



University of Hawai‘i Sea Grant College Program



Strategic Plan 2018-2021

The University of Hawai'i Sea Grant College Program (Hawai'i Sea Grant) conducts an innovative program of research, outreach, and education services toward the improved understanding and stewardship of coastal and marine resources of the state, region, and nation. Through these activities we serve those who live, work, and recreate in coastal communities in Hawai'i and the Pacific Region.

Hawai'i Sea Grant is one of 33 Sea Grant College Programs nationwide that comprise a network within our nation's coastal and Great Lakes universities and colleges, promoting unbiased, evidenced-based understanding, conservation, and sustainable use of marine and coastal resources.

As an organized research unit of the University of Hawai'i's prestigious School of Ocean and Earth Science and Technology, and with core funding provided by the National Oceanic and Atmospheric Administration, Hawai'i Sea Grant engages and connects academia, federal, state and local government, industry, and the local community with excellence in research, outreach, and education.



Contents

Preface	1
Introduction	1
1.0 National Planning Context	2
2.0 Hawai'i Planning Context	3
3.0 Our Vision and Mission for 2021	6
4.0 Focus Areas	8
4.1 Healthy Coastal Ecosystems	9
4.2 Sustainable Fisheries and Aquaculture	10
4.3 Resilient Communities and Economies	12
4.4 Environmental Literacy and Workforce Development	14
5.0 Cross-Cutting Themes	16
5.1 Sound Scientific Information	16
5.2 Open and Informed Decision-making	17
5.3 Climate Change Adaptation	17
5.4 Cross-Cutting Metrics	18
6.0 Implementation	19
6.1 The Center of Excellence Model	19
6.2 The Sustainability Strategic Hires	33
6.3 Research Proposal Process	34
6.4 Program Development	36
Endnotes	36

PREFACE

Hawai'i Sea Grant, in collaboration with our constituents, stakeholders, and other community members and partners, initiated work to update our strategic plan in 2016. This document is the fruit of those efforts and establishes a guide for the University of Hawai'i Sea Grant College Program (Hawai'i Sea Grant) for 2018-2021, while providing a reference for the community we serve, the people of Hawai'i. This "living" document will necessarily evolve as Hawai'i's future unfolds.

INTRODUCTION

America's invaluable coastal economic, cultural, and environmental assets are at risk. Climate-related environmental changes have made coastal communities vulnerable in ways never before imagined. Changing coastal uses and habitat degradation can no longer be ignored. Fisheries, once a major component of America's coastal communities, now comprise only minor sectors of our nation's coastal economies. Heightened concerns about human health and safety are focusing greater attention on port security, coastal infrastructure deterioration, and seafood safety. As hundreds of thousands more Americans move to the coast every year, it is increasingly important we find adequate ways to ensure the built environment, and the economies it supports, operate within the capacity of coastal and island ecosystems. America must use its coastal land, water, energy, and other resources in ways that preserve the health and productivity of coastal ecosystems while optimizing benefits to U.S. citizens now and in the future.



According to the U.S. Commission on Ocean Policy report (2004)¹, the U.S. coastal zone contributed \$4.5 trillion to the U.S. economy. Port and harbor industries, tourism, and the petroleum industry are now the largest components of coastal economies in most of America. Additionally, greater than one-half of the U.S. population now resides within 50 miles of the shoreline with a concomitant concentration of economic activity.² The challenges we face on our coasts clearly have significant implications for the nation as a whole, not just for those living and working in coastal communities. As individuals and as a nation, we must take immediate steps to educate ourselves about the magnitude of the threats we face and respond to these in bold and creative ways. Leaders at all levels—national, state, and local—must work with citizens, private sector businesses, and other organizations to utilize our collective intelligence, ingenuity, and financial resources to redefine a time of potential crisis as a time of opportunity.

Severe challenges present the greatest opportunities for change and innovation, and Sea Grant is equipped and prepared to respond. A demonstrated strength of the Sea Grant College Programs is the ability to rapidly mobilize and apply the capacity of our universities and other strategic partners to address emerging challenges across the country and around the world, as well as at home. Likewise, a strength of this Sea Grant network is the ability, through coordinated state and regional infrastructures, to implement the mission of our parent organization, the National Oceanic and Atmospheric Administration (NOAA) at multiple levels. At this time of risk and opportunity, Hawai'i Sea Grant will address its goals with innovation and creativity, reflecting the particular needs of our stakeholders in Hawai'i's coastal communities.

1.0 NATIONAL PLANNING CONTEXT

The goals and strategies outlined here, while developed for use in Hawai'i and the central Pacific, support NOAA's national priorities. Hawai'i Sea Grant's attention to sustainable practices in coastal development and tourism, increasing community resiliency to natural hazards and climate change, and accessibility and application of research to inform decision-making directly serve the needs of NOAA's constituents and stakeholders. Additionally, as an organization we strive to engage in work that expands our understanding of the nexus of coastal ecosystems and the economy, the built environment, and the cultural heritage and traditional knowledge of the host culture of the Hawaiian Islands. The urgent need for practical solutions requires coordination, cooperation, partnerships, and effective investment. The Sea Grant College Programs provide NOAA direct and immediate access to university-based capabilities and resources to achieve our mutual goals. (Figure 1).

Hawai'i Sea Grant, individually and collectively via the network of university-based programs constituting the National Sea Grant College Program, continues to aggressively integrate our efforts with those of NOAA. Collaborative planning efforts among the Sea Grant College Programs and NOAA ensure that NOAA's coastal programs are focused on local and regional as well as national priorities and that efforts are coordinated, outcome-oriented, and built around our respective programs' strengths.



Figure 1. Locations (blue dots) of the 33 Sea Grant College Programs that form the National Sea Grant College Program network.

National Planning Process and Strategic Approach

The NOAA National Sea Grant Office develops a National Sea Grant Network Strategic Plan (the Network Plan) every four years. The Network Plan for 2018-2021 establishes direction for the Sea Grant College Programs to address critical national needs in coastal, ocean, and Great Lakes environments. The plan capitalizes on Sea Grant's unique abilities and strengths, allows for flexibility and creativity on the part of the Sea Grant College Programs, and supports priorities in NOAA's strategic plan. The Network Plan provides guidance for the work of the Sea Grant College Programs, including the Hawai'i Sea Grant 2018-2021 Strategic Plan. Hawai'i Sea Grant remains committed to contributing to the realization of national goals while focusing on the specific needs, challenges, and opportunities of Hawai'i's stakeholders, their coastal ecosystems, and associated resources.

2.0 HAWAII PLANNING CONTEXT

Composed of seven inhabited islands and 129 smaller islands, Hawai'i possesses one of the longest marine coastlines in the U.S. at approximately 750 miles. In addition, no location in Hawai'i is further than 30 miles from the ocean making all of Hawai'i coastal. The state's mid-ocean location, 2,556 miles from the continental U.S. and over 3,000 miles from any other major population center, offers challenges in communications, access, and commerce. Hawai'i's environmental challenges and economic uncertainties threaten stability today and for generations to come. However, Hawai'i is also unique in the assets and capacity it possesses to address environmental and coastal challenges. Aggressive goals and targets have been set by state leadership to move Hawai'i's communities toward sustainability. In 2015, the state of Hawai'i enacted a law that mandates 100 percent of the state's electricity be derived from renewable sources by 2045. Additionally, commitments have been made to

effectively manage 30 percent of Hawai'i's nearshore environment by 2030. Achievements in Hawai'i can serve as a model for coastal communities worldwide.

Of Hawai'i's population of nearly 1.36 million, 998,000 people or 70 percent live within the City and County of Honolulu on O'ahu³. In contrast, approximately 196,000 people reside in the County of Hawai'i on Hawai'i Island. Together, the islands of Maui, Moloka'i, and Lana'i in the County of Maui are home to approximately 164,000 people, with just 71,000 residing on Kaua'i. Hawai'i's coastal communities range from ultra-urban to decidedly rural. The state's economy is based principally on tourism, military spending, and development. Hawai'i's visitor population has averaged about 213,394 persons per day with half of these visitors on O'ahu at any one time.

