Ka Pili Kai, “things connected with the sea,” focuses attention on the relationships between people and the marine environment. For over 40 years the University of Hawai‘i Sea Grant College Program has partnered with the National Oceanic and Atmospheric Administration to achieve environmentally, economically and culturally healthy coastal communities, and in this special issue we explore just a few of these multifaceted projects and partnerships. We are proud to share with you a glimpse of the ways we are addressing critical topics such as coastal hazards, sustainable coastal tourism, sustainable aquaculture, marine science education, and the linkages between the built and natural environment in a broad, coordinated fashion.

Cindy Knapman,
Communications Leader
REACHING OUT TO COASTAL COMMUNITIES

The National Oceanic and Atmospheric Administration (NOAA) Coastal Storms Program - a nationwide effort to assist coastal communities decrease the negative impacts of coastal storms on families, communities, the environment, natural resources, and property - is now being implemented in the Pacific.

For over 40 years, the University of Hawai‘i Sea Grant College Program (UH Sea Grant) has been working directly with coastal communities to enhance community resilience to coastal hazards. In particular, many of the Pacific Islands have experienced an increase in the frequency and intensity of extreme events, sea-level rise, coastal erosion, coral bleaching, ocean acidification, and contamination of freshwater resources by salt water, among other issues. To address these challenges, NOAA developed a nationwide Coastal Storms Program where local, state, and federal organizations work together to provide a suite of tools and services to enhance community resilience to coastal storms. These efforts are focused on specific regions of the country, but the results increase the capacity of the entire coastal zone to be better prepared for the inevitable coastal storm.

To date, regional pilot programs have been conducted in Florida, the Pacific Northwest, Southern California, and the Gulf Coast. In all four areas NOAA’s National Sea Grant College Program has developed and
implemented the constituent driven outreach and education programs. In the Pacific region, UH Sea Grant will spearhead this component of the program by designing and implementing programs in the State of Hawai‘i, American Samoa, Guam, Commonwealth of the Northern Mariana Islands, Republic of Palau, Republic of the Marshall Islands, and the Federated States of Micronesia. The Pacific region is the largest NOAA region geographically - bounded by the Hawaiian Archipelago in the north, American Samoa and the Pacific Remote Island Area in the south, and the Marianas Archipelago in the west, it contains over 7,000 acres of land, 1,000 miles of coastline, and 1.5 million square nautical miles of Pacific Exclusive Economic Zone (EEZ). This is roughly equal to all the remaining U.S. EEZ waters surrounding the continental U.S. and Alaska. Although a daunting task, UH Sea Grant will work closely with NOAA and other partners to address concerns for the fragile infrastructure, economic vitality, sustenance, and cultural and traditional values these island communities embrace.

**The Pacific Climate Change Impacts Resource Guide**

As a vital component of a broad, coordinated effort to create climate literate communities in the Pacific region, UH Sea Grant, in partnership with several NOAA programs, is developing The Pacific Climate Change Impacts Resource Guide. This publication is based upon a successful guidebook published in 1996 by NOAA’s Office of Global Programs, and is designed to provide formal and non-traditional educators with credible scientific information on climate change impacts. It will include information and activities that are place-based and culturally sensitive, and provide training opportunities through regional workshops, online workshops, and distance conference technology.

This educational resource was developed to ensure that the results of scientific research on global environmental issues like climate change are effectively applied to individual and societal decision-making. Similarly, the guidebook will also provide formal and non-traditional educators a selected set of Pacific-focused, culturally sensitive, and currently available materials to help frame and clarify the key issues related to climate change.

In the Pacific, stakeholders have a long-standing tradition of working closely together to build critical partnerships in an effort to understand, communicate and mitigate the impacts of climate change. This is critical because, in many ways, climate change begins in the Pacific. This region has been characterized as “the heartbeat of the Earth’s climate system” as it is the interaction between the ocean and the atmosphere in the Pacific that controls weather around the world. In addition, low-lying island communities in the Pacific are particularly vulnerable to the impacts of climate change and rising seas. UH Sea Grant, through its strong partnerships and expertise at the university, as well as regional extension networks throughout the Pacific, will be instrumental in developing and disseminating the information to a broad range of stakeholders.

