

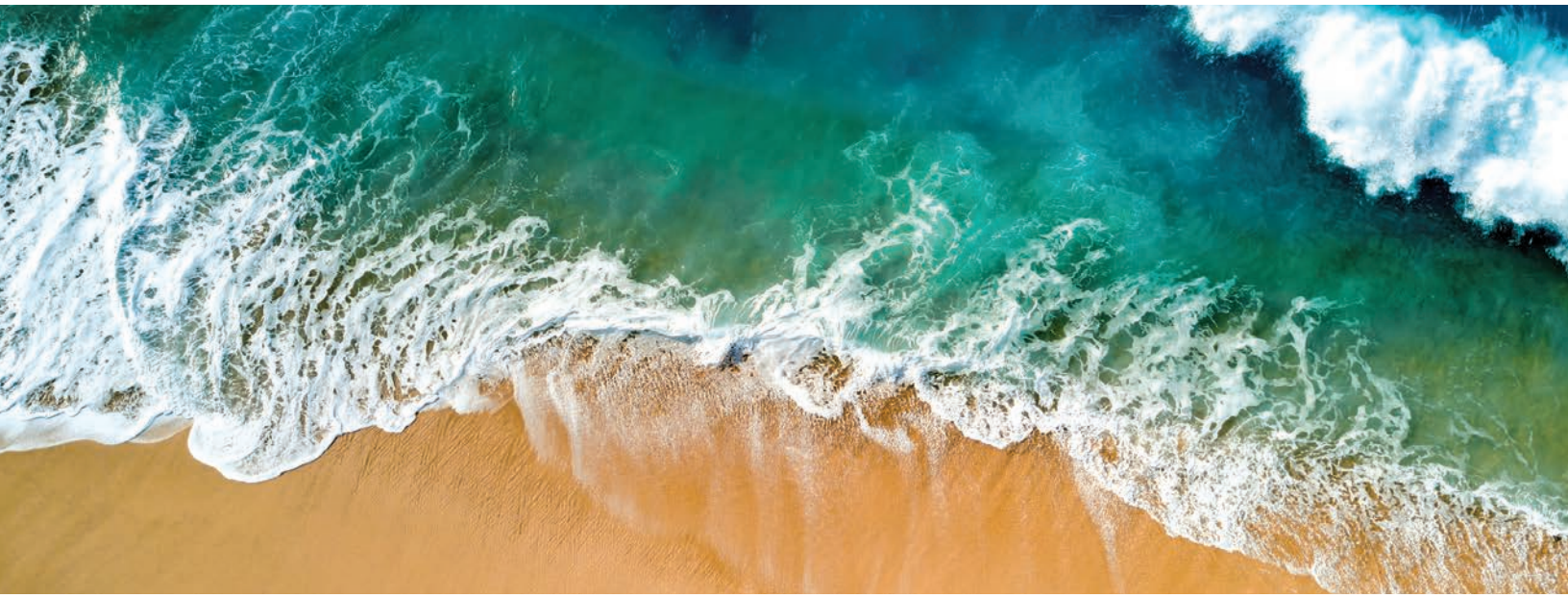
University of Hawai‘i Sea Grant College Program

BIENNIAL REPORT

2018-2019

On the Cover

The University of Hawai‘i Sea Grant College Program (Hawai‘i Sea Grant) is organized into Centers of Excellence, a unique structure within the 34 university-based Sea Grant programs across the network. This allows the work of our faculty and staff to engage across our universities to bring multi-, inter-, and transdisciplinary approaches and solutions in service to communities throughout the region. The cover images depict the passion, commitment, and diversity of people and projects that are genuinely representative of Hawai‘i Sea Grant and our expansive focus areas. Our program’s service is truly region-wide, with responsibilities spanning a geographic area greater than the continental United States. Hawai‘i Sea Grant has faculty located on all of the populated Hawaiian Islands, as well as in the U.S.-Affiliated Pacific Islands including American Samoa and two freely associated states; the Republic of the Marshall Islands and the Federated States of Micronesia.



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What is Sea Grant?

Founded in 1968, the University of Hawai‘i Sea Grant College Program (Hawai‘i Sea Grant) is part of a national network of 34 programs in all coastal states, the Great Lakes, Guam, and Puerto Rico that promote better understanding, conservation, and sustainable use of coastal resources. Hawai‘i Sea Grant works in partnership with the University of Hawai‘i’s prestigious School of Ocean and Earth Science and Technology (SOEST) and the National Oceanic and Atmospheric Administration (NOAA) to find solutions for Hawai‘i’s critical resource management issues and guide cutting-edge scientific research to address these challenges.

Hawai‘i Sea Grant supports an innovative program of research, extension, education, and communication services directed to the improved understanding and stewardship of coastal and marine resources. Realizing the necessity of collaboration to address these critical issues, Hawai‘i Sea Grant serves as a critical link for federal, state, and local government, industries, and community members to the university enterprise.

