members for the 2007-2009, 2009-2012, and 2012-2014 funding cycles can be found in Appendix 14.2.

Advisory Council Meeting Summary

- November 13, 2007: UH Sea Grant strategic planning
- November 14, 2007: UH Sea Grant strategic planning
- April 1, 2008: Research proposal screening and evaluation for 2009-2012 funding cycle
- October 8, 2010: UH Sea Grant strategic planning

- March 30, 2011: Research proposal screening and evaluation for 2009-2012 funding cycle

5. Setting of the Program within the University and Reporting Structure

The UH Sea Grant director reports to the SOEST dean, who reports to the UH Mānoa vice chancellor for research and graduate education, who reports to its UH Mānoa chancellor, who reports to the president of the University of Hawai'i System, who reports to its Board of Regents.

6. Research Proposal Process



The research component of UH Sea Grant represents a critical element of implementation as it generates the foundation of a significant core of extension activities in addition to its research value. A rigorous multi-tier peer review process that emulates that conducted by NSF was implemented in 2000 by the UH Sea Grant director. Since then, the administrative team has refined this process to further increase transparency and competitiveness.

The review process commenced with a request for preliminary proposals (RFPP) announced in the first week of December, 14 months prior to the start of the funding cycle (for example, for the 2007-2009 funding cycle the RFPP was announced in December 2005) with a submission deadline in spring (March). The RFPP was sent to UH campuses system-wide, the University of Guam, Brigham Young University - Hawai'i, Chaminade University, and Hawai'i Pacific University. Notice was also placed in the University of Hawai'i campus bulletin, local newspapers, and sent to an extensive email listserv to achieve broad distribution throughout the state and region. This listserv included an extensive current and potential list of principal investigators that is maintained and augmented continuously.

Preliminary proposal screening was undertaken by a science review panel composed of University of Hawai'i and local ocean and coastal agency scientists who evaluated the scientific merits of the preliminary proposals (see Appendix 14.3). The panel was constituted with special care to ensure that panel members did not have conflicts of interest. In addition, the SGAC met to advise UH Sea Grant on the relevance of the proposed work to our constituents and the community. From these meetings, preliminary proposals were recommended for development as full proposals. Full proposals were received by a June deadline. These full proposals were distributed for ad hoc peer review in summer and early autumn.

Based on the content of the proposals, an external science panel was formed to undertake final review and proposal selection for funding (see Appendix 14.3). This was the fourth UH Sea Grant proposal cycle to employ such a panel in the project review process and conforms to the rigorous methods of a NSF review panel. All panel members accessed proposals through a web-based system. Each panel member was asked to review and lead the panel in a discussion as a primary reviewer for several proposals and to act as secondary reviewer and tertiary reviewer for several additional proposals. All panel members were asked to have a working knowledge of all full proposals submitted. Thus, each proposal was initially considered in a dialogue among the three assigned reviewers. Other panel members were invited to add to the discussion of each proposal once the assigned panel members had presented. The number of proposals assigned to each member of the panel varied depending on the number of proposals falling within their areas of expertise. The panel members were provided with the ad hoc peer reviews prior to their arrival in Hawai'i. A NSGO program officer monitored the proposal review process. The Program Officer's duties included attending all meetings associated with full proposal selection and officially endorsing the process.

7. Number of Preliminary Proposals and Full Proposals Submitted, and Institutions Represented/Institutions Available in the State.