**Western Pacific and Northern Pacific Regional Marine Education and Training**

UH Sea Grant recently collaborated with the NOAA Fisheries Pacific Islands Regional Office (PIRO) to conduct outreach targeting marine education and training organizations in the western and northern Pacific regions. Information collected during this effort was used to develop a report which provides guidance and advice on establishing a pilot program for regionally-based marine education and training programs in the western Pacific and the northern Pacific. It provided specific recommendations to PIRO and the Western Pacific Regional Fishery Management Council on ways the pilot program can be designed to foster understanding, practical use of knowledge (including Native Hawaiian, Alaska Native, and other Pacific Islander-based knowledge), and technical expertise relevant to stewardship of living marine resources.
The University of Hawai‘i Sea Grant College Program (UH Sea Grant) and NOAA Pacific Services Center (PSC) staff have been collaborating on a series of climate adaptation projects and training, all with ties to the Kailua community on O‘ahu. Jointly, PSC and UH Sea Grant are working on climate training modules, a local beach management plan, a community survey for climate-change adaptation, climate change adaptation planning and policy analysis, and various outreach products. The lessons and products from each of these distinct projects complement each other with strong regional support that benefits from close working relationships. One example of this collaborative partnership is exemplified in the Kailua Beach Management Plan and community climate change adaptation survey.

Kailua Beach is located on the windward coast of O‘ahu, Hawai‘i. It is a wide, crescent-shaped, sandy beach fronting Kailua Bay that stretches approximately 2.6 miles and is well known for its scenic beauty and recreational value. Its shallow, clear waters, gentle waves, soft white sands, and absence of coral or rock make this beach amenable to a wide variety of age groups, users, and activities. The fact that most of the beach is stable or accreting (increasing in size) provides justification to develop long-term planning tools that will help to ensure this unique resource remains intact for future generations.

Kailua Beach is an anomaly in that it has been spared much of the shoreline erosion so prevalent around the state. In fact, Kailua is one of only a few accreting beaches on O‘ahu, having grown wider by an average of two feet per year over the last 70 years despite widespread coastal erosion around the state during the same period. This is thought to be partially due to a steady supply of sand to replenish the beach sourced from a large paleo-stream channel offshore, in addition to Kailua Bay being a sheltered embayment with a fringing reef that protects the beach from high wave energy. Nevertheless, the long-term (approximately 100 years) effects of sea-level rise will eventually appear at Kailua Beach, as well as other beaches statewide, and is expected to result in beach erosion and a shift of the beach system landward. Part of the Kailua Beach Management Plan specifically investigates this issue and provides a scientific projection for where the shoreline is estimated to be in the future based on widely accepted global sea level projections.

By working together and combining resources, programs, and agency talents, UH Sea Grant and NOAA hope to improve the Kailua community’s understanding of climate change impacts and facilitate better informed decision-making by elected officials and agency personnel. Ultimately, the priorities and values of the community need to be reflected in the policies and practices of local government. Such an effort requires a thorough understanding of the physical sciences, socio-economics, and land use planning related to climate change but also requires an interdisciplinary approach incorporating law, communication, social science, and policy in a cooperative and collaborative manner.
The University of Hawai‘i Sea Grant College Program (UH Sea Grant) and the Pacific Islands Ocean Observing System (PacIOOS) have an established partnership to develop and expand ocean observations in the insular Pacific region. Funded through NOAA as part of the U.S. Integrated Ocean Observing System (IOOS®), PacIOOS is a regional program that ties together data providers and users who work together to enhance ocean observations and develop, disseminate, evaluate, and apply ocean data and information products designed to address the needs of stakeholders who call the Pacific Islands home.

PacIOOS relies on the distributed network of UH Sea Grant extension agents to engage users, data providers, and other potential partners in the insular Pacific. Those extension agents, who function in part as PacIOOS regional liaisons, are a critical component of the PacIOOS outreach and extension service and allow for continuous, local, and in-depth engagement with ocean observing partners through the region. Over the past three years, these liaisons have executed programmatic needs assessments for PacIOOS as part of the NOAA regional research needs assessment, identified available data sets to be included in the PacIOOS data infrastructure, established partnerships for future stakeholder engagement and collaboration, and worked with the PacIOOS program to install the initial observing assets in the insular jurisdictions.

