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NOAA Pacific Islands Fisheries Science Center

PIFSC Science Plan (2012)

[October 5, 2012]

[This is a draft meant for comment. Based on stakeholder, public and in-house input, the final version, targeted for year's end, may change significantly. This means your comments are important and it also means that none of the following should be taken as the final word.]

Purpose

The Pacific Islands Fisheries Science Center (PIFSC)¹ in Honolulu, Hawaii is one of six NOAA Fisheries (National Marine Fisheries Service) science centers nationally.

Our mission is to provide timely, high-quality applied scientific information to support the conservation and management of fisheries, protected species, and marine habitats in the central and western Pacific Ocean.

PIFSC faces the challenge of an expanding mission across a broad geographical range, both in the types of research required to meet the Nation's needs as a whole and needs of our individual communities where we carry out our work. The PIFSC Science Plan addresses these research and monitoring activities, infrastructure, and support services we have identified as key to meeting our mandates over the next 3 - 5 years.

The intent of this plan is to organize, prioritize, and communicate our research and monitoring activities in a way that:

1) shows the full suite of research under three major themes so that the public, our key stakeholders, and our staff can see how the work of one part of the Center contributes to the Center as a whole and to our applied scientific information mission, and

¹ Government agencies swim in a world of acronyms. Departing from normal practice, we have spelled these out in most cases throughout the document, rather than in their first occurrence, to make reading the document easier.

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2) identifies our strategic research and monitoring activities that address our key mandates, and although this is not a budget prioritization document, would be privileged under potentially restrictive budget scenarios.

This Science Plan will serve as guidance for decision-making within PIFSC, and within the NOAA Fisheries science enterprise, with the goal of increasing the transparency of these decisions both within the agency and in the public. We expect this plan, and the planning process it incorporates, including input from our stakeholders and the general public, help position PIFSC to meet these challenges by clearly stating our core and desired research activities, providing increased focus, and enabling a concentration of PIFSC resources to accomplish these goals.

CONTEXT

The PIFSC science plan, and indeed PIFSC research and monitoring activities, occur under the umbrella of national priorities for living marine resource scientific advancement and the conservation and management of critical living marine resources. The PIFSC Science Plan is aligned with the NOAA Fisheries mission and with the priorities of NOAA as spelled out in NOAA's Next Generation Strategic Plan and companion documents of which we quote several sections here.

National Priorities for Ocean Research

NOAA Next Generation Strategic Plan (2011)

NOAA identifies its mission as central to many of today's greatest challenges. Climate change. Severe weather. Natural and human-induced disasters. Declining biodiversity. Ocean acidification. Threatened or degraded ocean and coastal resources. These challenges convey a common message: human health, prosperity, and well-being depend upon the health and resilience of coupled natural and social ecosystems. Managing this interdependence requires timely and usable information to make decisions and the science that underpins our knowledge of these systems. NOAA's mission of science, service, and stewardship is directed to a vision of the future where societies and their ecosystems are healthy and resilient in the face of sudden or prolonged change. -- NOAA's Next Generation Strategic Plan (2011)

<http://www.ppi.noaa.gov/ngsp/>

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NOAA's Vision and Mission²

NOAA's Mission: Science, Service, and Stewardship

- 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.

VISION

Resilient ecosystems, communities, and economies can maintain and improve their health and vitality over time by anticipating, absorbing, and diffusing change. This vision of resilience will guide NOAA and its partners in a collective effort to reduce the vulnerability of communities and ecological systems in the short-term, while helping society avoid or adapt to long-term environmental, social, and economic changes. To this end, NOAA will focus on four long-term outcomes within its primary mission domains.

NOAA Annual Guidance Memorandum (AGM)

NOAA generates an Annual Guidance Memorandum (AGM) to sharpen the focus of its programs each year. The current AGM for Fiscal Years 2014-2018 calls on NOAA to focus on these strategic priorities directly relevant to NOAA Fisheries:

² National Oceanic and Atmospheric Administration Next Generation Strategic Plan (December 2010) Published by NOAA Office of Program Planning and Integration 1305 East West Highway Silver Spring, MD 20910, (www.noaa.gov/ngsp).

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NOAA Annual Guidance Memorandum (2012)

Oceans: NOAA will advance our efforts to ensure the long-term sustainability of marine fisheries and recovery of protected species and their habitats. NOAA will apply capabilities and expertise in ecosystem science and stewardship to address core mandates and key aspects of the National Ocean Policy. NOAA will sustain efforts to end overfishing and rebuild and maintain fish stocks at sustainable levels to optimize fishing opportunities, jobs, and ecosystem services. NOAA will harmonize agency-wide habitat-related efforts to achieve habitat conservation.

Key FY 12 deliverables: (1) Complete implementation of annual catch limits and continue to assess economic and community impacts of these new management regimes ; and (2) develop and implement a NOAA-wide, integrated Habitat Blueprint to increase the efficiency and effectiveness of habitat protection and restoration.

<http://www.ppi.noaa.gov/see/agm/>

Not all areas of the NOAA's strategic plan are immediately or apparently relevant to PIFSC, but we are a part of the greater NOAA whole and our contributions can span many of NOAA's responsibilities. For example, our Corals program meets a range of needs under the Coral Reef Conservation Act (CRCA) as well as under the international Coral Triangle Initiative with the U.S. Agency for International Development. Yet increasingly our Corals program is also making major contributions to the NOAA Fisheries mission related to fisheries and protected species management.

We also use a broad range of NOAA products, particularly those related to remote sensing, and we host the regional node for the NOAA NESDIS OceanWatch program. Following the Deepwater Horizon oil spill in 2010, 12 PIFSC staff participated in recovery efforts related to the NOAA mission in the Gulf and we have contributed to other NOAA missions elsewhere in the country and in different areas of focus for NOAA in the Pacific Islands. These are the kinds of activities that we should be expected to participate in as NOAA employees and as scientists within our own community as well as those that contribute to our research more directly related to NOAA Fisheries conservation and management priorities.