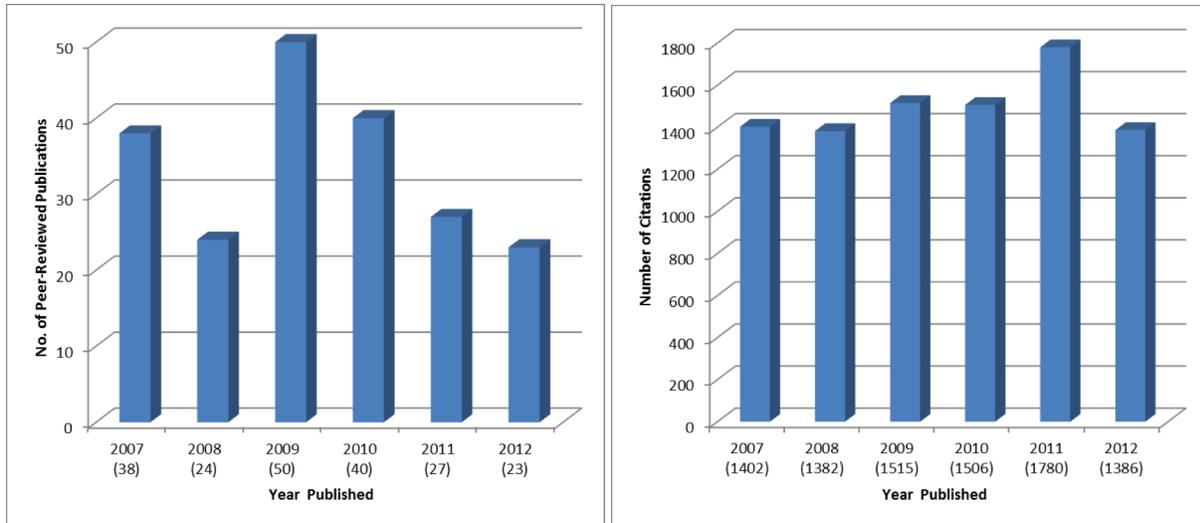
Funding Cycle	2007-2009 Omnibus	2009-2012 Omnibus	2012-2014 Omnibus	Total
Preliminary Proposals	68	42	70	180
Full proposals	25	29	42	96
Funded	18	14	16	48
Institutions Represented/Institutions Available*	1/1	2/1*	2/1*	N/A

*UH Mānoa is the only institution classified as a Carnegie Doctoral institution in the State of Hawai'i and U.S.-affiliated Pacific Islands. That notwithstanding, UH Sea Grant solicits and accepts proposals for review from any university or college affiliated academic from universities and colleges, state, local, and Indian tribal governments, organizations and individuals in Hawai'i, and U.S. Pacific territories. Non-UH Mānoa proposal submissions are uncommon but have included those from UH Hilo (the only other university level institution in the UH System) and the private Hawai'i Pacific University. In part due to the teaching mission of these latter two institutions, coupled with a lack of research infrastructure and administrative support for faculty research, these proposals are often at a competitive disadvantage. Nonetheless, in the 2009-2012 and 2012-2014 biennia, a research proposal from UH Hilo was competitively awarded a research grant.

8. Peer-reviewed Publications

A total of 202 peer-reviewed publications were generated by UH Sea Grant research from 2007 to 2012 (Figure 1). Figure 2 shows the number of citations by year from 2007-2012 for all UH Sea Grant peer-reviewed publications produced since the program's inception, which totaled 8,971.

The accomplishments of Sea Grant researchers (publications, grants awarded by UH Sea Grant) are included here and also in the self-study reports of the departments or institutes within SOEST where they have joint appointments.



(left) The number of peer-reviewed publications by year produced by UH Sea Grant research from 2007-2012. The number of publications is indicated in parentheses below each year.

(right) The number of citations by year from 2007-2012 for all peer-reviewed publications produced by UH Sea Grant research since the program's inception. The number of citations is indicated in parentheses below each year.

9. UH Sea Grant Graduate Student Trainee Program

The goal of the UH Sea Grant Graduate Student Trainee Program is to develop well-rounded scientists who are versed not only in research but outreach as well. Full-time graduate students who are working toward advanced degrees related to the marine or coastal sciences are provided funding to work on UH Sea Grant-funded research projects. These graduate trainees were expected to make good progress toward their degrees, remain in good academic standing, and participate in research that provides them with thesis and dissertation material. They also author an article in UH Sea Grant's quarterly magazine and conduct 40 hours of education and outreach activities annually to disseminate their work to a variety of stakeholders that include the public, scientists, resource agencies, and non-profits. The UH Sea Grant Student Trainees (graduate assistants) report directly to the UH Sea Grant director.