During ReefTalk’s early years, average attendance was between 20 and 30 people. By the year 2000, ReefTalk’s attendance increased to an average of 40-50 individuals per lecture, and several ReefTalks have drawn standing room only crowds of 130-140 people. ReefTalk’s largest audiences are attracted to presentations featuring the charismatic megafauna of Hawai‘i such as turtles, whales, dolphins, and manta rays, many of which are given by NOAA marine specialists.
Papahānaumokuākea ‘Ahahui Alaka‘i: Creating International Ambassadors of Marine Conservation

By Joseph Castro, UH Sea Grant Student Science Writer

Papahānaumokuākea ‘Ahahui Alaka‘i (PAA), a ten-day experiential leadership program that promotes the stewardship of natural and cultural resources around the world, is sponsored by the co-trustee agencies of the Papahānaumokuākea Marine National Monument (Monument)—the U.S. Fish and Wildlife Service, the National Oceanic and Atmospheric Administration (NOAA), and the state of Hawai‘i. It is open to formal and informal educators, community leaders, and others in positions that support community change and stewardship. Each year since the inception of the program two years ago, University of Hawai‘i Sea Grant College Program staff have been selected to participate.

Successful applicants are expected to be active in their communities and be able to promote stewardship and rouse community members to action. In addition, applicants must propose original stewardship projects for their own communities that tie in with the lessons learned during their time with the PAA program. However, diversity is also important to PAA and the program seeks a balance of different professions, skills, and understandings with its participants who come from Hawai‘i, the continental United States, and abroad.

Anne Rosa, Marine Park Education Specialist for the Hanauma Bay Education Program, participated in 2009, while Waikīkī Coastal Coordinator Jennifer Barrett participated this June. Rosa has since integrated valuable lessons from PAA into the Hanauma Bay Education Program and has used her experiences to assist with NOAA’s Navigating Change Curriculum as part of her stewardship project. She is also working on a song to inform people about the Monument while familiarizing them with the Monument’s important name. Barrett, on the other hand, hopes to create a Girl Scout badge about the Monument that fosters environmental stewardship and prompts students to think about the meaning and purpose of marine protected areas.

Above all else, PAA is intended to be a stewardship program. It has strong ties to Sea Grant’s various missions such as educating coastal communities, fostering healthy coastal ecosystems, and promoting coastal stewardship. Papahānaumokuākea ‘Ahahui Alaka‘i’s hands-on approach to marine conservation is particularly beneficial to Sea Grant staff as it allows an in-depth look at one of the world’s most cherished marine protected areas. With the knowledge and experiences gained from PAA, Rosa, Barrett, and future Sea Grant participants will be better able to tackle the worldwide issues related to natural and cultural resources.
Collaboration is a key component of the UH Sea Grant Hanauma Bay Education Program (HBEP). Throughout its 20-year history at the Hanauma Bay Nature Preserve, this award-winning program has fostered vital collaborations with university and resource agency partners. NOAA agencies have been an integral part of public outreach and education at Hanauma Bay and often share valuable marine resources information with residents and visitors during HBEP lectures and special events. A popular marine conservation district, the Hanauma Bay Nature Preserve is a showcase of successful coastal and reef management and has a unique partnership of county and state governments with the community. Staff members from NOAA’s Coral Reef Conservation Program and Coastal Services Center, National Marine Protected Areas Center, and their international guests are often hosted by the education program staff to highlight how effective education programs can successfully promote sustainable visitor interaction and community involvement.

In addition, the UH Sea Grant Hanauma Bay Education Program has had a strong ongoing relationship with NOAA’s Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS) including mutually beneficial collaborations over the years. For many years, the HIHWNMS office has loaned its humpback whale display panels to the Hanauma Bay Education Center to be exhibited in the alcove classroom.

Three other informational signs are strategically placed in popular viewing areas around the park which highlight the protected waters of the Sanctuary surrounding Hanauma Bay. In addition, Elizabeth Kumabe has represented the Education Committee on the HIHWNMS Advisory Council, first as alternate for the Education seat, then as the primary Education Chair from 2007 to present.

Community Outreach
The HBEP outreach program strives to bring Hanauma Bay to the community and share cutting-edge scientific research on Hawai‘i’s marine and coastal resources. The outreach series has partnered with and hosted governmental, non-governmental, non-profit, and community organizations and engaged experts in sharing information through public presentations, interactive learning activities, community fairs, and formal and informal gatherings. The weekly evening lecture series has hosted many NOAA programs, including: NOAA’s National Weather Service; Protected Species Division, Hawaiian Islands Humpback Whale National Marine Sanctuary; Papahānaumokuākea Marine National Monument; Marine Debris Program; Pacific Islands Regional Office; and Hawai‘i Undersea Research Laboratory. This fall HBEP will help to kick off Papahānaumokuākea Marine National Monument’s ten-year anniversary celebration with a series of evening programs that will continue through November.