We are also not starting from the beginning here in the central Pacific. When the NOAA Fisheries Pacific Islands Region was established in 2003, a strategic planning process

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was initiated with PIFSC, the NOAA Fisheries Pacific Islands Regional Office (PIRO), and the Western Pacific Fishery Management Council (WPFMC). That process led to the 2005 strategic plan that identified twelve goals in all within the scope of the following topics:

- Develop an integrated and comprehensive science-based approach to marine resource
- Foster greater coordination and cooperation in the Pacific Islands region
- Dramatically increase our community involvement and public outreach
- Ensure sufficient human capacity, facilities and funding to meet our goals and provide long-lasting and satisfying careers for all of our employees.

[Excerpted from the Strategic Plan for the Conservation and Management of Marine Resources in the Pacific Islands Region, 2005 – 2010.

http://www.pifsc.noaa.gov/do/dir_pir_strategic_plan_final.pdf

If we look back to the 2005 Pacific Islands Region marine resource plan, it is clear that the framework for a broad range of accomplishment of the objectives identified in that plan has been laid. At the same time, there remain some significant gaps in our capabilities.

The Hawaiian Archipelago Marine Ecosystem Research plan, an interagency plan including the Hawaii Division of Aquatic Resources, the Papahānaumokuākea Marine National Monument, the University of Hawaii, the U.S. Fish and Wildlife Service, the Western Pacific Regional Fishery Management Council, and PIFSC, was an effort to identify the broad themes that should guide ecosystem research in the Hawaiian archipelago. It laid out an ambitious menu of ecosystem-oriented research opportunities, including:

The plan identifies six research themes important to management including:

- (1) ecosystem indicators and metrics
- (2) native biodiversity and invasive species
- (3) connectivity
- (4) human interactions
- (5) resilience and recovery
- (6) modeling and forecasting.

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This menu of research themes remains relevant, and in many cases its approach is found in our current orientation. [Hawaiian Archipelago Marine Ecosystem Research (HAMER), 2008. http://www.pifsc.noaa.gov/tech/NOAA_Tech_Memo_PIFSC_14.pdf]

BACKGROUND

Function and Mission of the Center

The Pacific Islands Fisheries Science Center (PIFSC) was established in 2003 with the creation of the Pacific Islands Region within NOAA Fisheries and is headquartered in Honolulu, Hawaii. The Center is responsible for research on federally managed marine fisheries, protected species such as the endangered Hawaiian monk seal and other marine mammals and sea turtles, and ecosystems in the entire western and central Pacific Ocean, including coral reefs, insular (near island) habitats and pelagic (open ocean) environments, and the human communities that rely on these natural ecosystems.

The PIFSC mission is linked directly to the NOAA strategic plan and, in particular, NOAA's ecosystem mission and its Healthy Oceans goal. We look to engage "an integrated, cross-agency, interdisciplinary ecosystem approach to research that incorporates social sciences into the research design and is based on an understanding of ecosystem dynamics is critical if we are to support and sustain the ecosystem services that are key elements of NOAA's mission and mandates."

In providing scientific information to support an ecosystems approach to the conservation, management and recovery of living marine resources, PIFSC has adopted a multidisciplinary strategy. The strategy involves integrated data collection and monitoring of marine resources and their environment and communities; scientific research programs with activities focused on near-shore and pelagic fisheries, coral reef species and habitats, marine mammals and sea turtles, marine ecosystems and oceanography; socio-economic indicators such as demographics, measures of

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community knowledge, attitudes, and perceptions, and cost-earnings ratios for commercial fishing vessels; and conservation and management advice directly related to domestic and international conservation and management obligations.

This monitoring and research is authorized by several major mandates:

- Magnuson-Stevens Fishery Conservation and Management Act (reauthorized in 2006)
- Marine Mammal Protection Act (MMPA) of 1972
- Endangered Species Act (ESA) of 1973
- Coral Reef Conservation Act (CRCA) of 2000
- International treaties, primarily regional fishery management organizations related to the management of tuna fisheries
- U.S. government administrative (such as those governing our basic operations and ethical responsibilities) and executive orders (such as those that created the marine national monuments in the Pacific).

The Center's research supports NOAA Fisheries goals in several broad areas:

- Maintaining healthy and sustainable fisheries and fishing communities
- Domestic and international management of fisheries, enabling maximum long-term, sustainable benefits to U.S. fishermen, coastal communities, indigenous people, the seafood industry, and consumers.
- Conserving marine habitats and ecosystems
- Building an understanding of marine habitats and associated biological communities, the ecosystem services they provide, and the forces affecting them, including climate change.
- Recovering protected species
- Assessing and monitoring populations of marine mammal, sea turtles, and other protected marine species and identify ways to restore them to healthy population states.

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Other Activities

- The Center's administrative and technical support staff provides critical services enabling our research endeavors. In addition, our scientific staff is often called upon to take time from the Center's normal activities to join a NOAA task force or lead an agency team in response to an urgent, unplanned mission requirement.

Most of our fisheries research tends to be focused on particular species and groups of species that fall under Federal interest, and their ecosystems, rather than on the particular fishing gears used to harvest these species or the motivations for those harvests. This means we are not “commercially” focused nor “recreationally” focused, but we do need to be sure that we monitor fisheries across a broad spectrum of motivations and interests. We rely on our fishery agency partners to help in monitoring the broad spectrum of fisheries through our WPacFIN program (Western Pacific Fishery Information Network, a multi-agency collaboration) and we partner with the NOAA Fisheries Marine Recreational Information Program (MRIP) and the State of Hawaii specifically for recreational/non-commercial fisheries information. Some activities are largely focused on commercial fisheries, such as the American Samoa and Hawaii longline fisheries that are regulated by NOAA Fisheries in this region. Some activities are more focused on recreational/non-commercial fishing interests, such as our barbless hook outreach in Hawaii. Insuring that we hear what each sector of our region's fisheries has to say is important to making sure information is relevant and we are gaining from the experience of a broad range of ocean users, and in particular, from fishermen who collectively spend many more hours on the ocean than our research missions can hope to match.

Protected species research and recovery programs monitor the status of the Hawaiian monk seal and sea turtles in the Pacific and identify the factors affecting their population, health, and recovery. Human Dimensions Research Program staff provide

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technical expertise to PIRO for conducting study on knowledge and perceptions of monk seals. A newer component of the Protected Species program is focused on surveys of cetacean populations in the central and western Pacific.