From the Director

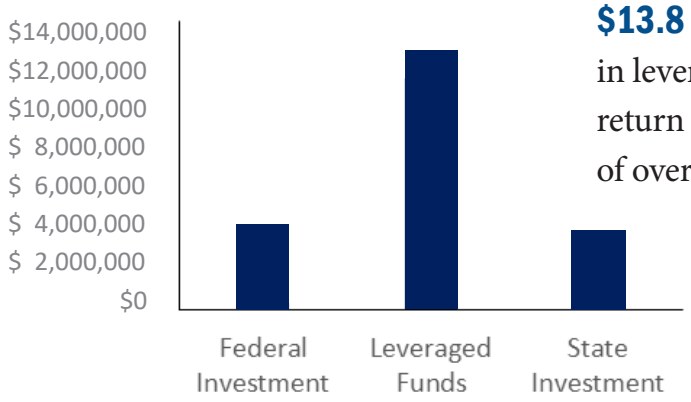
Since the University of Hawai‘i Sea Grant College Program (Hawai‘i Sea Grant) opened its doors in 1968, it has had one overarching mission – to foster the development of resilient, economically and socially vibrant, and inclusive communities that function sustainably within the capacity of their coastal habitats and ecosystems. Now, over 50 years later, we proudly look back at our unwavering dedication to the people we serve, and are poised to continue to support informed personal, policy, and management decisions that are integral to realizing this mission. Although Hawai‘i Sea Grant has grown and evolved over the years to meet the ever-changing needs of the state and the region, the dedicated staff, faculty, and researchers have not changed their commitment to prepare tirelessly for the challenges that lie ahead.

As Hawai‘i Sea Grant’s first director noted so eloquently when looking back on the early years of the program, “Sea Grant is a partnership program which in many ways is more than the sum of its parts, more than a “one of its kind” federal mission and source of funding, more than a university program, and even more than the missions and resources provided by its other partners. The Hawai‘i Sea Grant College Program has drawn the interest and commitment of a unique group of highly motivated people...who through their efforts, commitment, and love for their work, the islands, and their people, amplify the Sea Grant mission to a level unparalleled in the network.”

In this biennial report we offer highlights of Hawai‘i Sea Grant’s accomplishments over the 2018-2019 funding cycle. This brief report provides a snapshot of the important work in research, extension, education, and communications that our program is engaged in.

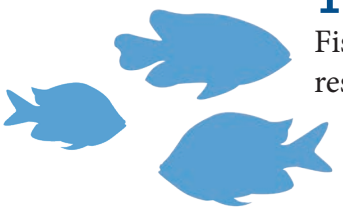
Darren T. Lerner
Director, Hawai‘i Sea Grant

Hawai'i Sea Grant by the Numbers 2018-2019



$13.8 MILLION
in leveraged funds, resulting in a return on the federal investment of over **300%**

Hawai'i Sea Grant created or sustained **59 JOBS** for an economic benefit of at least **$5.4 MILLION**



1283
Fishers who modified their practices as a result of Hawai'i Sea Grant activities

26,034 Volunteer hours completed

61 Graduate students and fellows supported

29 Undergraduate students supported

68
Publications in peer reviewed journals

651,326
K-12 students reached through Sea Grant education programs

1,815,746
People engaged in Sea Grant-supported informal education programs

RESEARCH
EXTENSION
OUTREACH

92
Trainings to improve coastal community resilience

10,514
Acres of coastal habitat protected, enhanced, or restored

74
Communities implemented sustainable development practices and policies

120
Resource managers used ecosystem-based approaches

Challenges and Opportunities

The Hawaiian Islands are approximately 2,500 miles from the nearest continental landmass and are aesthetically, geographically, culturally, and biologically unique. This presents great opportunities and also challenges for residents and for those who visit our coastal communities. At present, the 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 will undoubtedly require modifications to lifestyles and commerce in Hawai‘i, both in urban Honolulu and in the state’s rural areas. In Hawai‘i, the economy is inextricably linked to the environment. Tourism, the dominant industry, is supported by attractive tropical marine and terrestrial ecosystems, but at significant cost of 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 even more urgent. As a microcosm for the nation’s coastal communities, Hawai‘i can serve both as a lesson and a model for building sustainable and resilient coastal communities supported by healthy productive ecosystems.


Building Strong Partnerships

By partnering with diverse schools and colleges via joint faculty positions and other synergistic relationships, Hawai'i Sea Grant brings the full capacity of the University of Hawai'i's knowledge and human resources to serve citizens throughout the insular Pacific to a far greater degree than our federal funding alone can support. As shown in more detail on the following pages, Hawai'i Sea Grant's Centers of Excellence are interdisciplinary and build connections throughout the university by engaging the best and brightest minds to address the region's critical issues. The centers also play a vital role in defining our research agenda by working with communities to identify knowledge gaps that directly impact the well-being of coastal communities. In a complementary and synergistic fashion, the centers are highly effective at linking research results to community needs, challenges, and opportunities.

Hawai'i Sea Grant Support by the Numbers

$4.1M in federal money

$2.89M in state matching funds

$13.8M in funds from other sources




Educating Tomorrow's Workforce

The Hawai'i Sea Grant Graduate Fellowship Program supports training in research and extension of graduate students who pursue scientific, outreach, education, and policy careers in diverse agencies and industries, including local and federal government, academia, and non-profit organizations. These students, who were recruited by university scholars and receive Sea Grant research funding, represent various University of Hawai'i at Mānoa departments and schools including Oceanography, Earth Science, Marine Biology, Economics, Architecture, Biology, Geography, Education, and Urban and Regional Planning. Graduate fellows participate in required outreach and training by presenting their research to the public, authoring blog posts for the Hawai'i Sea Grant website, and participating in special professional development opportunities.

In addition to the Hawai'i Sea Grant Graduate Fellowship Program, additional student fellowship programs were administered including the Peter J. Rappa Sustainable Coastal Development Fellowship (Rappa Fellowship) and the E. Gordon Grau Coastal and Marine Resource Management and Policy Fellowship Program (Grau Fellowship). The Rappa Fellowship engages students in training and research to better understand aspects of coastal sustainability and resilience. The Grau Fellowship, which launched in 2019, provides a unique degree-to-work experience for post-graduate students with interests in ocean and coastal resources in the state of Hawai'i and the management and policy decisions affecting those resources. Named after Hawai'i Sea Grant's former director and University of Hawai'i emeritus professor E. Gordon Grau, it provides fellows an opportunity to acquire practical, on-the-job experience in the planning, implementation, and management of marine, coastal, and/or watershed resource policies and programs in the state of Hawai'i.