The challenges to our state are significant and compounded by its geographic isolation. In an island economy driven by tourism, *the environment is the economy*. Great care is required to minimize diminishment of environmental resources while simultaneously encouraging a robust economy. Clearly, this is an immense, vital task requiring commitment from end-users as well as partnerships across academia, industry, government, and local communities. The increasing cost and environmental impacts of importing fossil fuels, together with local limitations in water both as a basic human need and in its critical role in the nexus of energy, water, and food, argue for a long-term view toward a sustainable economy. Such an economy uses and protects Hawai'i's environmental assets, supports our communities socially, economically, and culturally, and leads to greater energy, water, and food self-sufficiency.

Hawai'i Sea Grant has served the people of Hawai'i for nearly 50 years through leadership in coastal resource stewardship and research. The U.S. Congress established a Sea Grant institutional program at the University of Hawai'i at Mānoa in 1968, and in 1972 designated it as a full-fledged Sea Grant College Program.

Hawai'i Sea Grant is an organized research unit within the University of Hawai'i at Mānoa School of Ocean and Earth Science and Technology, a premier marine sciences institution. The University of Hawai'i at Mānoa was ranked among the top 20 universities internationally for earth and environmental sciences according to the 2016 Nature Index. Hawai'i Sea Grant serves the ten-campus University of Hawai'i system, supporting projects and students



at the flagship Mānoa campus on O‘ahu, the University of Hawai‘i at Hilo, the University of Hawai‘i West O‘ahu, the University of Hawai‘i Maui College, and six additional community colleges statewide. Hawai‘i Sea Grant also has faculty and programmatic engagement in the Pacific Region in American Samoa at the American Samoa Community College; the Republic of the Marshall Islands at the College of the Marshall Islands; and, the Federated States of Micronesia in Pohnpei.

Hawai‘i Planning Process and Strategic Approach

The *Hawai‘i Sea Grant 2018-2021 Strategic Plan* is a living roadmap crafted from the collective needs, opportunities, and wisdom of our coastal constituents and stakeholders. Information included in this plan evolved through ongoing input from many sectors using a variety of engagement models to ensure broad representation. Hawai‘i Sea Grant research, extension, and education faculty, administration, and staff all actively participated with our constituents and stakeholders to identify the most pressing challenges as well as opportunities facing our island state. Formal and informal meetings were regularly held to seek input; written comments and guidance were also solicited on a continuing programmatic and ad hoc basis. Hawai‘i Sea Grant is also guided by the *University of Hawai‘i at Mānoa Strategic Plan* (2016)⁴ and the *University of Hawai‘i at Mānoa Institutional Proposal* (2009)⁵.

Facilitated strategic planning meetings and numerous topically focused small group and individual discussions were conducted specifically to address each of the focus areas in the *Hawai‘i Sea Grant 2018-2021 Strategic Plan*. This engagement and interdisciplinary approach is largely organized around our Centers of Excellence, which serve as the embodiment and operational expression of our plan’s focus areas. We received guidance through this engagement from a diversity of individuals including Hawai‘i Sea Grant Advisory Council members, university faculty, representatives from federal, state and county government, elected officials, Hawai‘i business leaders, representatives of private foundations, and community members at-large. In particular, we engaged our Advisory Council members on both a routine and ad hoc basis to continually understand the pulse of our community and seek information and guidance to achieve a continuously relevant and updated strategic plan.

In 2016, the NOAA National Sea Grant Office embarked on a strategic planning exercise for 2018-2021. These planning activities informed and facilitated Hawai‘i Sea Grant’s alignment with the *National Sea Grant College Program Network Plan*.

The *Hawai‘i Sea Grant 2018-2021 Strategic Plan* is also profoundly informed by the 2013 *Hawai‘i Ocean Resources Management Plan* (ORMP)⁶. The ORMP is a statewide plan mandated by Chapter 205A, Hawai‘i Revised Statutes. The scoping and participation conducted in updating the ORMP in 2012 involved extensive outreach and input gathering with participation of a multitude of stakeholder groups, government agencies, and the public over a period of 18 months. The ORMP is an integrated, place-based approach to ocean resources management founded on land and sea links, the role of human activities, and improved collaboration in governance.

3.0 OUR VISION AND MISSION FOR 2021

Vision

Thriving and resilient ecosystems and communities supported by an engaged and informed citizenry.

This is a vision of Hawai'i and the Pacific region in which we use our natural resources to capture the economic and recreational benefits they offer, while preserving their quality and abundance for future generations. This vision reinforces the vision articulated in the U.S. Department of Commerce Strategic Plan.

Mission

To provide integrated research, extension and education activities that increase understanding and wise stewardship of Hawai'i's coastal and marine resources.

Sea Grant advances NOAA's mission "to understand and predict changes in climate, weather, oceans, and coasts, to share that knowledge and information with others, and to conserve and manage coastal and marine ecosystems and resources."



Our Core Values

Excellence

- *Research is funded on a competitive basis and held to the highest scholarly standard, with scientific merit and student training as critical elements.*
- *Outreach and education activities are research- and stakeholder-driven and based on annually reviewed extension faculty workplans.*
- *Communication efforts utilize the best available technology to achieve broad visibility and citizen receipt of evidence-based information generated by researchers and extension faculty.*

Relevance

- *Research, outreach, and education activities are aligned with goals and strategic priorities identified in consultation with our program partners and stakeholders in Hawai'i, together with Network Plan priorities.*

Diversity

- *Diverse stakeholder and multiethnic perspectives are engaged to perpetuate and enhance multicultural understanding and heritage.*
- *University faculty, stakeholders, industries, community groups and citizens are involved in multi-, inter-, and trans-disciplinary research, outreach, and education activities.*
- *Graduate and undergraduate students from all backgrounds, including those from underrepresented groups, are actively and purposefully engaged in funded research, outreach, and education.*
- *Diversity and inclusion at all programmatic levels is enhanced by seeking and welcoming diverse perspectives to enhance cultural understanding*

Accountability

- *Internal and external processes are used to measure program accomplishments.*

Partnerships

- *Collaboration is sought and achieved to leverage activities and achieve synergistic, cost-effective outcomes.*

4.0 FOCUS AREAS

Hawai'i Sea Grant will concentrate effort in four areas:

1. **Healthy Coastal Ecosystems**
2. **Sustainable Fisheries and Aquaculture**
3. **Resilient Communities and Economies**
4. **Environmental Literacy and Workforce Development.**

Adapted from the Network Plan, these foci emerged from national and regional strategic planning processes as areas of critical importance to the health and vitality of Hawai'i's coastal communities and resources. They respond to issues of major importance to NOAA and are topical areas in which Hawai'i Sea Grant has made substantial contributions in the past. These foci also position Hawai'i Sea Grant to make significant future contributions and are driven by the following overarching principles/realities:

- Except for the direct extraction of resources, e.g. fish from the ocean, most of the issues that we face seaward of the shoreline result from the impacts of human behavior on land and associated policies.
- The economy and the environment are inseparably linked.
- Coastal uses and their economic importance have changed dramatically in the last 50 years and will continue to do so (e.g., the economic value of the nation's fisheries now pales to that of coastal tourism).
- Coastal America is facing the end of non-renewable resources including oil and phosphate deposits.
- Successful adaptation to climate change is essential to maintain the health of the environment, the economy and human safety and welfare.
- The workforce and informed citizenry that our research, outreach, and education activities build are among the most important long-term assets produced through Sea Grant investment.

For each focus area, we have identified goals and actions to take that will utilize our strengths in integrated research, outreach, and education and our established presence and reputation in coastal communities. Desired outcomes from our activities and related performance measures will indicate if we have achieved our goals in the shorter term. Cross-cutting performance measures and output metrics are also included to ensure we remain on track toward the long view. These elements are important guidelines but are not intended to constrain our response to emerging or unforeseen opportunities and challenges; we will continue to apply creativity and intellectual capacity to reprogram appropriately as the local context requires.