The total number of graduate student supported by UH Sea Grant from 2007-2012 was 145 (62 Master's students and 83 PhD students). These students, who were recruited by university scientists who received Sea Grant research funding, were from UH Mānoa departments such as Zoology, Oceanography, Geology and Geophysics, College of Education, Urban and Regional Planning, Economics, Hawaiian Studies, and Ocean Resources Engineering, as well as Tropical Conservation Biology and Environmental Science at the University of Hawai'i at Hilo and Marine

Science at Hawai'i Pacific University. See Appendix 14.5 for a complete listing of graduate students supported by UH Sea Grant from 2007-2012.

10. Fellowships Awarded

In 1979, the National Sea Grant College Program established a Dean John A. Knauss Marine Policy Fellowship. The highly competitive fellowship provides a unique educational experience to graduate students who have an interest in ocean, coastal and Great Lakes resources and in the national policy decisions affecting those resources. The program matches highly qualified graduate students with "hosts" in the legislative and executive branch of government located in the Washington, D.C. area, for a one year paid fellowship. Interested students submit applications through their state Sea Grant programs. Approximately 45-50 Knauss fellowships were awarded each year. The fellowship program is named in honor of one of Sea Grant's founders, former NOAA Administrator, John A. Knauss.

Competition	2007	2008	2009	2010	2011	2012	Total
Knauss Fellowship Applications	4	2	2	2	5	4	19
Knauss Fellowships Awarded	0	1	2	1	1	1	6

11. Sustainability Faculty Hiring Initiatives

In February 2011, former UH Mānoa Chancellor Virginia Hinshaw announced a university-wide strategic hiring initiative to increase the pool of scholars/faculty in the teaching and research community to join

UH Mānoa in fields directly related to the identified campus priority of sustainability.

In June 2011, the Chancellor awarded the hiring initiative to a UH Sea Grant-led proposal entitled "Integrating Marine Science, Economics, Engineering, Design and Policy for Sustainable Coastal Communities." The lead unit was UH Sea Grant, in collaboration with SOEST, the College of Engineering, the College of Social Sciences and the School of Architecture. According to Chancellor Hinshaw, "The proposal was a well-defined, tightly integrated cluster on a topic of great importance for the state with the potential for significant education, research, and community impact." Five tenure-track faculty positions were proposed, one in each of the following areas: coastal civil engineering, coastal policy and community development, environmental economics, microbial oceanography/biogeochemistry and sustainable building/community design – all with partial (0.25 FTE) appointments in UH Sea Grant for the purpose of conducting outreach. During the faculty recruitment process, the Chancellor added a second position for microbial oceanography/biogeochemistry.

Faculty Recruits:

- Dr. Michael Roberts became a member of the Department of Economics in June 2012. He was a tenured Associate Professor at North Carolina State University. His previous research interests focused on the analysis of climate change on agricultural production. He is also expert in the quantitative analysis of complex economic systems, and we hope that he will look at the intersection of alternative energy opportunities (including the engineering aspects) and the economics of changes at the coast.
- Dr. Daniele Spirandelli joined the Department of Urban and Regional Planning in early August 2012. Daniele has just finished her PhD at the University of Washington and has a particular interest in assessing the human impacts of changes along the coast.
- Dr. Oceana Francis joined the Department of Civil and Environmental Engineering Department in August 2012. Oceana's previous appointment was as a post-doc at the International Arctic Research Center, University of Alaska, Fairbanks. She has a civil engineer's license, and has skills that range from oceanography to structural engineering. She has spent a lot of time in Alaska working with Alaska Natives to help them sustain local communities.
- Dr. Rosie Alegado will join the Center for Microbial Oceanography: Research and Education (C-MORE) in the Department of Oceanography in August 2013. She is currently a post-doc at UC Berkeley, and specializes in microbial oceanography. There is a lot of overlap between her work in the near-shore environment with work to be done on land (fish ponds, waste water treatment, watershed protection, etc.).
- Dr. Craig Nelson will join the Department of Oceanography in August of 2013. He is currently an assistant specialist at the Marine Science Institute of the University of California at Santa Barbara. His research focuses on the structure and function of natural bacterial communities in aquatic habitats that include coral reefs, lakes, streams and the open ocean. Like Dr. Alegado, his work has relevance for assessing the impacts of coastal development on nearshore ecosystem health.