Sea Grant Students by the Numbers

23 undergraduates **26** master's **19** PhD

Communities in Hawai‘i and other Pacific Islands are highly vulnerable to coastal flooding and shoreline erosion which threatens homes and infrastructure and endangers critical habitat. Hawai‘i Sea Grant leads the Hawai‘i and Pacific Islands King Tides Project, a community science project that engages stakeholders in photographing effects of King Tides in their own communities to better understand tomorrow’s impacts from sea-level rise. In 2018, Hawai‘i Sea Grant partnered with the Pacific Islands Ocean Observing System to build a free, user-friendly online platform that captures photographic data, and a publicly accessible online database and map with over 3,000 unique photos uploaded to date.

Learn more:
pacificislandskingtides.org

Advancing
coastal and climate science and resilience

Promoting trans-disciplinary collaboration among university, community, and government partners across the Pacific to address critical issues of coastal and climate science and management. The **Center for Coastal and Climate Science and Resilience** emphasizes collaboration among multi-disciplinary faculty and their engagement with a broad range of regional stakeholders to help communities and decision-makers understand and address impacts of coastal hazards, climate change, and sea-level rise.

Learn more at: *https://seagrant.soest.hawaii.edu/coastal-and-climate-science-and-resilience/*

Building Resilience to Coastal Hazards and Climate Change in Hawai‘i

Hawai‘i Sea Grant assembled an interdisciplinary collaboration among university, government partners, and the community to address Hawai‘i’s vulnerabilities to coastal hazards as well as climate change and sea-level rise. With funding support from NOAA and the state of Hawai‘i, the program built on a 2017 State of Hawai‘i Sea Level Rise Vulnerability and Adaptation Report and other recent efforts involving Hawai‘i Sea Grant through three complementary projects:

1. An online, interactive State of Hawai‘i Sea Level Rise Viewer mapping tool
2. Guidance Disaster Recovery Preparedness
3. Guidance for Addressing Sea-Level Rise in Community Planning

The project has been central in informing a paradigm shift in Hawai‘i toward more proactive coastal hazards and sea-level rise preparedness, including endorsement of project outputs from the state’s climate change commission, expanded consideration of sea-level rise risks in a state hazard mitigation plan, and county declarations requiring consideration of sea-level rise vulnerabilities. Based on information in the State of Hawai‘i Sea Level Rise Vulnerability and Adaptation Report, the Mayor of the City and County of Honolulu and the Mayor of Maui both issued proclamations directing all departments to consider sea-level rise risks in any future planning and decision-making.

Nā Kilo ʻĀina refers to the watchers and observers of our ʻāina, the land, water, and pilina (relationships) that sustain our health and well-being. In 2018-2019, Hawaiʻi Sea Grant extension agents coordinated the Nā Kilo ʻĀina program, engaging over 1,000 participants from more than 50 communities across Hawaiʻi, Rarotonga, and New Zealand to build aquatic and environmental literacy and community capacity in natural resource management through studies of marine and freshwater systems in ways that integrate Indigenous knowledge and Western science practices.

Promoting marine science education

Supporting formal and informal education; connecting scientists, professionals, teachers, and the public; and sharing wisdom to support sustainable stewardship of coastal and ocean resources. As both a repository and a catalyst for practices and projects that span daily life, culture, and the ocean, the **Center for Marine Science Education** facilitates partnerships that enhance and foster understanding, literacy, and appreciation of marine and coastal environments.

Learn more: *https://seagrant.soest.hawaii.edu/marine-science-education/*

Voice of the Sea

Voice of the Sea, Hawai'i Sea Grant's award-winning weekly television series, profiles researchers, community leaders, federal agencies, local partners, and cultural practitioners— sharing stories of remarkable individuals making a positive impact on the future of Hawai'i and the insular Pacific. Each week, approximately 25,000 viewers tune in to watch *Voice of the Sea* on television in Hawai'i, and the series is also broadcast on TV in American Samoa, Guam, Palau, and the Federated States of Micronesia. In addition, episodes are archived online and connected to standards-aligned content and activities for educators' use. In 2018 and 2019, *Voice of the Sea* was recognized with seven Telly Awards for episodes focused on environmental and cultural issues in Hawai'i, including one silver, the top honor, in 2018. The Telly Awards were established in 1979 to honor excellence and support creativity in local, regional, and cable TV programming.

Watch episodes at: voiceofthesea.org

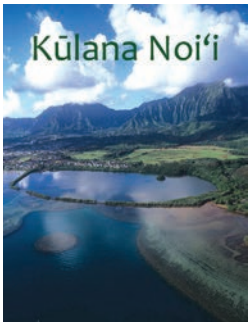
In partnership with the Hui Mālama Loko I'a and Pacific Islands Climate Adaptation Science Center, CIKS led an effort to facilitate, assess, and synthesize the research and management needs of loko i'a (Hawaiian fishponds) across the archipelago to provide information for resource managers to adapt to the impacts of a changing climate. The end result was a Loko I'a Needs Assessment report, which represents the first comprehensive compilation of the research ideas and needs within the community of fishpond managers, landowners, and stewardship organizations to inform adaptation of fishpond practices toward their resilience, adaptation, and sustainability in the face of a changing climate.