4.1 Healthy Coastal Ecosystems (HCE)

The Healthy Coastal Ecosystems focus area includes two goals and associated actions and desired outcomes.

Three performance measures are also identified for this focus area:

- Number of resource managers who are informed by and apply sustainable practices, for example ecosystem-based approaches among others, in the management of land, water, and living resources as a result of Sea Grant activities.
- Number of Sea Grant tools, technologies, and information services that are used by our partners/customers to improve ecosystem health and/or coastal and marine resource management to improve ecosystem-based management.
- Number of acres of coastal habitat protected, enhanced, or restored as a result of Sea Grant activities.

HEALTHY COASTAL ECOSYSTEMS

Goal: Habitat, ecosystems and the services they provide are protected, enhanced, and/or restored.	
Action	Desired Outcome
Develop and share scientific understanding, decision-support tools, technologies, and approaches to protect and restore ecosystems.	Scientific understanding and technological solutions inform and improve the management and conservation of natural resources.
	Ecosystem science and conservation priorities developed through stakeholder participation are addressed.
	Greater awareness and understanding of ecosystem functions and services they provide improves stewardship efforts.
Sustain the habitat, biodiversity, and abundance of coastal ecosystems, fish, wildlife, and plants.	Biodiversity, habitats and ecosystem functions and services are restored and sustained.
	Improved collaborative planning and decision-making leads to enhanced stewardship.

HEALTHY COASTAL ECOSYSTEMS

Goal: Land, water, and living resources are managed by applying sound science, tools, and services to sustain ecosystems.	
Action	Desired Outcome
Support a sound science- and management-driven framework that integrates observations, monitoring, research, and modeling to provide a scientific basis for informed decision-making.	Collaborations with partners and stakeholders support planning, research, and technological solutions to address resource management needs.
	Citizen science initiatives are engaged and contribute to improving our knowledge with respect to coastal communities, economies, and ecosystems.
	Communities have access to sound science, data, tools, and the training to be effective in planning and decision-making processes.
	Resource managers understand the risks, options, tradeoffs, and impacts of their decisions.
Identify and promote case studies and strategies that enhance resilient ecosystems and watersheds in the context of changing conditions.	Communities have access to information and understand projected changes within coastal ecosystems and how changes will impact coastal ecosystems.
	Communities can access case studies, training, and tools to improve their ability to plan, prepare, and adapt to future ecosystem conditions.

4.2 Sustainable Fisheries and Aquaculture

The Sustainable Fisheries and Aquaculture focus area includes two goals and associated actions and desired outcomes.

Two performance measures are also identified for this focus area:

- Number of fishermen, seafood processing, and aquaculture industry personnel who modify their practices using knowledge gained in fisheries sustainability and seafood safety as a result of Sea Grant activities.
- Number of Sea Grant tools, technologies, and information services that are used by our partners/customers to ensure a safe, secure, and sustainable supply of seafood products.

SUSTAINABLE FISHERIES AND AQUACULTURE

Goal: Fisheries, aquaculture, and other coastal and freshwater natural resources supply food, jobs, and economic and cultural benefits.	
Action	Desired Outcome
Develop a trained workforce and enhance technology transfer in domestic aquaculture.	Increased understanding and technological solutions aid aquaculture management and production.
	Partnerships enable the aquaculture industry to adapt and acquire innovative technologies.
Promote and support harvest and processing techniques that lead to safe, sustainable, and high-quality food, and economic and ecosystem benefits.	Coastal resource industries employ technologies and reinforce strategies to ensure safe and sustainable seafood and products.
	Consumers understand the health benefits of seafood and purchase safe and sustainable products.
	Coastal resource industries employ strategies that balance economic, community, and conservation goals.
Goal: Natural resources are sustained to support fishing communities and industries, including commercial, recreational, and subsistence fisheries, and aquaculture.	
Ensure sound science, services, and tools are available and accessible to resource managers, the fishing and aquaculture communities, and consumers.	Commercial and recreational fishermen and aquaculturists are knowledgeable about efficient, sustainable, and responsible tools, techniques, and uses of coastal and freshwater resources.
	Resource managers and fishing and aquaculture communities have access to science and tools to increase their capability to adapt to future resource management needs.



4.3 Resilient Communities and Economies

The Resilient Communities and Economies focus area includes two goals and associated actions and desired outcomes.

Three performance measures are also identified for this focus area:

- Number of communities that implemented sustainable economic and environmental development practices and policies as a result of Sea Grant activities.
- Number of communities that implemented hazard resiliency practices to prepare for, respond to, or minimize coastal hazardous events as a result of Sea Grant activities.
- Number of Sea Grant tools, technologies, and information services that are used by our partners/customers to support the development of resilient coastal communities and economies.

RESILIENT COMMUNITIES AND ECONOMIES

Goal: Coastal communities use their knowledge of changing conditions and risks to become resilient to extreme events, economic disruptions, and other threats to community well-being.	
Action	Desired Outcome
Use innovative tools to increase the public's awareness of changing conditions and the potential impacts their communities, economies and ecosystems may encounter.	Members of the community, including the underserved, are aware of and understand changing conditions and hazards and the implications to their communities, and are prepared to respond, and adapt.
	Existing and innovative training programs improve community leaders' understanding of changing conditions in their communities and implement adaptive strategies.
Utilize comprehensive planning and adaptive management strategies to enhance community resilience and adapt to hazards and changing environmental and socioeconomic conditions.	Communities have access to information needed to understand the factors impacting ecosystems and participate in adaptive management planning.
	Communities employ adaptive management strategies and apply tools to engage diverse members of the community to improve resilience and community sustainability.
Increase the resilience of coastal communities through diversification, growth, and strengthening of coastal economic sectors.	Members of the community, including the underserved, have access to information needed to understand how coastal economic activities and trends will impact environmental and community well-being.
	Communities have access to tools, services, and technologies to adapt and grow resilient economies.
	Leaders in coastal economic sectors understand how they can become more resilient through diversification and through conservation of ecosystem resources and the services they provide.

RESILIENT COMMUNITIES AND ECONOMIES

Goal: Water resources are sustained and protected to meet existing and emerging needs of the communities, economies, and ecosystems that depend on them.	
Action	Desired Outcome
Inform community members about how actions impact water quality and availability.	Community members understand watershed functions and the services they provide that support communities and economies.
	Community members understand how actions will impact water quality and quantity and are able to make informed decisions.
Collaborate with stakeholders to develop and share best management practices (BMPs) and measures to protect and manage water resources.	Communities have access to sound science, data, tools, and services to understand and anticipate changes in water quality and quantity.
	Communities have diverse, sustainable economies and industries that support the existing and emerging water resource needs.
	Communities have access to science, tools, and technologies to protect and sustain water resources and make informed decisions.



4.4 Environmental Literacy and Workforce Development

The Environmental Literacy and Workforce Development focus area includes two goals and associated actions and desired outcomes.

Four performance measures are also identified for this focus area:

- Number of Sea Grant products that are used to advance environmental literacy and workforce development.
- Number of people engaged in Sea Grant-supported informal education programs.
- Number of Sea Grant-supported graduates who become employed in a job related to their degree within two years of graduation.
- Number of Sea Grant tools, technologies, and information services that are used by our partners/customers to promote environmental literacy and workforce development.

ENVIRONMENTAL LITERACY AND WORKFORCE DEVELOPMENT

Goal: An environmentally literate public, informed by lifelong formal and informal learning opportunities, that reflects the range of diversity of the Nation's coastal communities.	
Action	Desired Outcome
Enable the public to engage in community planning processes with respect to adaptive management to changing conditions by providing the best available information.	Communities are knowledgeable and equipped with the best available science and technology in order to contribute to adaptive management planning processes and stewardship.
Increase effective environmental literacy instruction for K-12 students by formal and informal educators.	Teachers and students are better informed in science, technology, engineering, and mathematics fields, and can employ their knowledge to support sustainable practices within their communities.
Increase effective environmental literacy communication to stakeholders, including how ecosystem change affects economic, social, and cultural values, as well as implications for conservation and management.	Stakeholders develop a sense of awareness, understanding and stewardship in order to sustain watershed, coastal, and marine ecosystems and resources.
	Communities implement sustainable strategies when managing natural resources and make decisions based on information acquired through informal science education.