One faculty position that remains open at this time is with the School of Architecture. Plans are underway to initiate a second recruitment process this fall 2012 semester.

Dr. Mehana Vaughn will join Department of Natural Resources and Environmental Management/UH Sea Grant in August 2013. She recently defended her PhD dissertation in the Emmett Interdisciplinary Program in Environment and Resources at Stanford University. Her work focuses on community level natural resource management in Hawai'i with a particular emphasis on Hawaiian communities and state government to care for coastal resources at the watershed management level. This faculty position was created through a strategic hire for tenure track faculty in Native Hawaiian Natural Resource and Land Management, Economics, Law, Language, and Studies and is a collaboration between the Hawai'i inuiākea School of Hawaiian Knowledge, College of Tropical Agriculture and Human Resources (Department of Natural Resources and Environmental Management), and SOEST (UH Sea Grant). This new position was designed to transcend traditional academic boundaries and to focus on cross-

disciplinary solutions to natural and cultural resource management, sustainability, and food security issues facing Native Hawaiians, Pacific Islanders, and other Indigenous communities using traditional Hawaiian knowledge and practices. Dr. Vaughn will have her primary appointment in the Natural Resources and Environmental Management Department (75%) and a secondary appointment in UH Sea Grant (25%).

In summary, these new tenure-track faculty hires will add valuable staffing capacity and expertise to UH Sea Grant in support of its mission to promote the understanding and wise use of marine and coastal resources in Hawai'i.

14.2.2 B. Extramural Funding

UH Sea Grant is a *highly leveraged program*. NOAA through its NSGO provides UH Sea Grant with \$1.9 million annually to implement its program. UH Sea Grant has been highly successful in securing extramural funding to supplement the NOAA core funding for program implementation. From 2007-2012, UH Sea Grant obtained over \$25 million in extramural funds (Table 1). The breakdown of this total funding amount by different funding organizations is shown in Figure 3. A majority of this funding was provided by NOAA.

Table 1. UH Sea Grant Extramural Funding by Organization from 2007-2012.

Source	2007 (\$)	2008 (\$)	2009 (\$)	2010 (\$)	2011 (\$)	2012 (\$)	Total (\$)
Federal-Commerce NOAA	2,147,035	2,149,924	2,162,000	2,611,045	3,875,782	4,914,645	17,860,431
Federal-Other	167,494	530,354	-	140,695	297,156	167,120	1,302,819
State	256,265	202,383	204,753	41,035	161,870	74,890	941,196
County	489,184	696,876	696,058	663,222	633,648	668,476	3,847,464
Private	136,562	282,016	160,007	175,556	266,822	236,044	1,257,007
Total Extramural Awards	3,196,540	3,861,553	3,222,818	3,631,553	5,235,278	6,061,175	25,208,917