Engaging multiple knowledge systems

The **Center for Integrated Knowledge Systems (CIKS)** is deeply rooted in Native Hawaiian and Pacific Islander values, communities, and research initiatives. CIKS is a collaborative hub, a Sea Grant Center of Excellence dedicated to meeting the need for coordination among the growing number of Sea Grant faculty and extension agents who work on projects involving multiple knowledge systems. The long-term goal of CIKS is to empower customary practitioners in holding decision-making power and directing co-management of coastal and marine resources.

Learn more at: *https://seagrant.soest.hawaii.edu/integrated-knowledge-systems/*

Kūlana Noiʻi



Place-based stewards expressed the need for a set of guidelines to help ensure that research projects engage in equitable and reciprocal partnerships with those connected to, and caring for, an ahupuaʻa (land division extending from the mountain to the sea). In response to this need, a partnership was formed between the University of Hawaiʻi Sea Grant College Program, Kuaʻāina Ulu ʻAuamo (KUA), and others to develop Kūlana Noiʻi in 2018.

Kūlana Noiʻi is not intended to be a compliance standard or checklist for achieving reciprocal community-research partnerships. Instead, this guidance serves as a starting point for deeper conversation and lays out a set of ideas, values, and behaviors that, when applied alongside hard work, can build more just and generative relationships between researchers and communities. The goal is to promote more collaborative and mutually beneficial partnerships among university faculty and students conducting research, and the local communities who care for and utilize natural resources under investigation.

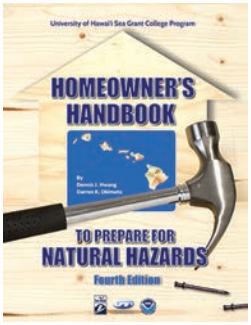
Hawai'i Sea Grant partnered with the Hawai'i Natural Energy Institute to provide technical assistance on renewable energy to Ka Honua Momona, a rural nonprofit organization on Molokai Island, whose mission is to serve as a model of sustainability. As a result of this partnership the nonprofit organization's facility is completely powered by 100 percent renewable energy, not connected to the utility. In addition, the energy dashboard, which detailed where the energy originated from and how it was being used, was used as an educational tool.

Creating smart buildings and community design

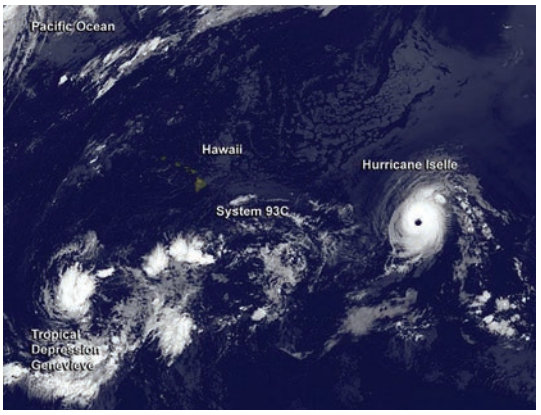
Developing and supporting economically, socially, and culturally inclusive communities to exist sustainably within their environmental footprint. Through a unique partnership of natural science with planning and architecture, the **Center for Smart Building and Community Design** addresses issues of urbanization and its impact on the natural environment to assist stakeholders in developing and implementing long-term solutions in the built environment.

Learn more at: *https://seagrant.soest.hawaii.edu/smart-building-and-community-design/*

Homeowner's Handbook to Prepare for Natural Hazards



Hawai'i Sea Grant's practical publications on coastal hazard preparation have been transformative in building the capacity of communities in Hawai'i and throughout the nation. For instance, over 100,000 copies of the *Homeowner's Handbook to Prepare for Natural Hazards* were printed by 2019 and are being distributed to communities in Hawai'i at no charge. This free guidebook, chock full of up-to-date practical information, was specifically developed for the homeowner, and outlines effective ways to significantly lower serious risks to lives and property. The handbook fills an important information gap for homeowners by showing how to plan and prepare for multiple hazards such as hurricanes, tsunamis, flooding, and earthquakes. It takes complex information traditionally used by scientists, engineers, and architects, and translates it so that the homeowner can make informed decisions and implement simple and cost-effective measures to protect their loved ones. Hawai'i Sea Grant is also working with many other Sea Grant programs around the country to assist in the development of state-specific handbooks.



The Hawai'i State Legislature appropriated $10 million for Waikīkī Beach improvements based in part on a Hawai'i Sea Grant-funded economic study assessing the value of Waikīkī Beach at $2 billion per year. The Center is developing a new comprehensive economic valuation model incorporating the value of multiple ecosystem services ranging from recreational benefits (e.g., swimming, surfing, canoeing, etc.) to protecting ecosystem health and reducing disaster risk. The Center is also supporting efforts to evaluate the impacts of concentrated tourism in Hawai'i's fragile communities, the Windward O'ahu Tourism Assessment being one example of this type of study.

Fostering sustainable coastal tourism

Directing scientific research, outreach, and education activities to support a vibrant tourism economy and improve the quality of Hawai'i's natural environment. Through strong partnerships with units within the University of Hawai'i, local businesses, and the government, the **Center for Sustainable Coastal Tourism** assists the state, the tourism industry, and the community to balance the need for a robust economy with regenerative tourism, preserving regional cultures, and reducing the environmental footprint of tourism.

Learn more at: *https://seagrant.soest.hawaii.edu/sustainable-coastal-tourism/*

Hanauma Bay Education Program

The award-winning Hanauma Bay Education Program is administered by the University of Hawai'i Sea Grant College Program. Hanauma Bay Nature Preserve has always been reveled for its beautiful, serene surroundings, and the Hanauma Bay Education Program was created to educate the public about Hawai'i's marine environment, thereby enhancing appreciation and promoting understanding and stewardship of Hanauma Bay. Approximately 800,000 annual visitors to Hanauma Bay are educated on the value of marine resources and reef etiquette. A strong team of volunteer docents make this significant education accomplishment possible. The Hanauma Bay Education Program also hosts visiting school groups and organizes marine and conservation-related evening presentations for the public. It is now seen as a successful example of balancing the needs of the expanding visitor industry with conserving natural resources.