ENVIRONMENTAL LITERACY AND WORKFORCE DEVELOPMENT

Goal: A diverse and skilled workforce is engaged and enabled to address critical local, regional, and national needs.	
Action	Desired Outcome
Grow awareness among the nation's diverse population of career paths that support the needs of the nation's coastal communities.	All members of a community are enabled to explore and pursue the variety of occupations that are essential to sustain the nation's coastal communities, economies, and ecosystems.
Increase opportunities for undergraduate and graduate students to gain knowledge and experience in the science and management of watershed, coastal, and marine resources.	College level courses and internships provide increased literacy, experience, and preparedness in areas of watershed, coastal, and marine ecosystems for all students including those from underrepresented groups.
	Undergraduate and graduate students, including those from underrepresented groups, are supported and have access to experiential learning, training, and research experiences.
Prepare a responsive and diverse workforce to advance and benefit sectors that support the needs of the nation's coastal communities and ecosystems (e.g. industry, research, government, etc.).	Employment in all sectors of the U.S. coastal resource enterprise expands and diversifies.
	The existing and future workforce is able to adapt and thrive in changing environmental, social, and economic conditions.



5.0 CROSS-CUTTING THEMES

Managing Hawai'i's natural resources to the benefit of both human needs and environmental health requires progress in three fundamental areas:

1. Better information about how Hawai'i's human-dominated coastal ecosystems function and how human activities affect coastal ecosystems.
2. Stakeholders who understand the complexities of coastal environments and economies and how these can interact to mutual benefit.
3. Management and other decision-making processes informed by evidence-based information that engage and involve a broad citizenry, and which include mechanisms to evaluate and optimize human/environmental interactions.

To facilitate progress in these three areas we have embraced three cross-cutting themes and goals that compliment and support the focus areas described above. These cross-cutting themes, and associated goals and actions, are core to Sea Grant's work and reflect the value of Sea Grant's integrated approach to research, outreach, and education. Desired outcomes and performance measures are not independently identified for these crosscutting themes. Program level cross-cutting metrics are identified that provide additional opportunity for program evaluation (please see section 5.4).

5.1 Sound Scientific Information

Goal	Sound scientific information to advance understanding of the nature and value of our coastal, ocean, and marine resources; to identify new ways to conserve and use these resources; and to support evaluation of the environmental impacts and socio-economic trade-offs involved in coastal decision-making.
Action	Support research to generate the scientific, technical, and legal information needed to increase understanding of coastal, ocean, and marine processes; support the development of new businesses, products, tools, and technologies; and answer the most pressing questions related to coastal and ocean resource conservation, use, and management at the state and regional levels.
	Play a leadership role within and outside the Sea Grant network to increase the amount of socio-economic research available to help decision-makers evaluate socio-economic trade-offs and assess risks to the future health and productivity of coastal, ocean and Great Lake resources.
	Improve stewardship efforts by increasing awareness and understanding of ecosystem functions and services they provide. Biodiversity, habitats, and ecosystem functions and services are restored and sustained.

5.2 Open and Informed Decision-making

Goal	Decision-making processes that involve the full-range of coastal interests, that integrate efforts of public and private partners at the federal, regional, state and local levels, and provide mechanisms for establishing common understanding and generating outcomes that recognize multiple interests.
Action	Utilize Hawai'i Sea Grant's research, extension, and education capabilities to encourage and support the creation of public decision-making processes that minimize overlap, maximize effectiveness, and provide an integrated response to coastal problems and opportunities.
	Build consensus on complex issues such as coastal land use, energy development, public access, invasive species control, and climate change impacts by supporting cutting-edge research, building broader understanding among diverse constituency groups, and convening diverse groups of stakeholders to work together to find common solutions.
	Strengthen partnerships to promote national, regional, and issue-related collaboration among federal, and state programs and other partners in order to support more effective and integrated coastal decision-making.

5.3 Climate Change Adaptation

Goal	A robust program of research, extension and education that supports effective decision-making and public behavior change that prepares citizens to effectively respond to climate change and motivates local, county, and state government to incorporate climate change adaptation into management decisions and policies.
Action	Partner with state and federal agencies to support coastal mapping, sea level monitoring and modeling at spatial and temporal scales relevant for planning decisions, and which considers environmental, social, cultural, and economic attributes.
	Engage scientists and resource managers in prioritizing the additional research, extension, and education activities needed to address linkages among human actions, ecosystems, and climate-related changes.
	Develop outreach and education programs that improve knowledge about climate change across generations and cultures, and facilitate the transfer of knowledge from scientists to extension agents, resource managers, planners, decision-makers, and community stakeholders.
	Engage communities in the development of policies and actions to adapt to climate change using science-based information and outreach to support improved understanding and responsible allocation of resources.

5.4 Cross-Cutting Metrics

We also gauge our programmatic achievements through the following metrics:

1. Core funded proposals
2. Peer-reviewed publications produced with Hawai'i Sea Grant support
3. Sea Grant staffing
4. Postsecondary students and degrees financially-supported by Sea Grant in higher education programs (undergraduate, graduate)
5. P-12 students reached through Sea Grant-trained educators or directly through Sea Grant education programs
6. P-12 educators who participated in Sea Grant education programs
7. Volunteer hours
8. Sea Grant-sponsored/organized events
9. Attendees at Sea Grant-sponsored/organized events
10. Public or professional presentations
11. Attendees at public or professional presentations
12. Leveraged resources



6.0 IMPLEMENTATION

6.1 The Center of Excellence Model

A nationally recognized *Best Practice* highlighting collaboration.



Hawai'i Sea Grant continues to develop and refine a paradigm to implement strategic priorities and goals through its Center of Excellence model. Centers of Excellence (Centers) include researchers, extension faculty, state and local government representatives, industry, and community members as well as “non-traditional” Sea Grant partners such as the U.S. Geological Survey and the American Institute of Architects, among others. The Centers build connectivity among academics and other stakeholders who can benefit from their scholarship. Linking researchers and users also allows researchers to hear firsthand about community needs. The Centers also provide for inter-college, inter-school and inter-departmental collaboration not readily facilitated by traditional academic institution structure. The Center model has been embraced by the University of Hawai'i administration, which recognizes its value to the university at-large, via support to Hawai'i Sea Grant including university administration salary support for Center directors and a sustainability cluster hire award described below.

The interdisciplinary Centers provide a vehicle for building connections university-wide, engaging the best and brightest minds available to address issues facing coastal communities. The Centers have successfully attracted faculty participation from the Schools of Architecture, Travel Industry Management, and Hawai'i inuiākea School of Hawaiian Knowledge; the Colleges of Business and Education; and the Departments of Urban and Regional Planning, Geography, Economics, Oceanography, Natural Resources and Environmental Management, and Geology and Geophysics, as well as the University of Hawai'i Joint Institute for Marine

and Atmospheric Research, one of 18 Joint/Cooperative Institutes under NOAA's Office of Oceanic and Atmospheric Research. Hawai'i Sea Grant researchers and extension faculty working through the Centers have significantly expanded their project efforts through increased collaboration with multidisciplinary center faculty.

The Centers have also been playing an increasing role in defining the Hawai'i Sea Grant research agenda. They are involved with projects that directly affect or impact coastal communities and are keenly aware of existing knowledge gaps to be addressed to help stakeholders. The Centers have also been very effective in disseminating research results to the community at-large.

The Centers also serve as a mechanism for regional collaboration among the Sea Grant College Programs. The inaugural Center for Smart Building and Community Design has provided a dynamic and successful platform for collaborative activities among Hawai'i Sea Grant and Oregon Sea Grant, Texas Sea Grant, Maine Sea Grant, Rhode Island Sea Grant, Mississippi/Alabama Sea Grant, Louisiana Sea Grant, and other network programs. Similarly, the Center for Sustainable Coastal Tourism led an effort involving Delaware Sea Grant, Michigan Sea Grant, Pennsylvania Sea Grant, and Indiana-Illinois Sea Grant to co-organize and conduct a session at the 25th International Congress on Coastal and Marine Tourism in Kailua-Kona, Hawai'i, that highlighted Sea Grant coastal tourism activities focused on sustainability and resilience.