Other PIFSC research investigates the structure and dynamics of central North Pacific marine ecosystems and how marine populations are affected by changes in their predators, prey, and habitat, and by ocean climate. With the establishment of the new Pacific marine National Monuments (Marianas Trench, Pacific Remote Islands, and Rose Atoll), PIFS will partner with other scientists and resource agencies to conduct the monitoring and research necessary to manage these resources. And across these physical-biological domains, PIFSC conducts research on the social, cultural, and economic environment and the consequence of potential regulatory measures on these communities.

PIFSC leadership and scientists also engages with other NOAA offices and agencies in the region, and indeed, on the west coast and across the nation. We have conducted collaborative AUV (autonomous underwater vehicle) research with the Northwest Fisheries Science Center and our corals research methodology is coordinated (although different due to different habitats and different concerns) with the Southeast Fisheries Science Center. We collaborate with the Southwest Fisheries Science Center on sea turtles, pelagic fisheries and cetaceans, and ecosystem science. We collaborate with the Alaska Fisheries Science Center on cetaceans and ecosystem science. Many of our scientific specialties benefit from engagement across the nation, such as our economics and social science programs.

History

The Center was founded in 2003 on 55 years of federal marine fisheries research dating back to the founding of the Pacific Oceanic Fishery Investigations in 1948 and its transition to NOAA's Honolulu Laboratory in 1970 within the Southwest Fisheries Science Center of La Jolla, CA. In six decades of scientific studies, Center staff and

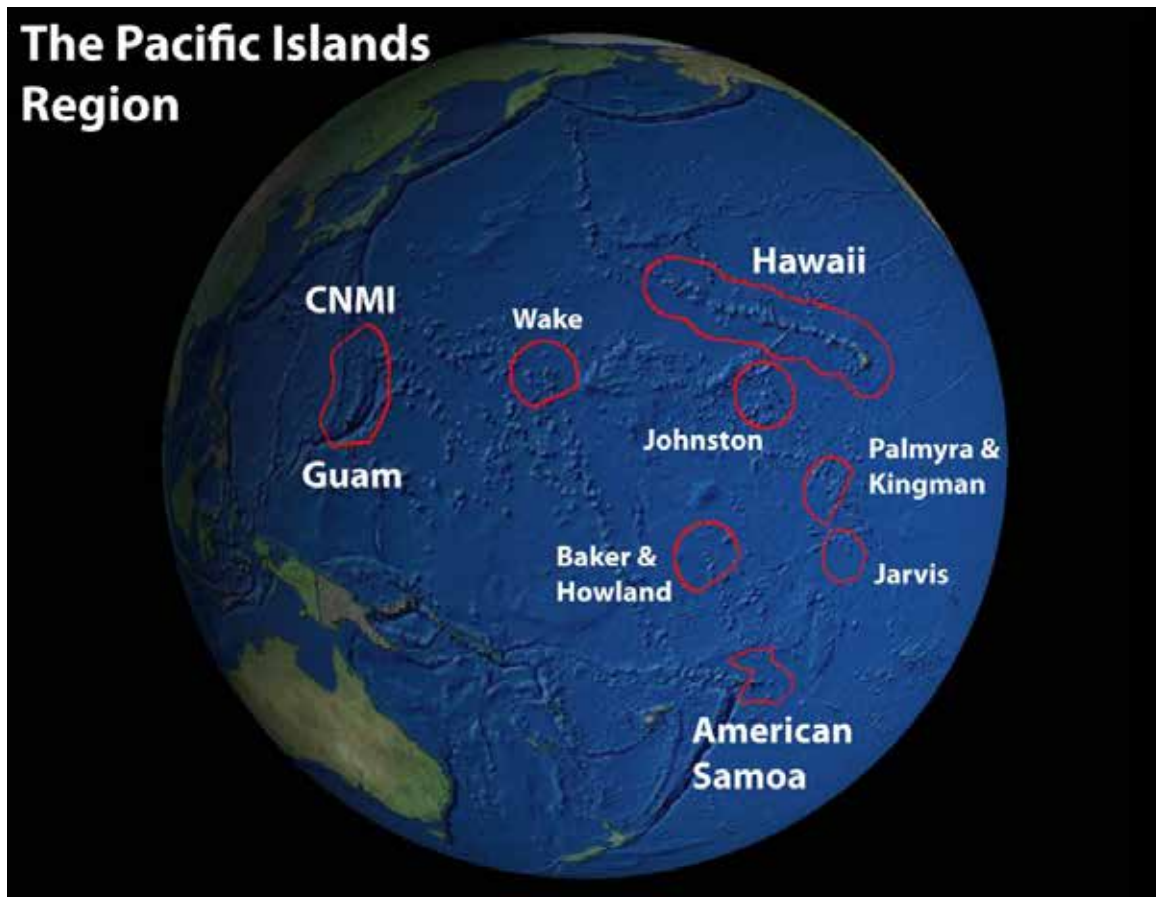
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their predecessors have engaged in oceanographic research, fishery resource exploration, fisheries development, fisheries biology and ecology, socio-economic and human dimensions research, and protected species recovery research and conservation throughout the Pacific and as far away as the Indian Ocean. More recently, the Center has established extensive programs in coral reef ecology through collaboration with NOAA's Coral Reef Conservation Program.

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Geographic Area of Responsibility

Bounded by the Hawaiian Archipelago in the north, American Samoa and U. S. Pacific Remote Island Areas in the south, and the Mariana Archipelago in the west, the Pacific Islands Region encompasses the largest geographical area within NOAA's jurisdiction. The U.S. Exclusive Economic Zone (EEZ) within the Region includes more than 1.7 million square nautical miles of ocean, roughly equal to the total EEZ of the continental United States and Alaska. PIFSC also shares responsibility for research on living marine resources in the high-seas areas of the central and western Pacific.



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Organization

The Center is organized into four major research divisions as well as one separate research group and several support programs.