Children from schools around the island are engaged by the various educational activities offered at Hanauma Bay’s education center.
Connecting with NOAA’s Navigating Change Curriculum

To help students make learning connections between the Hanauma Bay Nature Preserve and Papahānaumokuākea Marine National Monument, a more remote conservation area, the Hanauma Bay Education Program is hosting classes using NOAA’s Navigating Change curriculum. By visiting Hanauma Bay, a Marine Life Conservation District in the main Hawaiian Islands, Hanauma Bay provides an excellent venue for students to connect what they learn about marine conservation and Papahānaumokuākea with a marine preserve close to home.

Quantitative Underwater Ecological Surveying Techniques (QUEST) By Ephraim Temple, UH Sea Grant Aquaculture Extension Agent

At the University of Hawai‘i Sea Grant College Program (UH Sea Grant), marine science education is at the heart of its mission. In support of greater environmental literacy and to ensure the nation’s next generation of environmental professionals, UH Sea Grant develops a wide variety of education programs for K-12, undergraduate and graduate students, and the public.

In American Samoa, Ephraim Temple, UH Sea Grant extension agent and marine science program faculty at American Samoa Community College (ASCC), is designing various programs to provide college students in the Pacific Islands with opportunities to gain hands-on experience and acquire new technical skills.

One of the ways he is doing this is by coordinating a snorkeling Quantitative Underwater Ecological Surveying Techniques (QUEST) course which will provide students with training in underwater surveying techniques, fish, coral, invertebrate, and algae identification, and exposure to leadership and team building exercises. The snorkeling QUEST program culminates in a trip to the National Park of American Samoa on the island of Ofu where six Samoan undergraduates from ASCC are selected to participate in a five-day summer field course.

To accomplish this, UH Sea Grant is partnering with the NOAA Fisheries Pacific Islands Regional Office, NOAA Fagatele Bay National Marine Sanctuary, and other organizations. The program will focus on addressing several NOAA priority areas, including “preparing community residents for employment in marine related professions, including marine resource conservation and management, marine science, marine technology, and maritime operations;” and “conduct, develop, support, promote, and coordinate formal and informal education at all levels to increase public awareness about ocean, coastal, Great Lakes, and atmospheric science and stewardship.” This and other similar efforts are likely to increase recruitment of students interested in careers in marine-related fields.
In cooperation with NOAA’s Hawaiian Islands Humpback Whale National Marine Sanctuary, Jennifer Barrett, University of Hawai‘i Sea Grant College Program’s Waikīkī Coastal Coordinator, has brought an exceedingly popular ocean awareness training to O‘ahu. OceanAware Hawai‘i invites the public to learn about critical issues such as marine protected species, threats to coastal and marine environments, and the marine ecology of the Hawaiian Islands. These various topics are woven together within the context of a native Hawaiian land management system – the ahupua‘a – which recognizes and honors the interconnectedness of land, man, and sea. By presenting the information in this context it connects the participants and their actions to the island areas, marine life, and marine and coastal issues presented throughout the class.

To date the training has reached over 250 participants from communities throughout O‘ahu. It originated from an effort on the island of Maui, and the program’s immediate popularity and warm reception spurred UH Sea Grant and the Hawaiian Islands Humpback Whale National Marine Sanctuary to partner on a pilot program for the island of O‘ahu. Within two days of promoting the first O‘ahu training session, the class reached its registration limit of 50 participants, and within two weeks, a waitlist of over 200 community members had been generated.

On O‘ahu, more than 20 organizations from the public and private sector have provided support for the OceanAware training sessions.

Mahalo to the following:
NOAA’s National Marine Sanctuary Programs (Hawaiian Islands Humpback Whale National Marine Sanctuary and Papahānaumokuākea Marine National Monument); NOAA Fisheries (Protected Resources Division and Office of Law Enforcement); NOAA Marine Debris Program; State of Hawai‘i Department of Land & Natural Resources, Division of Aquatic Resources; University of Hawai‘i Marine Option Program; Hawai‘i Institute of Marine Biology; Kewalo Marine Laboratory; Waikīkī Aquarium; The Nature Conservancy; The Dolphin Institute; Friends of Hanauma Bay; Hawai‘i Community Stewardship Network; Reef Check Hawai‘i; Malama na Honu; Malama Maunalua; Surfrider Foundation; Malama Pupukea-Waimea; Livable Hawai‘i Kai Hui; and Kyo-ya Hotels & Resorts.
Hawaiian Language Newspaper Translation Project