In short, the Centers encompass Hawai'i Sea Grant's mission while providing the critical service of focusing program resources to optimize effectiveness. The Centers also play a significant role in broadening engagement in Hawai'i Sea Grant's strategic planning activities. Perhaps most importantly, they serve as the functional realization and embodiment of both national and state focus areas. By conducting integrated research, outreach, and education activities they serve as the implementation arm of Sea Grant and play a critical role in dissemination of evidence-based information among researchers and to users to inform coastal resource management and policy decisions.



Creating and supporting economically, socially, and culturally inclusive and resilient communities that work within the carrying capacity of their environments.

*Hawai'i Sea Grant and the School of Architecture established the **Center for Smart Building and Community Design (CSBCD)** in 2004. This unique partnership combines design and planning with the natural and social sciences to address issues related to development and urbanization, and their impacts on the natural and human environments. The core mission of the CSBCD is to encourage vibrant, resilient coastal communities that exist sustainably within their environmental footprint and exemplify restorative pathways in building design and community development. The CSBCD seeks to consolidate partnerships and focus university expertise, resources, and networks to assist stakeholders in demonstrating long-term solutions in the built environment.*

KEY PARTNERS: University of Hawai'i at Mānoa: School of Architecture, College of Social Sciences, School of Ocean and Earth Science and Technology, Hawai'i Natural Energy Institute; State of Hawai'i Office of Planning; City and County of Honolulu Department of Planning and Permitting; County of Maui Department of Planning; County of Kaua'i Department of Planning; NOAA Office for Coastal Management; the Environmental Protection Agency Smart Growth Program; and Smart Growth America.



CENTER FOR SMART BUILDING & COMMUNITY DESIGN

SERVES TO:

- ✓ Provide knowledge and information on achieving energy, water, and waste independence in community planning and development
- ✓ Conduct research on designs that reduce construction and maintenance costs while reducing environmental impact
- ✓ Engage the university community in reducing campus energy use and water consumption and introduce green building practices

RESULTING IN:

Communities that are economically viable and environmentally sustainable while supporting social and cultural diversity



SIGNATURE PROJECTS

ESTABLISHED FIRST POWER PURCHASE AGREEMENT

The **first rooftop photovoltaic system** for the University of Hawai'i at the Hawai'i Institute of Marine Biology generates **222 kW** of electricity, approximately **30%** of its energy needs.

SAVINGS EXPECTED TO EXCEED

\$2.3 MILLION

ACHIEVING SMART GROWTH IN KAPOLEI



15,000 new housing units were designed to minimize environmental impact, increase transportation options, and create a more sustainable community.



WHAT IS "SMART BUILDING"?

The process of designing and constructing a structure while considering how it will interact with its inhabitants and its environment.

WHAT IS "COMMUNITY DESIGN"?

A holistic approach to development; it is mindful that neighborhoods, towns, and cities can be more sustainable and inclusive in their design.



SUSTAINABILITY AND RESILIENCE IN THE ALA WAI WATERSHED

A working partnership addresses community resilience in the Ala Wai watershed and focuses on **known natural hazards and risks** as well as environmental issues.



The Ala Wai watershed, which includes Waikiki, is **the most densely populated watershed** in Hawai'i, accounting for nearly **20%** of O'ahu's population.

20%

Conducting research, education, and outreach to assist the state and communities in supporting a vibrant tourism economy while ameliorating visitor impact on culture and the environment, and increasing visitor understanding of marine and coastal environments.

*The **Center for Sustainable Coastal Tourism (CSCT)**, established in 2009, is a collaboration between the College of Social Sciences, School of Ocean and Earth Science and Technology, School of Travel Industry Management, Hawaiʻi inuiākea School of Hawaiian Knowledge and School of Architecture. In partnership with local businesses, government, and the community, the CSCT conducts research, outreach, and education activities on sustainable coastal tourism in Hawaiʻi and various economic, cultural, and environmental impacts of the visitor sector. The primary focus is to conduct scientific research, economic, and policy extension and outreach efforts that: 1) improve the quality of Hawaiʻi's natural environment, and 2) reduce energy and water resources needed to support the tourism sector, resulting in positive impacts for the state economy and the quality of life for its residents.*

KEY PARTNERS: University of Hawaiʻi at Mānoa: College of Social Sciences and School of Travel Industry Management; State of Hawaiʻi Department of Land and Natural Resources-Office of Conservation and Coastal Lands; State of Hawaiʻi Department of Business, Economic Development and Tourism; the Hawaiʻi Tourism Authority; and the Waikīkī Improvement Association.



CENTER FOR
**SUSTAINABLE
COASTAL TOURISM**

SERVES TO:

- ✓ Reduce the environmental footprint while increasing the economic bottom line in support of the tourism industry
- ✓ Restore habitats and ecosystems to improve the quality of Hawai'i's environment
- ✓ Provide scientific expertise in support of energy and water conservation

RESULTING IN:

Positive impacts on Hawai'i's economy, environment, and quality of life for local residents



SIGNATURE PROJECTS

HANAUMA BAY EDUCATION PROGRAM

APPROXIMATELY
800,000
ANNUAL VISITORS
ARE EDUCATED ON THE
VALUE OF MARINE
RESOURCES AND
APPROPRIATE BEHAVIOR

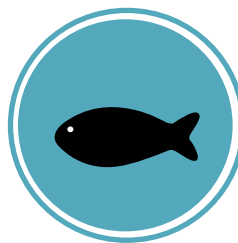
CREATED AND OPERATED BY HAWAI'I
SEA GRANT, THE HANAUMA BAY
EDUCATION PROGRAM HAS BEEN
EDUCATING VISITORS FOR MORE THAN

25 YEARS

1967 DECLARED AS HAWAI'I'S
FIRST MARINE LIFE
CONSERVATION DISTRICT



A premier snorkeling location.



Home to some of the most colorful, unique marine life in the world.



Public events share marine and coastal research with the community.

BEACH RESTORATION PROJECTS

Restoring and *maintaining* the health and vitality of these natural resources is integral to the continued economic contributions of Hawai'i's flagship visitor destination. Simultaneously, this supports a healthy environment for surfing, paddling, fishing, and other ocean-based activities that contribute to the overall quality of life for O'ahu's residents.



REEF WATCHERS
HAWAI'I ISLAND



SEAWATER
AIR CONDITIONING



CLIMATE CHANGE
ADAPTATION



COMMUNITY-BASED
RESTORATION

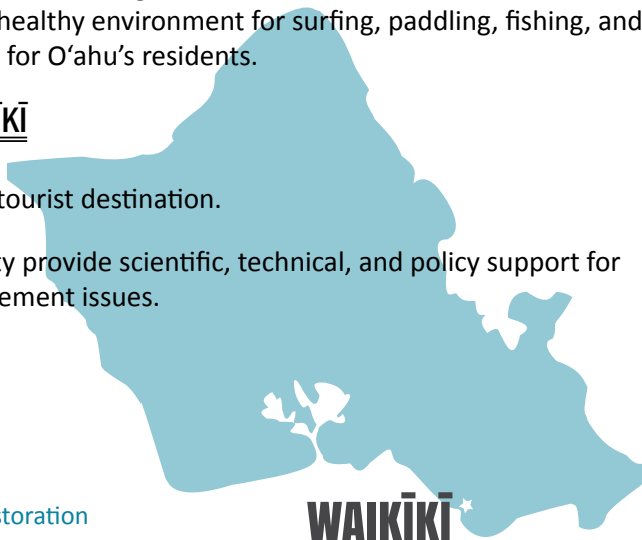
BEACH NOURISHMENT IN WAIKĪKĪ

Waikīkī is the state's **LARGEST** tourist destination.