Darren T. Lerner, Hawai'i Sea Grant director, also served as the interim director of the University of Hawai'i at Mānoa Water Resources Research Center (WRRC) which serves the state of Hawai'i as well as other Pacific islands by researching water-related issues distinctive to these areas. WRRC's main focus is to coordinate and conduct research to identify, characterize, and quantify water-related problems, and facilitate access to interdisciplinary expertise within the university to enhance understanding and identify effective solutions.

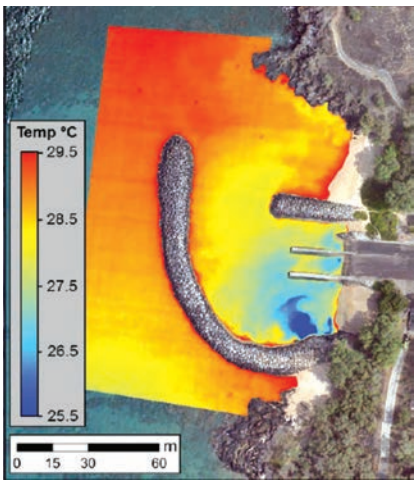
Encouraging water resource sustainability

Coordinating and conducting research, outreach, and education to address island-specific issues related to water quality, water quantity, and wastewater management. The **Center for Water Resource Sustainability** identifies, characterizes, and quantifies water-related issues in the state of Hawai'i, and assists U.S.-affiliated Pacific Island governments to enhance the understanding of environmental problems, identify effective solutions, and inform management and policy decision-making.

Learn more at: *HawaiiSeaGrant.org*

Groundwater Research

In response to concerns over the health of Maui's coral reefs, Hawai'i Sea Grant funded research to evaluate how sources of nutrients in groundwater are related to land use. The research team applied novel techniques using aircraft and unmanned aerial vehicles to collect thermal infrared imagery and map the coastlines, analyzed groundwater and algae samples to look for isotopic signatures unique to agriculture and wastewater, and used tracer dyes to track rates and paths of injected wastewater effluent to Maui's coastal waters. The results conclusively showed that millions of gallons per day of deeply injected, treated sewage effluent were being added to Maui's adjacent ocean waters. These results were essential to a 2020 U.S. Supreme Court ruling which clarified that underground water connections to surface waters are covered by the Clean Water Act.



Publication Highlights

Contributing to Scientific Knowledge

The influence of Hawai'i Sea Grant extends far beyond the state and region through its contributions to scientific knowledge. For instance, in 2018-2020, Hawai'i Sea Grant faculty and researchers published 112 journal articles, books, and other outreach publications.

SELECTED PUBLICATIONS

BOOKS

Vaughan, M. B. 2018. *Kaiaulu: Gathering Tides*. Corvallis, OR: Oregon State University Press.

Hwang, D.J, Okimoto, D.K. *Homeowner's Handbook to Prepare for Natural Hazards*, version 3.2 and 4.0. Honolulu, HI: University of Hawai'i Sea Grant College Program.

PEER-REVIEWED JOURNAL ARTICLES

Delevaux, J. M.S., K. B. Winter, S. D. Jupiter, M. Blaich-Vaughan, K. A. Stamoulis, L. L. Bremer, K. Burnett, P. Garrod, J. L. Troller, and T. Ticktin. 2018. Linking land and sea through collaborative research to inform contemporary applications of Traditional Resource Management in Hawai'i. 2018. (Special Issue: Biocultural Restoration in Hawai'i). *Sustainability* 10(9):3147.

Eyre, B. D., T. Cyronak, P. Drupp, E. H. De Carlo, J. P. Sachs, and A. J. Andersson. 2018. Coral reefs will transition to net dissolving before end of century. *Science* 359(6378):908-911.

Jury, C. P., and R. J. Toonen. 2019. Adaptive responses and local stressor mitigation drive coral resilience in warmer, more acidic oceans. *Proceedings of Royal Society of London Series B* 286:20190614.

Kelly, L. W., C. E. Nelson, A. F. Haas, D. S. Naliboff, S. Calhoun, C. A. Carlson, R. A. Edwards, M. D. Fox, M. Hatay, M. D. Johnson, E. L.A. Kelly, Y. W. Lim, S. Macherla, Z. A. Quinlan, G. G. Z. Silva, M. J.A. Vermeij, B. Zgliczynski, S. A. Sandin, J. E. Smith, and F. Rohwer. 2019. Diel population and functional synchrony of microbial communities on coral reefs. *Nature Communications* 10:1691. URL: https://www.nature.com/articles/s41467-019-09419-z.

Mora, C., D. Spirandelli, E. C. Franklin, J. Lynham, M. B. Kantar, W. Miles, C. Z. Smith, K. Freel, J. Moy, L. V. Louis, E. W. Barba, K. Bettinger, A. G. Frazier, J. F. Colburn IX, N. Hanasaki, E. Hawkins, Y. Hirabayashi, W. Knorr, C. M. Little, K. Emanuel, J. Sheffield, J. A. Patz, and C. L. Hunter. 2018. Broad threat to humanity from cumulative climate hazards intensified by greenhouse gas emissions. *Nature Climate Change* 8:1062-1071. DOI: 10.1038/s41558-018-0315-6

Morishige, K., P. Andrade, P. Pascua, S. Kanoelani, E. Cadiz, L. Kapono, and U. Chong. 2018. Na Kilo `Aina: Visions of Biocultural Restoration through Indigenous Relationships between People and Place. *Sustainability* 10(3368):1-20.