Between 1834 and the late 1940’s, more than 100 newspaper publications equaling approximately 125,000 pages of text in the native Hawaiian language were published for an avid and highly literate public. These publications served as sources of traditional, cultural, historical, and political discussions of those times, and until a few years ago this newspaper archive was virtually inaccessible to the general public. Thanks to Dr. Marvin “Puakea” Nogelmeier, an Associate Professor of Hawaiian Language at the University of Hawai‘i (UH) Hawai‘inuiākea School of Hawaiian Knowledge and the Hoʻolaupaʻi Newspaper Resources project at the Bishop Museum, the Hawaiian-language newspapers are now beginning to be scanned and indexed. To date 13,000 newspaper pages representing a little more than 10 percent of the newspaper archive have been processed.

Of particular interest to the University of Hawai‘i Sea Grant College Program (UH Sea Grant) are articles touching on marine ecosystem management in Hawai‘i, traditional and introduced fishing practices, climatic conditions, and storms and other significant weather events. However, the availability of translators is extremely scarce and is currently limited to a handful of individuals. As the need to develop capacity in Hawaiian language proficiency became clear, Dr. Richard Brock, former UH Sea Grant Extension Director, and Elizabeth Kumabe Maynard, UH Sea Grant Regional Environmental Education Extension Agent, initiated a pilot project with Dr. Nogelmeier to investigate the accessibility of fisheries-related articles in the newspaper archive as well as train the next generation of translators.

To date, UH Sea Grant has hired three Native Hawaiian students to carry on this important work - two high school graduates from Hawaiian language immersion schools and one senior majoring in Hawaiian studies at UH Mānoa. In order to translate the articles in an accurate historical and cultural context, the students are being mentored directly by Dr. Nogelmeier and his staff to help the students expand their knowledge of Hawaiian history and learn about the sequence of significant historical events. The students were also fortunate to be given a special opportunity to access fragile, limited access archival materials at the Bishop Museum after receiving training in the proper protocol for handling and reviewing archival materials in the museum’s closed collections.

This partnership has generated a collection of 22 newspaper articles from the early 1900’s, ranging from proclamations by the Hawaiian royalty and landowners on reef access restrictions to master fishermen sharing their manaʻo (thoughts) about types of fishing nets. Support from NOAA Fisheries for this project has allowed UH Sea Grant to continue its partnership with Dr. Nogelmeier and help store and protect a large archive of fragile Hawaiian language newspapers.
The UH Sea Grant College Program’s Center for Marine Science Education (CMSE), in collaboration with the National Oceanic and Atmospheric Association (NOAA) Pacific Services Center (PSC) and the UH Curriculum Research and Development Group (CRDG), have recently formed a partnership to develop a middle and high school level science-based curriculum in coastal and ocean sciences in Hawai‘i.

As part of this partnership, CMSE will develop, evaluate and distribute a series of Exploring Our Fluid Earth curriculum modules over the course of three years, focusing on the physics, chemistry, biology, evolution, ecology, and technology of coastal and ocean systems. The series of modules will be tailored to the seven Ocean Literacy Essential Principles (OLEP) and draw content from the nationally recognized CRDG Fluid Earth / Living Ocean (FELO) curriculum.

The resulting online curriculum will complement a current U.S. Department of Education-funded CRDG professional development research grant, and will comprise six inquiry-based coastal and ocean science modules and corresponding student materials. Development of the curriculum materials will involve extensive integration of updated FELO materials with NOAA science, including case studies of NOAA scientists and related careers. Module features will highlight the nature of science and marine-related careers.

In addition to the online curriculum, the project will include a television series outreach component to integrate media-based, self-directed learning and public outreach. The television series will draw from the NOAA scientist case study sources used in the online modules to create an original series that will air on television statewide in Hawai‘i and also will be available online. The series, which will
highlight careers in coastal and ocean science as well as current practices and challenges, will help to develop the public’s understanding of what it means to be an ocean scientist as the public explores and discovers along with the scientists.

Overall, the Exploring Our Fluid Earth curriculum will emphasize the nature of scientific investigation and process skills to help students build the critical thinking techniques they need to become responsible, environmentally literate citizens. Connecting to the National Sea Grant network will provide the opportunity for dissemination beyond Hawai‘i to the U.S. mainland and Pacific rim. The use of the television series will provide a novel opportunity for promotion and visibility not only of the program itself, but also of NOAA activities and career opportunities.