Hawai'i Sea Grant extension faculty provide scientific, technical, and policy support for a variety of regulatory and management issues.

Projects include:

Public and private property issues
Coastal land use
Coastal hazard mitigation
Coastal erosion control
Beach and dune conservation and restoration



Providing leadership and support to formal and informal educational institutions and organizations through the education of scientists, professionals, teachers, and the public about the benefits of wise and sustainable stewardship of coastal and ocean resources in Hawai'i and the Pacific region.

*The **Center for Marine Science Education (CMSE)**, established in 2008, builds partnerships that enhance marine science education at all levels, lifelong, to foster understanding of the natural world, the critical importance of our earth's oceans and the role of humans in it.*

Ocean and aquatic sciences are among the most underrepresented disciplines in K-12 curricula. Even in Hawai'i, where the ocean is a daily part of life and Hawaiian cultural practices recognize the connectivity of land and sea, ocean knowledge is rarely connected to school learning. The CMSE is a place that scientists and educators look to for ideas and support, acting as both a repository and a point of initiation for new projects to bridge the gap between daily life, culture, and ocean science research and education. The aim of the CMSE is to facilitate partnerships and connections among scientists, teachers, students, and life-long learners and enhance understanding, literacy, and appreciation of the marine and coastal environments.

KEY PARTNERS: University of Hawai'i at Mānoa: College of Education and Hawai'i Institute of Marine Biology; NOAA: Hawaiian Islands Humpback Whale National Marine Sanctuary and Office of Coastal Management; Hawai'i State Department of Education; and City and County of Honolulu Department of Parks and Recreation.



CENTER FOR MARINE SCIENCE EDUCATION

SERVES TO:

- ✓ Build partnerships and enhance marine science education at all levels
- ✓ Connect scientists, teachers, students, and life-long learners
- ✓ Act as a repository and a point of initiation for new ocean science and ocean education projects

RESULTING IN:

Increased understanding and appreciation of the marine and coastal environment



SIGNATURE PROJECTS

TEACHING SCIENCE AS INQUIRY

A Teacher Quality grant was awarded to research and develop a four-part series of Teaching Science as Inquiry for middle and high school teachers, focusing on **aquatic science**.



Teachers from **HAWAII'I, MAUI, MOLOKA'I, LĀNA'I, O'AHU, AND KAUAI** islands formed learning cohorts to be part of in-person workshops and an online learning community.



EXPLORING OUR FLUID EARTH



The Hawai'i Sea Grant Center for Marine Science Education formed a partnership with NOAA and the University of Hawai'i to develop a middle and high school level science-based curriculum in ocean and coastal sciences in Hawai'i.

Based on an award winning curriculum.

CARING FOR OUR ISLANDS THROUGH NA KILO 'ĀINA



The Na Kilo 'Āina network is working directly with community members of all ages to actively care for the shoreline and marine environment through ongoing, monthly monitoring activities and training.

KILO were people who made detailed observations of the nuances of their surroundings in relation to their cultural practice and livelihood.

'ĀINA refers to our lands and oceans which are our sources of sustenance.

VOICE OF THE SEA

The show focuses on ongoing scientific and cultural work in the Pacific from recognized experts in a half hour television series.

It airs throughout Hawai'i and the Pacific and promotes careers in **Science, Technology, Engineering, and Mathematics** (STEM).



Since launching in 2011, this educational TV show has won **11 TELLY AWARDS**, the premier regional television awards.

11

Supporting, enhancing, perpetuating, utilizing, and learning from past understanding and practices derived through traditional knowledge and cultural heritage in Hawai‘i and the Pacific region to integrate and inform current research, outreach, and education activities.

*The **Center for Integrated Science, Knowledge, and Culture** (CISKC), established in 2016, seeks to integrate current research with traditional and cultural knowledge and practice to improve understanding and inform policy decisions relating to marine and coastal resource management, the potential impacts of climate change, and the development of the built environment. This Center also houses the Institute for Hawaiian Language Research and Translation which generates access to the resources of the Hawaiian language repository for all fields of study through research, translation, and the training of a new cadre of capable resource people.*

Much can be learned from the success of Hawaiian and Pacific island resource management systems and associated practices of resiliency and sustainability. For example, before container ships, airplanes, and the internet, the people and communities that populated the Hawaiian Islands necessarily lived, in large part, sustainably from their land, freshwater streams, and surrounding ocean. This success depended upon systems of land division in which district boundaries were carefully planned and delineated. One level of these divisions are known as ahupua‘a. Ahupua‘a boundaries were drawn to include agricultural land, freshwater sources, and access to the shoreline and open-ocean, providing resources for area residents to survive.

KEY PARTNERS: University of Hawai‘i at Mānoa: Hawai‘inuiākea School of Hawaiian Knowledge, College of Education, College of Tropical Agriculture and Human Resources, and School of Ocean and Earth Science and Technology, and the Joint Institute of Marine and Atmospheric Research; University of Hawai‘i System; University of Hawai‘i at Hilo; NOAA Pacific Islands Regional Office; National Science Foundation Experimental Program to Stimulate Competitive Research (EPSCoR); and the non-profit organization Awaiaulu.



CENTER FOR
**INTEGRATED SCIENCE,
KNOWLEDGE, & CULTURE**

SERVES TO:

- ✓ Learn from, utilize, and perpetuate cultural knowledge and heritage of Hawai'i and the Pacific Islands to inform current research
- ✓ Promote translation and information access to knowledge and culture captured in historical Hawaiian language materials (e.g., newspapers)

RESULTING IN:

Sharing and integration of traditional knowledge, cultural heritage, and current science for improving the conservation, sustainable management, and resilience of Hawai'i and Pacific region environments and economies



Much can be learned from the success of *Hawaiian resource management systems* and associated practices of *resilience and sustainability*. For example, before container ships, airplanes, and the internet, the people and communities that populated the Hawaiian Islands necessarily lived, in large part, sustainably from their land, freshwater streams, and surrounding ocean.

SIGNATURE PROJECTS

INSTITUTE FOR HAWAIIAN LANGUAGE RESEARCH AND TRANSLATION



Sea Grant supported the development of the only website which displays the original Hawaiian newspaper article and the English transcription.

<http://ihlrl.seagrantsoest.hawaii.edu>

Articles speak to changes in weather patterns, coastal hazards, and coastal and marine ecosystem management in Hawai'i, and serve as a resource for understanding climate impacts and current coastal management issues.



NA KILO 'ĀINA – COMMUNITY BASED OCEAN MONITORING

Building local community capacity in nearshore monitoring, community stakeholders are trained to observe the natural cycles of local ecosystems and assist with the implementation of community strategies that promote ecosystem health.

KILO were people who made detailed observations of the nuances of their surroundings in relation to their cultural practice and livelihood.

'ĀINA refers to our lands and oceans which are our sources of sustenance.

IN 2015, HAWAI'I SEA GRANT WORKED WITH FOUR COMMUNITIES NUMBERING APPROXIMATELY 200 PARTICIPANTS ON HAWAI'I ISLAND TO MONITOR THEIR NEARSHORE ENVIRONMENTS

HA'ENA

COMMUNITY BASED SUBSISTENCE FISHING AREA – HA'ENA, KAUAI

IN 2014, rules were approved by the state and *signed into law by the Hawai'i Governor in August 2015*, creating the state's very first community-based subsistence fishing area.

Other communities in Hawai'i have embarked on a similar process to protect their nearshore resources and are using the lessons learned from Ha'ena to guide their efforts.

Promoting trans-disciplinary collaboration among university, community, and government partners to address critical and emerging issues relating to all aspects of coastal and climate science and management throughout Hawai'i and the U.S.-affiliated Pacific Islands.