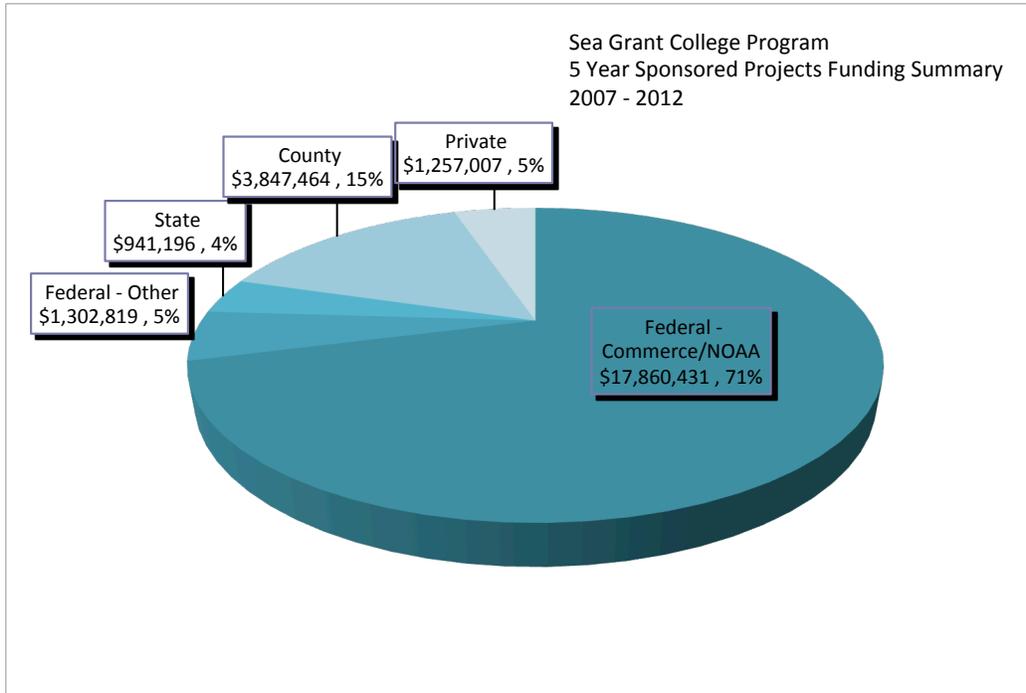


Figure 3. Five-year total of UH Sea Grant Extramural Funding from Different Organizations.

14.2.3 C. Stakeholder Engagement

In parallel with the integration of program elements into a cohesive whole, UH Sea Grant commenced the process of aligning its program priorities with the needs of Hawai'i stakeholders. This is a step that must precede the engagement of stakeholders inasmuch as priorities are determined by those that set them. The foundational question is "Who should be in the room?"



Hawai'i's economy and environment are dominated by its tourism, by development and construction, and by the fact that it is nearly 2,500 miles from anywhere else, making it the most isolated place on earth. Hawai'i's population far exceeds the carrying capacity of what its resource base and ecosystems can provide. For example, though blessed with abundant wind, solar and wave energy, it is more dependent on imported oil than any other state in the nation. Though surrounded by water, most of Hawai'i's seafood is imported because of

the low productivity of "blue water." Though it has an ideal climate for aquaculture, its landmass is limited, and labor cost and the regulatory burden are high. Though construction is a major industry, the great majority of building supplies are shipped in from elsewhere.

Perhaps nowhere is the connection between activity on land and coastal ecosystem health more apparent than in Hawai'i. No place is farther than 29 miles from the coast and so isolated is the Hawaiian archipelago from any landmass that there is no one to blame but ourselves for coastal pollution. Still, Hawai'i, like other coastal and insular locales, is especially vulnerable to the consequences of global climate change and its attendant rise in sea level, increases in ocean temperature and acidification, and possible increases in the frequency and severity of storms.

These were factors that drove the processes of prioritization and stakeholder engagement. Another factor was the robust presence of NOAA and the University of Hawai'i's ocean and coastal research enterprise. The question was how to dovetail and synergize with these capabilities rather than duplicate them with dissipated effect. This led inevitably to the need to exercise care in selecting projects and priorities, and in all cases, to partner. Fortunately, there was a convergence among the priorities identified by our discovery process and the transition that was occurring throughout the Sea Grant Network as a whole. In both cases, there has been an engagement of new sets of stakeholders, and a shift in focus and priority.