- Coral Reef Ecosystem Division (CRED)
- Ecosystems and Oceanography Division (EOD)
- Fisheries Research and Monitoring Division (FRMD)
- Protected Species Division (PSD)
- Socio-economics Group

The Operations, Management, and Information (OMI) Division has two programs providing essential support across the Center:

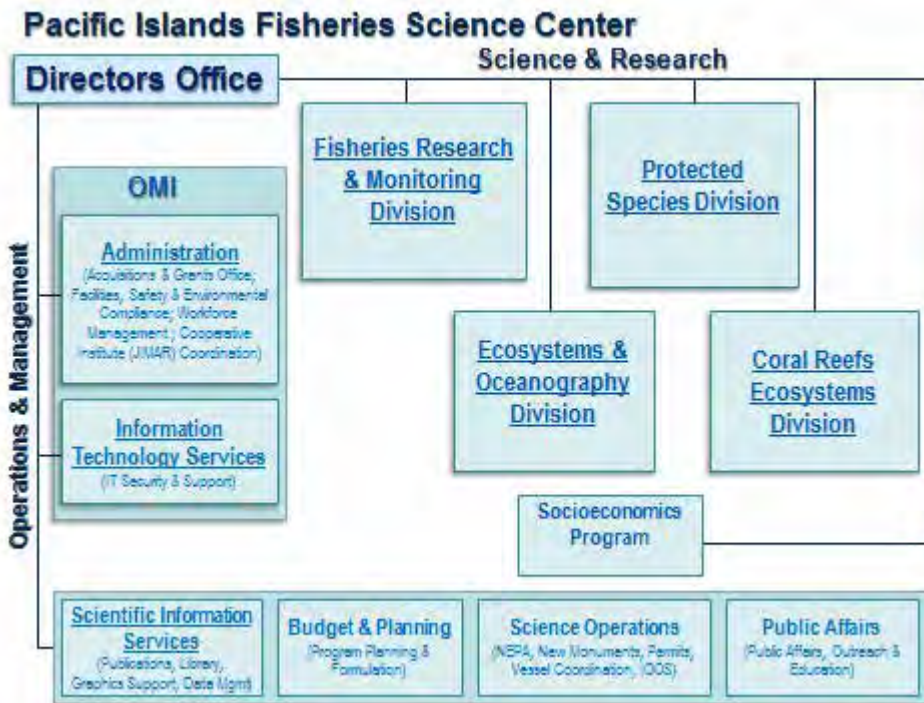
- Administrative Services
- Information Technology Services

In addition, there are a variety of programs managed directly by the Directors' Office, including

- Scientific Information Services
- Scientific Operations
- Budget & Planning

Public affairs and outreach are shared with the NOAA Fisheries Pacific Islands Regional Office.

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Budget and Staffing

In fiscal year (FY) 2012 the PIFSC budget was \$31 million and supported a staff of 240 researchers, technical personnel, and administrative employees. Almost the Science Center's entire budget supports the NOAA ecosystems mission and its Healthy Oceans goal³. Three of its objectives are central to the work of PIFSC: Improved understanding of ecosystems to inform resource management decisions; Recovered and healthy marine and coastal species; and Healthy habitats that sustain resilient and thriving marine resources and communities.

³ <http://www.ppi.noaa.gov/goals/>

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PIFSC programs also include many scientists and seasonal technical staff employed by the NOAA Joint Institute for Marine and Atmospheric Research (JIMAR) through the Research Corporation of the University of Hawaii (RCUH) as well as some private contractors. Several UH students also work at the Center or are engaged in graduate research with Center projects, and Center scientists serve as affiliate and adjunct faculty and are on graduate student committees within the university.



**Pacific Islands Fisheries Science Center
FY10-12* Budget Summary & Comparison**

	<u>FY-10</u>	<u>FY-11</u>	<u>FY-12*</u>
Protected Species: (Hawaiian monk seal, sea turtles, cetaceans)	\$ 8,212,377	\$ 6,012,919	\$ 4,880,308
Fisheries: (Monitoring, assessments, biology, oceanography, WPacFIN)	\$10,519,077	\$11,163,379	\$ 9,705,603
Center Operations:	\$ 4,826,448	\$ 4,555,660	\$ 4,353,262
Coral Reef Ecosystems: (including marine debris)	\$ 5,251,929	\$ 4,457,444	\$ 3,887,500
Congressional Directives: (PFRP, Oceanic Institute, WP IEAs)	\$ 2,147,850	\$ 0	\$ 0
TOTAL (all sources)	\$ 30,957,681	\$ 26,189,402	\$ 22,826,673

* FY12 initial allocation – likely to be increased but not fully

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[Note that these graphics will be updated to reflect full FY12 budget allocations, which was \$31 million in Total (all sources).]

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Division	Federal	Non-Fed	Total
Directors Office	20	13	33
OMI	30	4	34
FRMD	28	29	57
PSD	14	29	43
EOD	6	6	12
CRED	5	51	56
Total	103	132	235

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Facilities and Vessels

PIFSC is currently located at five sites in Honolulu: the original facility and largest number of staff are located on Dole Street, adjacent to the University of Hawaii at Manoa campus. PIFSC marine mammal, socioeconomics, Western Pacific Fishery Information Network (WPacFIN), and scientific operations programs are located in offices adjoining the PIRO headquarters on Kapiolani Boulevard in downtown Honolulu by Ala Moana. A small seawater research facility was located at Kewalo Basin on the Honolulu waterfront for over 40 years that enabled research on live, large pelagic fishes, monk seals, and sea turtles. This location is now the site of most of the Center's coral reef ecosystem program. Offices and a wet laboratory supporting fish biology work are leased in Aiea near Pearl Harbor. Several fisheries monitoring staff utilize a joint NOAA Fisheries office at Pier 38 dockside in Honolulu, and a small number of staff are working out of the new but still under construction NOAA consolidated facility on Ford Island

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(see below). There a new sea water system for live animal research has just been completed and our small boat and research cruise missions are staged from Ford Island as well which is where the NOAA ships are berthed. PIFSC staff are also stationed in American Samoa, Guam, and the Northern Mariana Islands as well as temporary assignments on the continental U.S. and operations in foreign countries.