*With capacity and concentration working in these focal areas for more than 10 years, the **Center for Coastal and Climate Science and Resilience (CCCSR)** was formally established in 2016 to increase support for collaborative and transdisciplinary coastal and climate research, outreach, and education in the service of communities and decision-makers to understand and address impacts of coastal hazards, climate change, and sea-level rise in Hawai'i and the Pacific region. University of Hawai'i researchers and Hawai'i Sea Grant extension faculty working through the CCCSR significantly amplify project impacts and outcomes through increased collaboration and involvement of multidisciplinary center faculty. The CCCSR engages a broad range of regional stakeholders involved in coastal community resilience and coastal ecosystem management to inform the CCCSR's research agenda, advise decision-makers on potential impacts of climate change and the implementation of adaptation measures, and improve sustainable management of public coastal resources and shoreline land use.*

KEY PARTNERS: University of Hawai'i at Mānoa: Joint Institute for Marine and Atmospheric Research, Coastal Geology Research Group and Department of Geography; International Pacific Research Center; NOAA: Pacific Islands Ocean Observing System and National Ocean Service Sentinel Sites Program; U.S. Geological Survey Pacific Islands Climate Science Center; State of Hawai'i: Department of Land and Natural Resources-Office of Conservation and Coastal Lands and Office of Planning; County of Maui Department of Planning; County of Kaua'i Department of Planning; and the City and County of Honolulu Department of Planning and Permitting.



CENTER FOR
COASTAL & CLIMATE
SCIENCE & RESILIENCE

SERVES TO:

- ✓ Support research in coastal and climate sciences and promote access to the best available science for decision makers
- ✓ Increase coastal community resilience to natural hazards and adaptation to climate change
- ✓ Improve conservation and management of coastal resources

RESULTING IN:

Resilient coastal communities that are better prepared for the impacts of natural hazards and climate change



SIGNATURE PROJECTS

HAWAI'I CLIMATE ADAPTATION INITIATIVE

Hawai'i Sea Grant is supporting the development of

HAWAI'I'S FIRST SEA-LEVEL RISE VULNERABILITY AND ADAPTATION REPORT

which will be released in

DECEMBER 2017

As sea-level rise accelerates and climate and ocean conditions change, it is becoming **INCREASINGLY IMPORTANT** for island communities to develop policies and implement strategies that *reduce vulnerability* and *increase resilience* to natural hazards.



HAWAIIAN ISLANDS SENTINEL SITE COOPERATIVE

Bringing together *science*, *management*, and *technology* to help communities adapt to climate change.

BUILDING RESILIENCE TO COASTAL HAZARDS AND CLIMATE CHANGE IN HAWAI'I

To help increase resilience and understanding of impacts from sea-level rise, Hawai'i Sea Grant is completing:

- A web-based Hazard Exposure and Vulnerability Mapping Tool
- Guidelines for Integrating Coastal Resilience into Existing Planning Frameworks
- Guidelines and Training for Post-Disaster Rebuilding and Recovery



**SEA LEVEL HAS RISEN OVER THE LAST
CENTURY ON EACH ISLAND AT RATES
VARYING FROM 0.5-1.3 INCHES PER
DECADE**

HAWAI'I AND PACIFIC ISLANDS KING TIDES PROJECT



Members of the general public, or "citizen scientists," contribute photographs documenting the impact of King Tides on coastal resources and infrastructure.

Conducting research, outreach, and education on water resource-related issues in Hawai'i and the U.S.-affiliated Pacific Islands that inform management and policy decision-making on water quality, quantity, and infrastructure best practices.

The **Center for Water Resource Sustainability (CWRS)** also houses the Water Resources Research Center (WRRC) at the University of Hawai'i at Mānoa, which Hawai'i Sea Grant has been administering since 2013. The WRRC is one of 54 water resources centers or institutes with federal support from the U.S. Geological Survey that constitute the network of National Institutes for Water Resources. The WRRC serves the state of Hawai'i and the U.S.-affiliated Pacific Islands by conducting research, outreach, and education on water-related issues distinctive to these areas. Hawai'i Sea Grant is one of five Sea Grant College Programs (e.g., Hawai'i Sea Grant, North Carolina Sea Grant, Wisconsin Sea Grant, Illinois-Indiana Sea Grant, and Lake Champlain Sea Grant) that co-hosts their respective water resources research centers. Hawai'i Sea Grant and the WRRC leverage resources between programs and identify synergies to address island-specific issues related to water quality and quantity, wastewater infrastructure, and the energy-water-food nexus.

The focus of the CWRS is threefold: 1) coordinate and conduct research to identify, characterize, and quantify water-related issues in the state of Hawai'i, 2) assist U.S.-affiliated Pacific Island governments facing water problems similar to those facing stakeholders in Hawai'i by providing research expertise, and 3) facilitate access to interdisciplinary expertise within the university to enhance understanding of environmental problems and identify effective solutions.

KEY PARTNERS: University of Hawai'i at Mānoa: WRRC, College of Engineering, College of Social Sciences, and School of Ocean and Earth Science and Technology; National Science Foundation EPSCoR; U.S. Geological Survey: Pacific Islands Water Science Center and Water Resources Research Institutes.



CENTER FOR WATER RESOURCE SUSTAINABILITY

SERVES TO:

- ✓ Conduct research on water resources-related issues in Hawai'i and the U.S.-affiliated Pacific Islands
- ✓ Facilitate access to interdisciplinary expertise within the university to enhance understanding of water issues

RESULTING IN:

The use of data and science based evidence to inform management and policy decision-making on water quality, quantity, wastewater management, and infrastructure best practices



The Center for Water Resource Sustainability partners with the University of Hawai'i at Mānoa Water Resources Research Center (WRRC) which Hawai'i Sea Grant has been administering since 2013.

For **MORE THAN 50 YEARS**, the WRRC has been conducting research, education, and outreach addressing the unique water and wastewater management problems and issues in Hawai'i and the Pacific.

THE WRRC IS ONE OF **54** WATER RESOURCES RESEARCH INSTITUTES NATIONWIDE INCLUDING PUERTO RICO, THE U.S. VIRGIN ISLANDS, AND GUAM.

The Center for Water Resource Sustainability facilitates access to interdisciplinary expertise within the university to enhance understanding of environmental problems and to identify effective solutions.

SIGNATURE PROJECTS

NATIONAL SCIENCE FOUNDATION EPSCoR PROJECT

Hawai'i Sea Grant is a collaborator on 'Ike Wai, a **\$20 MILLION DOLLAR** National Science Foundation award to the University of Hawai'i (UH) System to engage in a five-year study of water sustainability issues.



The project brings together a team of hydrologists, geophysicists, modelers, volcanologists, engineers, visualization experts, social scientists, cultural experts, and educators.

SEVEN new faculty in the UH system will be hired to specifically focus on the 'Ike Wai project.

INCREASING ACCESS TO SAFE DRINKING WATER ON HAWAII ISLAND



Tens of thousands of residents do not have access to municipal water and must rely on **rainwater catchment** for their potable water needs.

HAWAII ISLAND



Hawai'i Sea Grant conducted **11** workshops on Hawai'i Island on rainwater catchment system components, maintenance, and waterborne diseases.

More than **3,000** people were reached and **10,000** water testing kits were distributed.



DID YOU KNOW?

Fresh water, or **wai**, played an integral role in Hawaiian culture and was believed to be sacred. Several words in the Hawaiian language make reference to the value of water. **Waiwai** refers to abundance or wealth, and the Hawaiian word for law, **kanewai**, means "sharing water equally."

From the *Rainfall Atlas of Hawai'i* it can be estimated that 2 billion gallons of water in the form of rain falls each day in the state of Hawai'i.