Nelson, C. E., and E. K. Wear. 2014. Microbial diversity and the lability of dissolved organic carbon. *Proceedings of the National Academy of Sciences* 111:7166-7167.

Schoepf, V., C.P. Jury, R.J. Toonen, and M. McCulloch. 2017. Coral calcification mechanisms facilitate adaptive responses to ocean acidification. *Proceedings of Royal Society of London Series B* 284(1868):pii:20172117.

Silbiger, N. J., C. E. Nelson, K. Remple, J. K. Sevilla, Z. A. Quinlan, H. M. Putnam, M. D. Fox, and M. J. Donahue. 2018. Nutrient pollution disrupts key ecosystem functions on coral reefs. *Royal Society B: Biological Sciences* 285:20172718.

Vitousek, S., P. L. Barnard, C. H. Fletcher, N. Frazer, L. Erikson, and C. D. Storlazzi. 2017. Doubling of coastal flooding frequency within decades due to sea-level rise. *Nature Scientific Reports* 7:1399.

Montgomery, M., and M. Vaughan. 2018. Ma Kahana ka ʻike: Lessons for community-based fisheries management. 2018. *Sustainability*, 218 (10): 3799, 2018.

OUTREACH PUBLICATIONS

“Economic impact analysis of the potential erosion of Waikīkī Beach: A 2016 Update.” Tarui, N., M. Peng, and D. Eversole. 2018. Honolulu, HI: University of Hawai‘i Sea Grant College Program

“Kūlana Noi‘i.” (1). 2018. Honolulu, HI. University of Hawai‘i Sea Grant College Program.

“Sustainable Capture-Based Aquaculture of Rabbitfish in Pacific Island Lagoons.” Seale, A. P., and S. Ellis. 2019. Honolulu, HI: University of Hawai‘i Sea Grant College Program.

“Guidance for Disaster Recovery Preparedness in Hawai‘i.” Courtney, C.A., K. Gelino, B.M. Romine, K.D. Hintzen, D. Addonizio-Bianco, T.M. Owens, M. Lander, and J. Buika. 2019. Honolulu, HI: Tetra Tech, Inc.

Sea Grant by the Numbers

In two years, Hawai‘i Sea Grant published:

68 journal articles **4** books **40** other publications

2018-2019 Funded Research

Hawai'i Sea Grant funds research that emphasizes solution-based outcomes and applicability to pressing issues. Science-based information promotes the development of beneficial products and services, while providing marine and coastal resource managers with the knowledge required for successful sustainable resource practices.

The research projects fall within four focus areas which explore pressing issues related to the health and well-being of our coasts and coastal economies:

- **Healthy Coastal Ecosystems**
- **Sustainable Fisheries and Aquaculture**
- **Environmental Literacy and Workforce Development**
- **Resilient Communities and Economies**

HEALTHY COASTAL ECOSYSTEMS

Harnessing Environmental DNA for Healthy Reefs

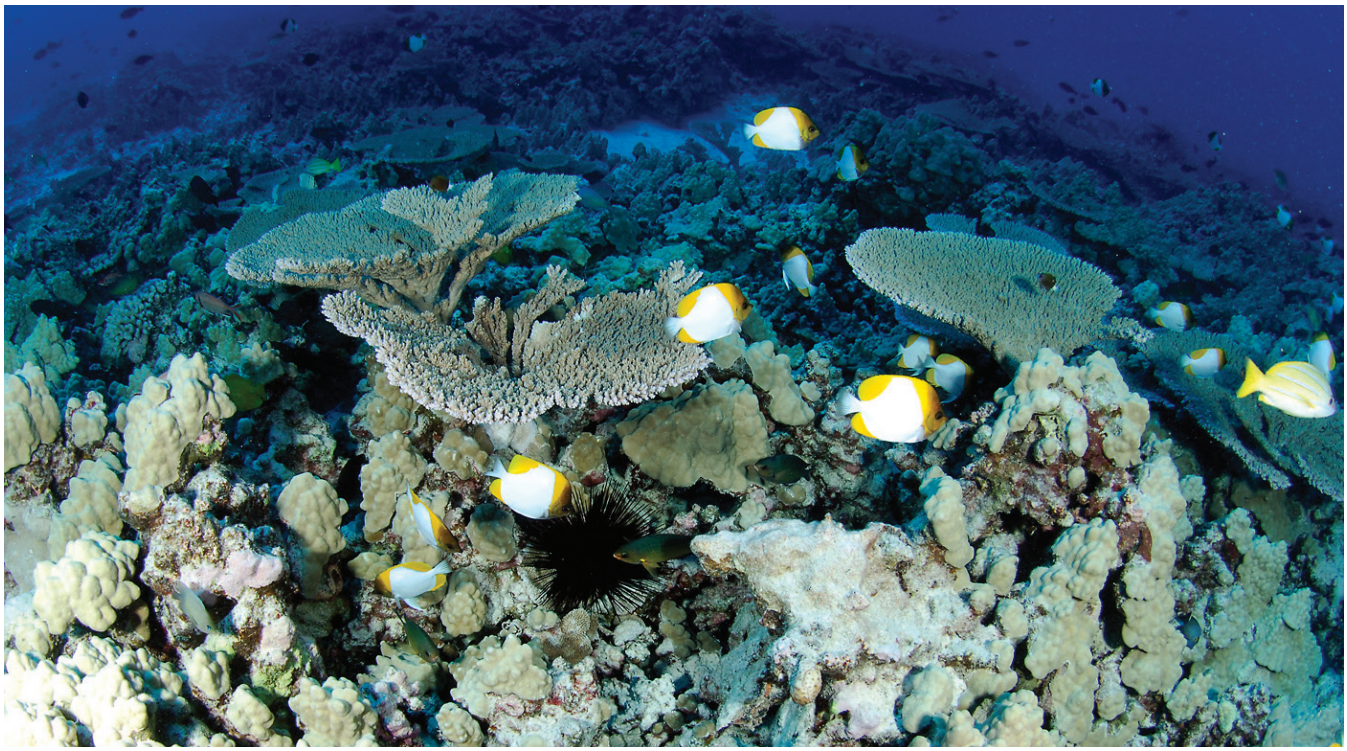
Principal Investigator: Dr. Brian Bowen
Graduate Fellows: Cassie Lyons and Mykle Hoban
This study monitored the health of coral reefs by using environmental DNA collected from waters around the reefs to identify which species were present, including cryptic and hidden ones, and to track the overall biodiversity on reefs in response to environmental stressors.