The University of Hawai‘i Sea Grant College Program is represented in American Samoa by a single extension agent, Ephraim Temple, who focuses on research, teaching and extension activities. With a lot to do and only one person to do it, partnerships are crucial, so he often collaborates with governmental and non-governmental agencies to provide the most effective service to the community. In particular, he has fostered close relationships with NOAA offices since NOAA personnel are well respected and established in the area, and the missions and priorities of both organizations are closely aligned.

Temple’s work focuses in large part on providing students with internships and other opportunities. For example, he:

- Designed an internship program in partnership with NOAA Fisheries and NOAA’s National Marine Sanctuary Program Pacific Islands Regional Office, and the Hawai‘i Institute of Marine Biology to improve student understanding of marine invertebrates;

- Introduced NOAA’s Coral Reef Ecosystem Division Coral Reef Ecosystem Monitoring Report for American Samoa for use as a textbook in the American Samoa Community College Natural Marine Resources course;

- Helped to organize a student tour of the NOAA research vessel Hi‘ialakai while it was in port in Pago Pago, American Samoa;

- Worked with the NOAA Fisheries Pacific Islands Regional Office to conduct summer camps with Le Tausagi, a local group of environmental educators that promote childhood education;

- Recruits students for internships and projects with several NOAA offices such as the Fagatele Bay National Marine Sanctuary, NOAA Fisheries, and the Pacific Islands Fisheries Science Center.
Homeowner’s Handbook to Prepare for Natural Hazards

Since its release in June 2007, approximately 30,000 copies of the Homeowner’s Handbook to Prepare for Natural Hazards have been distributed to communities throughout Hawai‘i. The guidebook, which provides homeowners with simple tips to prepare their home and family for major coastal hazards, has been distributed at neighborhood board meetings, to various church groups, lions clubs, rotary clubs, insurance companies, and at community emergency preparedness fairs, to name just a few. Due to the high demand for the guidebook, particularly at the start of hurricane season, it is currently under revision and will be reprinted to accommodate the continued high demand.

The handbook would not have been possible without the participation of many NOAA partners, including the National Weather Service Central Pacific Hurricane Center and the Pacific Tsunami Warning Center.

As hurricane season runs from June through November, it is a good idea to begin preparations if you have not already done so. The Homeowner’s Handbook to Prepare for Natural Hazards, which is currently available in print or online, contains many useful tips.

Download your free copy today:
www.soest.hawaii.edu/SEAGRANT
or call (808) 956-7410.

Case Studies Focusing on Climate Change and Fisheries

UH Sea Grant is partnering with faculty members from the University of Hawai‘i School of Ocean and Earth Science and Technology and NOAA Fisheries to generate a case study focusing on the impacts and implications of future climate change on fisheries in the Western and Central Pacific and the Hawaiian Islands. This tripartite collaboration will produce a case study combining the state-of-the-art understanding of future climate change with the impacts on local and regional fisheries.

The case study, which is part of a larger series, will provide appropriate content for high school, undergraduate, and graduate coursework on fisheries, climate, and sustainability. The information will also be used to educate the public, resource managers, and policy makers on the impacts of climate change on sustainable fishery resources that are important from an economic, cultural, and a dietary standpoint.

Local, coastal, and regional fisheries have played and continue to play an important role in Pacific Island communities. The fisheries serve as economic and dietary resources and embody cultural significance to the local populations and endemic peoples of these island communities. Climate change will have an impact on Pacific Ocean fisheries as well as coral reefs and associated reef fisheries.

To date two case studies authored by Dr. Michael Guidry and Dr. Fred Mackenzie have been produced: 1) Climate Change, Water Resources, and Sustainability in the Pacific Basin: Emphasis on O‘ahu,
Now Available from UH Sea Grant!

Climate Change in the Federated States of Micronesia
Food and Water Security, Climate Risk Management, and Adaptive Strategies

By Charles H. Fletcher and Bruce M. Richmond

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Na Mea Like ‘Ole

The Snorkeler’s Guide to the Fishes of Hanauma Bay

By John E. Randall

This 65 page waterproof fish guide provides full color photographs, names, and descriptions of the fishes most commonly viewed by snorkelers and swimmers at Hanauma Bay.

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