6.2 The Sustainability Strategic Hires

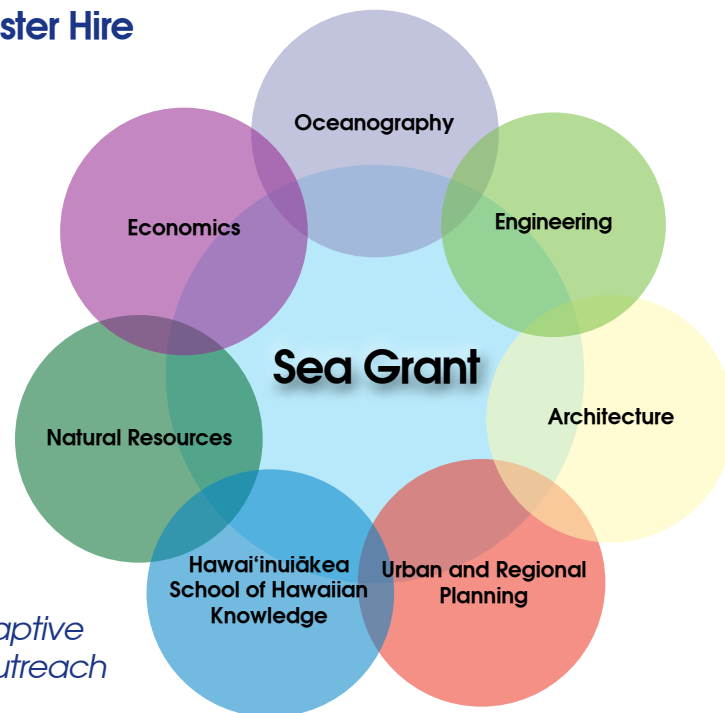
Sustainability Initiative Cluster Hire

7 Tenure Track Faculty

Inter-, trans-, and multi-disciplinary

Joint Faculty Appointments:
25% Sea Grant Outreach
75% Unit of Discipline

*Synergistic, dynamic, and adaptive
world-class scholarship and outreach*



The University of Hawai'i at Mānoa recognized the excellence of Hawai'i Sea Grant and its longstanding commitment to coastal sustainability by awarding the program seven new permanent faculty positions in 2012 as a result of a competition among 11 university-based proposals. Over the next 30 years, these faculty represent an investment of more than \$50 million in Hawai'i Sea Grant's research and outreach programs. To our knowledge, this is an unprecedented commitment on the part of a university to a Sea Grant College Program and our parent organization, NOAA. This sustainability cluster hire greatly increases Hawai'i Sea Grant's ability to address diverse challenges, needs, and opportunities for decades to come.

This strategic cluster hire embodies integrated research, outreach, and education efforts focused on deepening our understanding of the energy-water-food nexus while realizing the development and implementation of energy and water conservation, technology and design practices toward a resilient, economically and socially inclusive future for Hawai'i's people. These faculty are also making significant contributions in transportation science, community design, and "greening" infrastructure. Effective implementation of new technologies requires that Hawai'i's citizens make informed decisions based on an understanding of their environmental, social, engineering, and economic impacts, as well as alternate technologies' strengths and limitations compared with "business-as-usual." The seven sustainability faculty each have joint research and outreach appointments to formally support the Sea Grant mission.

These new faculty build on the established partnerships of our Centers of Excellence by integrating science and design into decisions on development and public policy in coastal communities. These hires, recruited under a rubric of multi-, inter- and trans-disciplinary collaboration, strategically add faculty capability to existing partnerships facilitated and supported through the Centers of Excellence and partner schools/colleges. By intention, these faculty hold loci of tenure in their respective areas of expertise within collaborating schools and colleges of the University of Hawai'i at Mānoa including the Department of Oceanography in the School of Ocean and Earth Science and Technology, Departments of Economics and Urban and Regional Planning in the College of Social Sciences, the Department of Civil and Environmental Engineering in the College of Engineering, the Department of Natural Resources and Environmental Management in the College of Tropical Agriculture and Human Resources, the School of Architecture, and the Hawai'i inuiākea School of Hawaiian Knowledge.

6.3 Research Proposal Process

Hawai'i Sea Grant research is a critical element of programmatic implementation through its core research value, including graduate education, but also by serving as a significant foundation for extension activities. The Hawai'i Sea Grant 2018-2021 Strategic Plan encompasses two research funding cycles, each of two years duration. The 2018-2020 research component was initiated by a request for proposals (RFP) announced on October 28, 2016. The request was sent to University of Hawai'i departments at the Mānoa and Hilo campuses, the University of Guam, Brigham Young University of Hawai'i, Chaminade University, and Hawai'i Pacific University, as well as to community colleges in the insular pacific. The RFP was also placed as a public notice in the Honolulu Star Advertiser, in the University of Hawai'i campus bulletin, shared via social media, and sent to an extensive email listserv to achieve broad distribution.



The RFP process consists of two general phases, a pre-proposal request and subsequent development and submission of select full proposals as described below. All complete pre-proposals submitted undergo the following. The Hawai'i Sea Grant Advisory Council meets to advise Hawai'i Sea Grant on the relevance of submitted pre-proposals to constituents and the greater community. In addition, Hawai'i Sea Grant extension faculty provide their input on pre-proposal relevance. To complete the pre-proposal review process, an additional ad hoc Expert Panel conducts an independent peer-review and incorporates an assessment of all other reviews to make recommendations for development of full proposals. As a result of this process, approximately one-third to one-half of submitted pre-proposals are invited for development as full proposals. Full proposals are subsequently vetted by additional ad hoc peer review and an External Science Panel as described below.

Based on topical areas of full proposals received, referees are sought from accredited institutions of higher education worldwide. A minimum of three peer-reviews are sought per proposal. An External Science Panel is formed with appropriate expertise to undertake final review and selection of proposals for funding. All External Science Panel members receive copies of all full proposals submitted. Each panel member is asked to review and lead the panel in a discussion as a primary reviewer for several proposals and to act as secondary reviewer for several additional proposals. All panel members are asked to have a working knowledge of all full proposals submitted. Thus, each proposal is initially considered in a dialogue among the two assigned reviewers. Other panel members are invited to contribute to the discussion of each proposal once assigned panel members have presented. The number of proposals assigned to each panel member varies depending on the number of full proposals appropriate to their area(s) of expertise. Panel members are provided with the ad hoc peer reviews noted previously prior to the External Science Panel meeting, i.e., prior to their arrival in Hawai'i. This peer review/referee process mirrors the rigorous methods of the U.S. National Science Foundation and is overseen by the Hawai'i Sea Grant program officer assigned by the NOAA National Sea Grant Office. Due to limits on available funding, many meritorious research proposals are not funded during any given funding cycle.



6.4 Program Development

Program development grants are extramural to the process described above and impart agility to the program to respond to meritorious proposals, opportunities, and challenges that emerge outside the realm addressed by the formal biennial research program. Program development funds are disbursed at the discretion of the Hawai'i Sea Grant director when projects or actions are identified that will assist the program in serving its constituents or increasing its capacity. For example, program development grants may be awarded to attract new investigator participation in the program. Emphasis is placed on fostering proof of concept work or method validation with a relatively small award of “seed” funds that enhance project competitiveness in subsequent Sea Grant funding biennial cycles and other extramural funding opportunities (e.g., U.S. National Science Foundation). Program development grants may also be awarded to build specifically needed capacity within the university through training and other experiential opportunities.

ENDNOTES

¹ U.S. Commission on Ocean Policy. 2004. An Ocean Blueprint for the 21st Century. Final Report. Retrieved from http://govinfo.library.unt.edu/oceancommission/documents/full_color_rpt/welcome.html.

² Rappaport, J. and J.D. Sachs. 2003. “The United States as a Coastal Nation.” *Journal of Economic Growth* 8(1): 5–46.

³ State of Hawai'i Department of Business, Economic Development & Tourism. 2015. 2015 State of Hawaii Databook. Retrieved from <http://dbedt.hawaii.gov/economic/databook/db2015/>.

⁴ University of Hawai'i at Mānoa. 2016. University of Hawai'i at Mānoa 2015–2021 Strategic Plan. Retrieved from <http://www.uhm.hawaii.edu/strategicplan/>.

⁵ University of Hawai'i at Mānoa. 2009. University of Hawai'i at Mānoa 2009 Institutional Proposal. Retrieved from https://manoa.hawaii.edu/assessment/archive/institutional_outcomes/.

⁶ State of Hawai'i Office of Planning. 2013. Ocean Resources Management Plan. Retrieved from <http://planning.hawaii.gov/czm/ocean-resources-management-plan-ormp/>.