Economic activity, technological progress, and water resource utilization on O'ahu

Principal Investigator: Dr. Peter Fuleky
Graduate Fellow: Sisi Zhang
The researchers developed summary measures of economic conditions in various industries (especially tourism, health care, food, and agriculture) to establish the levels of dependency on the state's limited water resources and likely future demand under various scenarios of economic, technological, and population change.

Collaborative Investigation of Hydraulic and Geochemical Connectivity Between Wastewaters and Other Land Uses with the Ocean Waters of Waialua Bay, O'ahu

Principal Investigator: Dr. Craig Glenn
Graduate Fellows: Jordan Mason and Lucas Ellison
This project assessed the hydraulic and geochemical connectivity between on-site sewage disposal system wastewaters and the oceanic waters around the greater Waialua Bay area, O'ahu, to help develop a more complete understanding of the environmental and health risks of wastewater leakage.



Growth optimization and survival of the bleaching-resistant coral genus Pavona for reef restoration in Hawai‘i

Principal Investigator: Dr. Peter Marko
Graduate Fellow: Claire Lewis
The researchers aided in bleached coral-reef restoration efforts by experimentally determining optimal nursery growth conditions for the stress-tolerant coral genus Pavona, and evaluating the role of colony size and morphology variation on out-planted coral survival at restoration sites.

Enabling real-time predictive modeling of microbial pathogen risk along the Honolulu shoreline

Principal Investigator: Dr. Craig Nelson
Graduate Fellow: Jessica Bullington
This project generated a real-time predictive model of microbial pathogen risk for the south shore of O‘ahu, an area with some of the highest instances of recreational waterborne disease in the U.S. Ideally, the model will be easily applied and interpreted by health agencies for the benefit of the general public.

Investigating the origin and impact of sedimentation on the health of Hawaiian mesophotic reefs for sustainable coastal development

Principal Investigator: Dr. Robert Toonen
Graduate Fellow: Evan Barba
This project continued collecting data from mesophotic zones (30-180 m depths) around O‘ahu and West Maui to update models and develop predictive maps of coral and invasive algae distribution, in order to help managers and policymakers choose best strategies for coastal development and runoff control to protect these vulnerable low-light ecosystems.

SUSTAINABLE FISHERIES AND AQUACULTURE

Land-based Pollutants in Herbivorous Reef Fishes on Hawaiian Reefs

Principal Investigator: Dr. Megan Donahue
Graduate Fellows: Eileen Nalley and Julie Zill
This work compared concentrations of metal pollutants in reef fish muscle tissue collected at several sites suffering, to different degrees, from contamination due to urban runoff into watersheds and coastal waters. The researchers aimed to identify species and locations most impacted, and aid communities to minimize the effects of land-based pollutants on coral reefs.

Hehihehi management for microbially-mediated sediment removal in fishponds

Principal Investigator: Dr. Kiana Frank
This study employed the modern tools of microbiology to examine the efficacy of a traditional management tool applied to today's fishpond restoration efforts. The researcher examined whether microbes may decompose pond-clogging sediment faster if aided by hehihehi, the traditional practice of stomping and mixing of the fishpond sediment.

ENVIRONMENTAL LITERACY AND WORKFORCE DEVELOPMENT

Our Project In Hawai'i's Intertidal: Examining Change Over Time

Principal Investigator: Dr. Joanna Philippoff
Graduate Fellow: Patrick Nichols
OPIHI, Our Project in Hawai'i's Intertidal, continues a long-term effort to expand knowledge of the vulnerable intertidal zone across Hawai'i, engaging students and communities in collecting meaningful data used to characterize whether and how intertidal organisms' abundance and diversity is changing over time.

RESILIENT COMMUNITIES AND ECONOMIES

A Next-Generation Beach Observing System for Hawai‘i

Principal Investigator: Dr. Charles Fletcher
Graduate Fellows: Anna Baker Mikkelson and Kammie Tavares
With sea-level rise impacting Hawaiian coasts, this project aimed to develop a next-generation program for monitoring short and long-term changes in Hawaiian shorelines, employing recent technological advances to enhance the efficiency and data quality of beach surveys, and ultimately, to improve accuracy and coverage of beach monitoring databases.

Coral reef CO_2 variations at the Coastal Ocean Hawai‘i Acidification Network (COHAMN): Impact of basin scale oceanographic forcing

Principal Investigator: Dr. Eric DeCarlo
Graduate Fellow: Lucie Knor
This project continued the decade-old MAPCO2 buoy program at four coral reef sites around O‘ahu, measuring CO2 in the atmosphere and dissolved in seawater as well as other parameters relevant to CO2 biogeochemistry, as part of an ongoing global CO2 monitoring program.