Another major element of UH Sea Grant's strategic planning, prioritization and stakeholder engagement came from its continued participation in the development and implementation of the Hawai'i Ocean Resources Management Plan (ORMP) that was led by the local Hawai'i Coastal Zone Management Office. The ORMP process engaged virtually every constituency and stakeholder group in the state. It provided a separate and independent mechanism that led in all significant ways to a set of priorities that are strongly similar to those found in the National Sea Grant College Program Strategic Plan. It also provided an efficient, cost-shared means for integrating Sea Grant with other state agencies and NOAA assets in addressing the challenges, risks and opportunities facing coastal Hawai'i stakeholders.

In thirty years, the NOAA budget for UH Sea Grant has risen only by about \$200,000. A benefit of constrained budgets is that it drives the need for efficiency through partnering. Prior to 2000, UH Sea Grant acted largely in isolation from other units at the University of Hawai'i, including SOEST. This stemmed to an important degree from the "stove-piped" culture of the university itself. The assets were there, but they were without concerted application. This provided the opportunity to engage the university community through "in-reach" as both stakeholders and as a base of resources that might be applied to the UH Sea Grant enterprise. From this, the "Centers of Excellence" model and structure developed to produce a multidisciplinary capacity that integrates physical, natural and social sciences with design and law. The Centers integrate the human resources of UH Sea Grant with those of other units and organizations, both within the University of Hawai'i System, within government at the state and county levels, and with the private sector. Our aim is to support the development of good policy that, in turn, leads to the implementation of improved and enlightened practice that, in turn, realizes and justifies the policy. The Centers, which are served and administered by UH Sea Grant, have produced a

synergy and the means for all of the partnering units to serve coastal Hawai'i stakeholders in a manner that is far more effective than previously. By design, the Centers engage stakeholders in the identification of challenges, risks and opportunities, in the setting of priorities, and in the enterprise that addresses them.

In addition to its Centers, UH Sea Grant engages with its stakeholders in many other ways. Stakeholders serve on the SGAC as well as in advisory capacities in its extension program. SGAC members participate in the UH Sea Grant's strategic planning process, provide input on the relevance of preliminary proposals during the RFP process, and provide direction to the UH Sea Grant director on priority needs and issues to address in the state. UH Sea Grant extension faculty engage stakeholders through daily



implementation of extension activities; by serving on various university and government committees, community groups and non-profit boards; and by working on collaborative projects that are either initiated by themselves or by their stakeholders. Stakeholder input derived from these various mechanisms of engagement is used in prioritizing our research, outreach and education efforts as well as in crafting our RFPs.

One means of stakeholder engagement that we have found to be especially effective and successful is the cost-sharing of UH Sea Grant extension faculty positions with stakeholders where possible. For example, two faculty are based with the State of Hawai'i Department of Land and Natural Resources and provide technical assistance to state agencies on shoreline assessments, coastal hazard mitigation, policy development, and climate change adaptation. We also have two faculty who are seconded to county planning departments on Kaua'i and Maui and provide similar services to their respective county departments.

14.2.4 D. Selected Collaborative Network and NOAA Activities

The following is a listing of selected collaborative activities/projects with other Sea Grant or NOAA Programs.

NOAA Coastal Storms Program

The NOAA Sea Grant Pacific Islands Region Coastal Storms Program serves Hawai'i and the U.S.-affiliated Pacific Island territories. It assists communities enhance community resilience to storm-related hazards and climate change impacts (i.e., sea-level rise) by providing assessment tools, up-to-date information, and outreach and coordination support. UH Sea Grant is partnering with the NOAA Coastal Storms Program, and other NOAA and partner efforts.