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A NOAA-wide consolidation facility for Honolulu is expected to be completed by early 2014, at which time PIFSC will vacate its existing facilities (including the Dole Street laboratory which will return to the University of Hawaii). The facility will be on Ford Island on the U.S. Navy Base Pearl Harbor in renovated historic World War II hangers.



Drawing of NOAA Regional Center, Ford Island



Current status of construction, August 2012.

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The NOAA ship Oscar Elton Sette, home-ported at Ford Island in Honolulu, is the primary research vessel supporting the Science Center's extensive field activities. Center staff also conduct benthic habitat mapping and other coral reef ecosystems monitoring activities aboard the NOAA ship Hi'ialakai in partnership with NOAA's National Ocean Service. PIFSC also has about 30 small boats, ranging from 14 to 25 ft. in length, to facilitate near-shore research. Both NOAA ships as well as the small boats are based at the Ford Island facility.



NOAA ship Oscar Elton Sette

RESEARCH AND MONITORING FOCUS

PIFSC is organized into five research programs that define the underlying focus for our research and monitoring activities although there is not a strict separation of the types of activities between these programs. As a way to manage the breadth of activities our research programs undertake, PIFSC operates on a system of milestones that mark key areas of research and monitoring activity. Of the 114 milestones in FY12, 41 were for

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operations and management of the Center and 67 were for research and monitoring activities. These milestones are tracked quarterly to identify areas of success and areas where efforts are off course and need intervention. These milestones cover a broad range of topics, of which several are identified here:

- Monitoring and identifying methods for reducing fishery interactions with protected species
- Assessing the status of Hawaiian monk seals and finding ways to increase their survival and population sustainability
- Conducting population assessments of deepwater snappers, groupers and jacks (bottomfish) in the main Hawaiian Islands and both shallow and deepwater fish in American Samoa, Guam, and the Northern Mariana Islands.
- Monitoring the status of marine turtle populations in the Pacific
- Assessing cetacean populations and the effects of human activity
- Assessing the stocks of tunas, billfishes, sharks, and ecologically related pelagic species and providing scientific advice in support of international and domestic management of fisheries that catch these species
- Researching the use of barbless circle hooks by recreational fishers to reduce post-release fish mortality and risks of injury to protected species
- Expanding the understanding of socioeconomic and cultural aspects of living marine resource use and management throughout the region
- Assessing the physical and biological structure, dynamics, and health of coral reef ecosystems
- Monitoring and removing derelict fishing gear and other marine debris from reefs and near-shore waters of the Hawaiian Archipelago

Expanding our fisheries and ecosystems monitoring and research in the waters of American Samoa, Guam, and the Northern Mariana Islands in cooperation with these jurisdictions to understand similarities and differences across the Pacific islands region

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The research activities underlying these kinds of milestones are intended to meet NOAA objectives, both nationally and locally, and each activity represents broad scale and detailed planning at both the budget and project planning levels.

PIFSC program planning is a part of the NOAA budget planning process that is focused on agency level goals (e.g., the Healthy Oceans Goal) to which PIFSC has input through the NOAA Fisheries Office of the Chief Scientist and the NOAA Fisheries Office of Science and Technology, as well as through the NOAA Coral Reef Conservation Program. The PIFSC budget planning process involves extrapolating current costs profiles into the next two fiscal years and determining what activities can be conducted within the scope of expected funding in coordination with the PIFSC research divisions.

The PIFSC project planning process involves interaction with budget allocations at the NOAA Fisheries and CRCP levels (and occasionally with other NOAA offices) and the detailed requirements for conducting individual projects. In most cases, the research divisions within PIFSC are responsible for planning their individual projects. To the extent that the projects require infrastructure external to the division (e.g., the Center's Oracle databases, the NOAA ships, or resources from other divisions), the division chiefs are expected to coordinate. At the Center-level, these projects are coordinated and monitored through the Milestone system managed by the Directors Office. In some cases there are formal activity-specific plans (e.g., the new Marine National Monuments science plan or the Hawaiian Archipelago Marine Ecosystem Research Plan) or input from agency or stakeholder priorities (e.g., monk seal recovery team recommendations or the fishery management council's 5-year research plans). Information from these plans is consulted in the process of developing PIFSC center-level program planning as well in activity-level planning.

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Priorities and Research Themes

NOAA Fisheries is focusing its research and monitoring efforts on core missions to advance the science and the methodologies for assessing and managing fish stocks and protected resources related to three critical mandates:

- Magnuson-Stevens Fishery Conservation and Management Act (Magnuson Act)
- Marine Mammal Protection Act (MMPA)
- Endangered Species Act (ESA)

The fisheries science mission is a key element in ending and avoiding overfishing through the implementation of annual catch limits (ACLs), monitoring Federally-regulated fisheries on an on-going basis, and evaluating the effectiveness and social costs and benefits from these regulatory systems. We are also working on further improvements and efficiencies in fisheries science that informs management through advanced sampling technologies and next generation stock assessments. We also need to be more efficient to quickly transform available data streams into scientific advice for evaluating and adjusting management measures.

We must develop new and improved methods for assessing the abundance and distribution of species protected under the MMPA and ESA, and for the evaluation of the impacts of various anthropogenic threats. Particular areas of additional research focus include bycatch reduction research. Additional scientific needs include evaluation of threats to species being considered for listing under the ESA (shallow and deep water corals, bumphead parrotfish and false killer whales, as contemporary Pacific island examples).

Other important research areas, such as ecosystem science and response to climate change, are assessed first as they apply to the three conservation and management mandates and second as they improve the underlying scientific understanding of the ecosystems comprising the marine resources managed by NOAA

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Fisheries. The Coral Reef Conservation Act and the NOAA Habitat Blueprint are additional top level guidance for PIFSC activities.

These NOAA Fisheries focus areas are mirrored within PIFSC both in terms of program structure and in terms of the key activities within those programs. From an over-arching strategic perspective, we have chosen to organize our priorities through a series of themes and topics.

Themes

We have identified three main themes that describe our work:

Theme 1: **Monitor and Assess:** Monitor and assess the diversity, abundance, and distribution of fish and coral reef species, marine mammal and sea turtle populations, and marine ecosystems and the associated human communities that interact with these resources in the central and western Pacific.