Integrating Climate Science with Local Knowledge through Community Vulnerability Assessments on Kaua‘i

Principal Investigator: Dr. Daniele Spirandelli
Graduate Fellow: Alisha Summers
This study examined the opportunities and challenges of integrating coastal resilience into local community plans, using the County of Kaua‘i’s efforts as a case study. Researchers combined broader climate science risk information with local knowledge to support statewide goals to prepare counties for future climate hazards.

West Maui Wave Runup Forecasts
Principal Investigator: Dr. Douglas Luther
Graduate Fellow: Camilla Tognacchini
This project developed short-term forecast models of wave-driven inundation "run-up" events for West Maui, to help managers, emergency management personnel, and the public cope with the increasing hazards of flooding events, and associated erosion, driven by wave activity superimposed on rising sea levels.

Impacts of climatic changes on a native and an invasive Hawaiian plant using a newly developed Intelligent Plant Growing System (IPS)
Principal Investigator: Dr. Camilo Mora
Graduate Fellow: Devon DeBevoise
This study used a previously-developed, affordable Intelligent Plant growing System (IPS) that employed automation technology to control climatic conditions precisely. For this project, the system was applied to assess the viability of plants under multiple co-occurring climatic changes and prepare managers for future decision-making to cope with agricultural and vegetation issues as the climate shifts.

For a complete list of 2020-2021 research projects, visit Hawai'i Sea Grant's research website: *http://seagrant.soest.hawaii.edu/research/*

Hawai‘i Sea Grant 2018 – 2019 Directory

FACULTY AND STAFF

ADMINISTRATION TEAM	TITLE
Dr. Darren T. Lerner	Director
Dr. Darren K. Okimoto	Associate Director/Extension Leader
Maya Walton	Program Leader
Dr. Mary Donohue	Program Management Specialist
Lisa Heindl	Program Management Specialist
Kristin Pada	Program Management Specialist
Kelly Ching	Program Management Specialist

COMMUNICATIONS TEAM	TITLE
Cindy Knapman	Communications Leader
Heather Dudock	Assistant Communications Leader/Multimedia Specialist
Rachel Lentz	Communications Specialist/Science Writer
N. Harold Richman	Information Technology Specialist

FISCAL/HUMAN RESOURCES TEAM	TITLE
David Keola	Administrative Officer
Una Ching	Human Resources Specialist
Diane Sakamoto	Administrative Officer
Dana Tamashiro	Administrative Officer

EXTENSION	TITLE
Pelika Andrade	Hawai‘i Island Extension Agent
Chantal Chung	Hawai‘i Island Extension Assistant
Adrienne Copeland	Ocean Exploration Specialist
Simon Ellis	Federated States of Micronesia Marine Resource Management Specialist
Dolan Eversole	Extension Agent, Waikīkī Beach Management Coordinator
Matthew Gonser	Community Planning and Design Extension Agent
Shellie Habel	Coastal Resilience Specialist
Katy Hintzen	Coastal Resilience Specialist
Dennis Hwang	Coastal Hazard Mitigation Specialist
Gavin Iwai	Hanauma Bay Education Program Education Assistant
Mahealani Kaneshiro-Pineiro	Hanauma Bay Education Program Outreach Coordinator
Brooke Cleveland	Hanauma Bay Education Program Assistant Volunteer Coordinator
Morgan Mamizuka	Hanauma Bay Education Program Volunteer Coordinator
Elizabeth Kumabe Maynard	Hanauma Bay Education Program Manager

EXTENSION	TITLE
Michael Mezzacapo	Water Resources Outreach Specialist
Tara Miller Owens	Maui Coastal Processes Extension Agent
Ruby Pap	Kaua'i Coastal Land Use Extension Agent
Eileen Peppard	Sustainability Specialist
Bradley Romine	Coastal Management Specialist
Anne Rosa	Hanauma Bay Education Program Marine Park Education Specialist
Kanesa Duncan Seraphin	Director, Center for Marine Science Education
Kelly Anderson Tagarino	American Samoa Extension Specialist
Max Sudnovsky	Republic of the Marshall Islands Extension Specialist

COASTAL RESILIENCE AND SUSTAINABILITY TEAM FACULTY (CREST)

COASTAL RESILIENCE TEAM	TITLE
Rosanna Alegado	Associate Professor of Oceanography; Deputy Director, Center for Integrated Knowledge Systems
Oceana Francis	Associate Professor of Engineering
Wendy Meguro	Assistant Professor of Architecture
Craig Nelson	Associate Researcher of Oceanography
Michael Roberts	Professor of Economics
Daniele Spirandelli	Assistant Professor of Urban and Regional Planning
Mehana Vaughan	Associate Professor of Natural Resources and Environmental Management

Special Program Resources

Ka Pili Kai

Hawai'i Sea Grant's free biannual magazine celebrates the people and places across the Pacific region and our deep connection to all things related to the sea through vivid photographs and inspiring stories.

https://seagrant.soest.hawaii.edu/resources/ka-pili-kai/

Useful Websites

University of Hawai'i Sea Grant College Program
HawaiiSeaGrant.org

NOAA National Sea Grant
seagrant.noaa.gov

University of Hawai'i at Mānoa
School of Ocean and Earth Science and Technology
www.soest.hawaii.edu

Social Media Channels

UHSeaGrant • HawaiiSeaGrant • Hawaii_Sea_Grant • Hawai'i Sea Grant • HawaiiSeaGrant

Contact

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