National Sea Grant Climate Change Network

There is a need for education on the immediate and long-term impacts of climate change (and other coastal hazards) on human safety and property along the nation's coasts, as well as on how to prepare for and survive these events. UH Sea Grant worked with other Sea Grant programs to establish the National Sea Grant Climate Change Network. The aim is to build links among the Sea Grant Climate Change Network and federal, state, and local agencies to address climate change issues. The network conducted a successful workshop entitled "Climate Adaptation in Coastal Communities: A Network Approach to Outreach," in Charleston, SC in November 2009. The network also established a website (<http://sgccnetwork.ning.com/>) to make resources and information related to climate change widely available.

National Focus on Sustainable Coastal Tourism

Tourism is a major economic driver in coastal states. It also presents significant natural, cultural, and social challenges to many coastal communities. Maintaining a healthy, sustainable coastal tourism industry requires that increased attention be given to the energy, water, and waste demands and impacts that tourism places on coastal ecosystems. Our Center for Sustainable Coastal Tourism is working with Delaware and Maine Sea Grant to develop a national research and extension network to address tourism-related issues. A workshop was held in October at Sea Grant Week 2010. A national Coastal Tourism Roundtable was conducted in October 2011 to include representation from all of the Sea Grant programs. One important outcome of the meeting was the development of a policy white paper entitled, *Sustainable Coastal Tourism: Renewing Sea Grant's Role*.

Regional Sea Grant Extension Network Support for the Republic of the Marshall Islands

Many Pacific Islands are especially vulnerable to natural hazards and the effects of climate change, especially the Republic of the Marshall Islands (RMI), which consists of 33 low-lying atolls and islands. RMI is also confronted with the effects of rapid urban and industrial development, a common scenario in the insular Pacific. A UH Sea Grant extension faculty position was hired in 2009 and located at the College of the Marshall Islands (CMI) to work in tandem with a local multi-institutional advisory board and the private sector. Agent activities include research on coastal processes, public outreach, teaching, and liaising with other technical specialists and relevant regional initiatives. The agent also assists CMI in developing and teaching a coastal management curriculum to build future local capacity. The position is currently vacant; UH Sea Grant has initiated a recruitment to fill the agent position for another two years.

Regional Extension Network Support for American Samoa

American Samoa is a U.S. Territory in the South Pacific. American Samoa is highly vulnerable to tsunamis and other coastal hazards and is challenged with climate change impacts and waste management issues. Its commercial tuna cannery provides access to fishmeal for aquaculture feed and sustainable aquaculture development. Since 2002, UH Sea Grant has

located an extension agent at the American Samoa Community College (ASCC) to serve as an extension and education resource. A member of the ASCC Land Grant Program and Science Department faculty, the agent develops local capacity in marine resource management, including aquaculture development, and represents ASCC on several advisory groups. He provides public education aimed at increasing awareness of local ecosystem health and global environmental changes, teaches courses at ASCC, and serves as the American Samoa representative for the NOAA Pacific Islands Ocean Observing System (PacIOOS) project. The agent also mentors student research projects, internships and service learning programs, and manages accredited, vocational certificate programs in aquaculture and marine science (Marine Option Program).

Pacific Islands Ocean Observing System

PacIOOS is one of 11 regional observing programs that support the emergence of the U.S. Integrated Ocean Observing System. PacIOOS is guided through a collaborative governance framework, and is administered by SOEST with funding support from NOAA, SOEST, and the state of Hawai'i. PacIOOS develops observational, modeling, data management, and outreach for an end-to-end ocean observing system designed to ensure a safe, clean, and productive ocean and a resilient coastal zone for the U.S. Pacific Islands. UH Sea Grant extension faculty serve as PacIOOS liaisons for the RMI and American Samoa.

14.2.5 E. Partnerships

Establishing effective collaborations has been a key to UH Sea Grant's success. These partnerships are especially beneficial when a problem is too large, complex, or diverse to be addressed by UH Sea Grant alone. Partners may also provide additional expertise to address problems as well as provide access to additional sources of funding. Examples of major partners can be found in Appendix 14.6.