Theme 2: **Environment and Ecosystems:** Describe and understand environmental and ecosystem linkages, oceanography, habitat, climate [change], and social effects on marine ecosystems. Develop ecosystem tools in supporting the conservation and management of marine resources.

Theme 3: **Maximizing Effectiveness:** Maximize the efficiency, effectiveness, transparency, and public accessibility of our research by strengthening partnerships and providing useful scientific information products, services, and advice to resource managers, policy makers, stakeholders, and the public.

In developing this strategic plan, we chose not to mirror our existing budget and program structure by simply laying out those programmatic areas since in general they are at too high a level of generality to really force the consideration of priorities and trade-offs amongst activities. Instead we asked the staff in the PIFSC research divisions to identify activities that currently exist or should comprise our research and monitoring

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portfolio. We have identified approximately 65 current activities which are components of our existing research programs, approximately 30 related to maximizing the effectiveness of our research and monitoring activities, and almost 70 activities that might be significantly expanded from current levels of activities or conducted in the future. These have been grouped into 15 topics and collectively these topics and activities helped frame the three research and monitoring themes.

We have laid out these Topics and some, but not all, of these Activities in the following pages and we acknowledge that we will not be able to fully implement all of these activities. We do not have the resources now to do most if any of the future activities and in a number of cases we do not have resources adequate to fully meet our expectations for the current activities as well. But this is precisely why we have developed this strategic plan: to state our expectations, obtain input from key stakeholders and the general public, and to provide clear insights to our research direction.

The following elaborates on these three Themes, the key Topics under these themes, and some of the current and future Activities that might draw input as we complete this plan. {We would note that the allocation of activities to Topics is malleable as we further define the nature of the Themes and differentiate on-going from future directions.}

Theme 1: Monitor and Assess

Theme 1 Topics:

- Monitoring fisheries (logbooks, observer programs, market sampling, etc.)
- Assessing populations and stocks
- Conducting biological research (species-specific research), including bio-sampling and necropsies
- Conducting sea-going surveys and laboratory studies of living marine resources
- Investigating socio-economic dynamics and human dimensions

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- Researching fisheries interactions (by-catch)

Theme 2: Environment and Ecosystems

Theme 2 Topics:

- Understanding and predicting changes to marine ecosystems
- Understanding physical and biological linkages in the marine environment

Theme 3: Maximizing Effectiveness

Theme 3 Topics:

- Conducting scientific operations, logistical coordination, methods development, and data management
- Conducting scientific work in a transparent and conscientious manner
- Enhancing external collaboration and partnerships
- Evaluating and employing emerging technologies and approaches
- Helping build scientific capacity in the local community and with local academic institutions
- Providing timely scientific advice

The following elaborates on each Theme and illustrates it with some of our current and potentially future research and monitoring activities. Choosing where to focus our attention is a matter of balancing priorities in the context of available funding, and where we invest for the future.

THEME 1: Monitor and Assess

The primary responsibility of PIFSC is to provide scientific data, information and analysis and technical advice to the NOAA Fisheries Pacific Islands Regional Office (PIRO), Western Pacific Fishery Management Council and other

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conservation and management responsibilities within NOAA (e.g., the National Marine Sanctuaries Program). We also have a responsibility to partner with the State of Hawaii, the Territories of American Samoa and Guam, the Commonwealth of the Northern Mariana Islands, and with U.S. representatives participating in international fishery negotiations as well as the fishing industry, other agencies of NOAA and the Federal government, the U.S. Fish and Wildlife Service, university and other scientific research partners, both domestic and international, and the general public. The work of monitoring and assessing fish and marine mammal populations, fisheries, and marine ecosystems, and economies and societies are mandated by legislation and public policy.

Topics and Typical Activities under Theme 1: Monitor and Assess

Conducting sea-going surveys and laboratory studies

- Fishery-independent insular resource surveys using cooperative research with fishermen
- Fishery-independent insular resource surveys using advanced technologies for surveying resource abundance and factors affecting abundance, and for collecting samples.
- Conducting annual census of Hawaiian monk seals in the Northwestern Hawaiian Island
- Conducting surveys of cetacean populations the central Pacific
- Conducting surveys to monitor the status of the region's coral reef ecosystem

Monitoring fisheries (logbooks, observer programs, market sampling, etc.)

- Fishery-dependent data collection via logbooks, observers, VMS (vessel monitoring system), electronic data submission, State and Territorial agency data collection and surveys, and recreational fishing surveys.
 - § Insular domestic fisheries
 - § Pelagic high-seas fisheries

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- Fast-track quota monitoring and forecasting of regulated fisheries.
- Bio-sampling of life history parameters to enhance stock assessments
- Enhanced Western Pacific Fishery Information Network (WPacFIN) program for fishery dependent data

Assessing populations and stocks

- Assessment of the status and dynamics of monk seal populations
- Assessment of the status and dynamics of cetacean populations in the central Pacific
- Assessment of the status and dynamics of sea turtle populations
- Interdisciplinary coral reef ecosystem assessment/long-term monitoring, reef fish and biodiversity assessments
- Assessment of the status of insular fishery stocks as well as pelagic fisheries stocks through international collaborations

Investigating socio-economic dynamics and human dimensions

- Conducting cost-earnings studies, fishing vessel trip costs and data collection (econ add-ons to observer program and creel surveys), including new data elements affected by potential catch share programs: crew numbers and compensation, safety at sea, season length, and industry consolidation.
- Conducting on-going surveys of fishing communities

THEME 2: Environment and Ecosystems

Oceanographic and other physical features affect all areas under the research responsibility of PIFSC. PIFSC has extensive oceanographic and ecosystem research programs in the central and western Pacific Ocean, including both insular and pelagic habitats, and is carrying out research to improve our understanding of the manner in which these ocean ecosystems and

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human communities may respond to climate change. PIFSC needs to develop and conduct baseline assessments throughout this region with a particular focus on areas that support critical fisheries, protected species populations, and coral reef ecosystems and human communities. PIFSC conducts research to understand the role habitat (Essential Fish Habitat (EFH) and Critical Habitat in endangered species considerations) plays in the health and sustainability of the region's fish, marine mammal, and sea turtle populations and coral reef ecosystems. The Magnuson-Stevens Act requires NOAA Fisheries to designate EFH and minimize the effects of fishing and non-fishing activities on these habitats. The ESA requires the Federal government to designate Critical Habitat for any Endangered Species Act species.

Another key consideration under Theme 2 is the archipelagic nature of the environment and indeed cultures of the Pacific islands, including the differences between individual islands, atolls, and islets, as well as off-shore banks, within a particular archipelago, and the differences between the three main archipelagos and the remote island areas (Palmyra, Wake, Johnston Atoll, etc.). Being able to compare and contrast environmental and ecosystem effects across a broad spatial spectrum is an important component of this theme.

Topics and Typical Activities for Theme 2: Environment and Ecosystems

Understanding and predicting changes to marine ecosystems

- § Preparing oceanographic integrated forecasts for by-catch mitigation (e.g., Turtle Watch)
- § Using cruise, dive, satellite, and fisheries data to monitor insular and pelagic ecosystems.
- § Assessing, understanding, and predicting impacts of climate, ocean acidification, fishing, and other human activities on coral reef ecosystems.

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- § Influences on protected species and modeling biological linkages with the environment.
- § Conducting oceanographic surveys to understand physical and biological linkages that drive marine ecosystems

Investigating socio-economic dynamics and human dimensions

- § Estimate benefits, costs and externalities of fishery regulations
- § Evaluate the effects and effectiveness of conservation and management measures including bigeye and yellowfin tuna and main Hawaiian Islands bottomfish quotas and swordfish closures
- § Estimate benefits, costs and externalities of protected species and habitat regulations
- § Estimate the effect of non-fishery developments, e.g., Guam military buildup, American Samoa cannery closures, aquaculture and aquarium fish collection, gentrification, and restricted access to coastal sites.

Researching fisheries interactions (by-catch)

- § Estimate bycatch and understand factors that may mitigate bycatch through analysis of fishery-dependent data
- § Estimate bycatch and understand factors that may mitigate bycatch through analysis of laboratory and fishery testing of modified fishing methods, and investigation of post-release survival using NOAA Fishery Research Vessels, cooperative research, and contracted platforms for research fishing.

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Theme 3: Maximizing Effectiveness

PIFSC has a broad science enterprise that has developed substantially over the past 8 years from our previous manifestation as a laboratory associated with the NOAA Fisheries Southwest Fisheries Science Center in La Jolla, California. Developing the infrastructure required to provide an efficient research platform and a basis for meeting the growing diverse needs of its stakeholders, particularly as the responsibilities of the NOAA Fisheries Pacific Islands Region have expanded, has been challenging. But it is important to meet these demands, both internally and externally.

Topics and Typical Activities for Theme 3: Maximizing Effectiveness

Conducting scientific operations, logistical coordination, methods development, and data management

- Maintain Infrastructure & operational capacity and capabilities such as laboratories and specialized equipment, marine sampling gear (e.g., trawls and longline reels), veterinarian services, oceanographic sensors and sea water analysis, tissue banks, database support, genetics, stable isotopes
- Comprehensive planning and implementation for data collection to meet specified objectives and purposes with development of advanced technologies and with responsive adaptation to feedback from data users.

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Conducting scientific work in a transparent and conscientious manner

- Preparing appropriate documents to plan and permit research under the National Environmental Policy Act (NEPA) and similar statutes
- Development and maintenance of safe and productive research infrastructure especially laboratories, ships, small vessels, diving facilities, and live animal care facilities.
- Dissemination and availability of information and scientific services through the editorship of Fishery Bulletin and other publication of peer reviewed research
- Providing informative scientific material through a range of venues, including the Internet, Intranet, and social media, and outreach activities.

Enhancing external collaboration and partnerships

- External collaboration and partnerships: working with local jurisdictions, other agencies, academic, international partners, and public interest groups
- Enhance public outreach & media capability.
- Conducting international multilateral and bilateral scientific collaboration (e.g., Coral Triangle Initiative, South Pacific Regional Environmental Program, PICES (North Pacific Marine Science Organization), etc.)

Evaluating and employing emerging technologies

- Develop and implement emerging technologies such as acoustics, biotelemetry, optics, gliders and rovers, new analytical techniques for survey requirements
- Employ advanced technologies and quantitative methods - using a range of technologies (electronic tags, satellite oceanographic data, acoustic data, etc.) and numerical models (ecosystem, climate, and oceanographic models), and other quantitative tools in marine ecosystem studies.

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Helping build scientific capacity in the local community and with local academic institutions

- Conducting internship programs for high school and college students (nationally and regionally)
- Enhancing PIFSC capacity in American Samoa, Guam and the Northern Mariana Islands, as well as the neighbor islands of Hawaii, across our research programs
- Help build scientific capacity in the region through exchanges and technical assistance

Providing timely scientific advice

- Providing scientific information and advice for
 - § domestic fishery management decision-making
 - § ESA Section 7 and related analysis for conservation decision making
 - § International RFMOs (regional fishery management organizations) for high-seas fisheries, by-catch reduction, etc.
- Conducting ESA status reviews for listing/delisting decision making

Life Cycle aspects of research

Integral to the PIFSC science plan is the understanding that much of our work involves a “life cycle” of activities from monitoring and observation to understanding functions and dynamics to prediction of future states (and subsequent evaluation and feed-back) to provide scientific information for conservation and management decision-making that is repeated on an on-going and regular basis. Thus there are many core activities under the first Theme that are long-term, on-going activities that are critical to the success of the assessment process. What this means in strategic terms is that some activities are strongly inter-related and a failure to invest in “up-stream” activities

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will impoverish downstream activities, increasing the uncertainty and/or timeliness of the scientific information we provide for conservation and management.

The strongest examples of this “life cycle” approach relates to the population assessments carried out by various programs within PIFSC. As an example, consider a recent fishery assessment that involves the following steps that take place over one-two years and are retaken every five years.