14.2.6 F. Program Changes Resulting from the Previous National Sea Grant Office

Program Assessment Team Review

The 1998 NSGO Program Assessment Team (PAT) report initiated a major change in the leadership, direction and operation of the program. Issues were aggressively addressed by the university and Sea Grant administrations to the unequivocal satisfaction of the 2003 PAT. Following on the 1998 PAT, a university-appointed committee developed recommendations that initiated a restructuring for program unity and management effectiveness. Central to this was the integration in 2000 of the previously separate extension program with the rest of UH Sea Grant. Following a period of assessment and evaluation, UH Sea Grant also reorganized its communications unit. The director, associate director, and extension and communications leaders have worked collaboratively in planning and administering of all program aspects. Weekly meetings of the program's administration are held continuously with the regular participation of the NSGO program officer. Consensus on goals, methods and approaches is

achieved the sharing of knowledge and ideas. This has produced a collaborative, integrative approach that leads to coordinated and synergistic action.

The SGAC was substantially modified to more comprehensively reflect UH Sea Grant stakeholders. This group's participation in strategic planning and evaluation of the research preliminary proposals has significantly increased the relevance of the program's research portfolio to stakeholder needs. UH Sea Grant also implemented a program of focus groups which brought together extension and UH research/instructional faculty with members of stakeholder communities for planning, and for strengthening ties between research and extension. This process increased the relevance of the research portfolio and aided in the formulation of the UH Sea Grant strategic plan. These focus groups provided the means to attract scholars to address issues of importance to Hawai'i's coasts and coastal ocean and facilitated the organization of UH Sea Grant activities under common areas of interest. They also identified opportunities for UH Sea Grant to realize its mission and the means to exploit those opportunities. Importantly, they provided a vehicle for building connections and collaboration among UH Sea Grant extension and communications personnel and the University of Hawai'i's research and instructional faculty leading to enhanced services delivery. Focus groups also engaged leaders and managers in government, education and industry that led to support for UH Sea Grant programs and activities, and initiatives because they participated in their formulation and provided opportunities for cooperative ventures with other agencies and a method for providing information to policymakers. This focus group engagement evolved into the interdisciplinary Centers of Excellence.

Upon becoming director in 2000, Gordon Grau led an overhaul of the proposal review process to achieve a more competitive, peer-refereed, transparent, and therefore more credible proposal selection process based on the NSF model. The UH Sea Grant Graduate Trainee Program was undertaken to integrate Sea Grant-supported research and graduate students into extension and communications activities.

UH Sea Grant now has one unified strategic plan that follows the national strategic plan and integrates all program elements including research and extension. The 2009-2013 UH Sea Grant strategic plan was developed through participation, along with other NOAA assets, in the Hawai'i Coastal Zone Management Program's planning process together with formal and informal community interactions, focus group discussions, and review by the SGAC. These actions were followed by multiple strategic planning meetings of the Centers of Excellence. These processes identified coastal community sustainability as the driving theme for all program activities--research, education, and outreach.

To document UH Sea Grant accomplishments, we built interactive databases that: 1) track postdoctoral associates, graduate and undergraduate students; 2) track and categorize diverse publications; 3) track and categorize outreach activities and accomplishments; and 4) track and document fiscal matters and omnibus administration. We now track the professional accomplishments of UH Sea Grant alumni: former students and postdoctoral associates. We also conducted research to improve the accuracy and completeness of our publication database

to document scholarly accomplishment more thoroughly and to assess investigator and project productivity.

The 2003 PAT provided a very favorable evaluation of UH Sea Grant, with many elements receiving the rank of “Exceeds Benchmark” or “Highest Performance,” with relatively few recommendations provided. Among these, the PAT recommended that UH Sea Grant continues to advocate for a uniform policy throughout the University of Hawai‘i for extension personnel including the professional opportunity for tenure. Subsequently, a new faculty contract obviated this inequity by allowing certain positions to be converted to tenure-track.