Research and monitoring life cycle for fisheries population assessments

- a) Continuous monitoring of catch, effort and landings (WPacFIN surveys and Federal longline logbook monitoring)
- b) Collection of life history parameters (through the new PIFSC bio-sampling program, including at-sea and dockside)
- c) Estimation of life history parameters (through the PIFSC life history program’s laboratory work in collaboration with academic partners)
- d) Population assessment model development, including professional publication of new modeling approaches
- e) Compilation of historical catch, effort and landings data, including development of meta-data describing these data for use in assessments
- f) Development of standardized catch per unit effort (CPUE) time-series
- g) Assessment modeling and projections, applying data to the developed models and projecting future biomass conditions relative to various management reference points
- h) Presentation of results to stakeholders and resource managers
- i) Peer review of assessments and evaluation
- j) Provision of assessment information for conservation and management decision-making
- k) Quota monitoring and forecasting
- l) Evaluation of effectiveness

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Other research activities may not represent such a regular cycle but many similarly build over time, such as implementation of a multi-year Integrated Ecosystem Assessment (IEA) at a particular site that builds various components of a descriptive system and its eventual expansion to a broader spatial scale.

Clearly the line between observation – understanding – prediction in the two research themes is not precisely drawn. The assessment activities under Theme 1 involve both monitoring, understanding and prediction but instead of breaking them apart into different themes they are grouped together under the rubric of assessment which is at the heart of most of our legislative mandates. Similarly, while the activities in Theme 2 represent similar life cycles, they represent a broader look at the processes of the ecosystems underlying the assessments of Theme 1.

Research infrastructure and support

PIFSC research activities require the active development and improvement of PIFSC infrastructure and support capabilities. PIFSC maintains the infrastructure for critical information technology functions, laboratory facilities, field sampling, and administrative activities including human resources, acquisition and grants, safety, facilities management, budget planning and execution, etc. Clearly these operations are critical to successful implementation of our research and monitoring program and we intend to address this work in a follow-up strategic plan for our Operations, Management and Information (OMI) Division.

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Scientific and Support staff

Similarly PIFSC research activities require dedicated and knowledgeable scientific, technical and support staff to design and conduct surveys, compile data, stage and maintain critical equipment and instruments, analyze and publish results, manage facilities and conduct the basic administrative functions that make this possible. PIFSC should be an exemplary place to work, a place where the work is not only fascinating and important but also where the workplace is professional and rewarding. Basic workforce management capabilities that are within control of PIFSC such as training, recognition, and supervision need to be highlighted. This applies as much to the JIMAR and contract staff as to the Federal employees at PIFSC even though different personnel systems apply to these different categories of staff.

PIFSC must continue to dedicate staff and budgetary resources for operations and administrative functions. Continued information technology support is critical to ensure computer systems are secure and functional and to develop and maintain necessary databases and applications for research and administrative functions. Laboratory, field, and office safety is a priority and an essential part of successful performance of PIFSC research. Staff with expertise and resources to manage our procurement, personnel, travel management and security systems, oversee budget formulation and execution, maintain our facilities and ensure workplace safety and environmental compliance are critical to the Center's success as a scientific organization.

The PIFSC scientific publications program provides publication, web, graphics, outreach, and education services to promote and support effective communications of our scientific research activities and findings to a broad audience.

PIFSC established a Data Management Steering Committee to provide advice and direction on the development and implementation of data management strategies and polices and ensure that they are consistent with NOAA and NFMS directives.

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Additionally this committee is responsible for the development and oversight of Center data management guidelines and best practices procedures and metrics to ensure data stewardship, preservation and access within and across research divisions.

Strategic Orientation

Research under these themes is intended to provide answers to broad-scale strategic questions related to the PIFSC mission of providing timely, high-quality scientific information for conservation and management decision-making that are common across different types of enterprises. These include:

- **Mandate:** To what extent does this activity represent a clear mandate?
- **External:** Is this activity highly valued by stakeholders?
- **Basic Science:** How does this activity support broader scientific understanding of Pacific island and high seas ecosystems, support the internal cohesion and excellence of our science enterprise?
- **Future:** What activities should PIFSC be conducting in 5 years that we are not conducting in a significant manner now?

We have not conducted this analysis on all of the Topics and Activities underlying our three research Themes as yet. This draft of the PIFSC Science Plan provides an overall view of priorities in meeting our mission. It needs to be correlated with scientific information priorities from our conservation and management agency partners, as well as with broader social priorities, including those from our academic partners. We are providing this plan as an avenue for taking input on these priorities and intend to revise the final plan with this input in mind.

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Consistency with key stakeholder needs and priorities

We have reviewed the stated priorities from agency-related stakeholders such as the Western Pacific Fishery Management Council, the Hawaiian monk seal Recovery Team, the false killer whale Take Reduction Team, and we have initiated discussions where appropriate to clarify similarities and differences in research priorities. We provided a draft of this plan within the agency through the NOAA Regional Collaboration Team for the Pacific islands. The plan will also be made available for discussion with private sector stakeholders, including our academic partners.

We believe that this plan at the broad, general level at which it is constructed, is consistent with the priorities of our fellow agencies although it differs in many areas. Our mandates are broad and while the overlap with each of our stakeholder interests and mandates, they are not the same. Implementing a strategic science plan requires an on-going process of testing priorities against reality and against the wise input of our stakeholders and the public. We intend to further develop the mechanisms for such validation. Ultimately we are judged by the results we provide these stakeholders and society as large, including marine resource science.

Once the draft PIFSC Science Plan is reviewed and revised, it will lead to the development of an implementation plan outlining the processes for resource allocation decision-making and communication to accomplish core activities and high priority research. While these plans are envisioned as separate documents, they will work together as guiding documents for PIFSC long-term and short-term decision-making.

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Conclusion

The PIFSC science plan is part of a multi-faceted strategy for equilibrating our research and monitoring activities to the scientific information needs of our partners as well as keeping up with changing methods and standards of scientific research. For the last five years we have conducted external reviews of facets of our scientific enterprise.

http://www.pifsc.noaa.gov/do/reports.php#external_reviews

We also conduct external peer reviews of individual research products under the NOAA Fisheries contract with the Center for Independent Experts, and we insure that our benchmark and foundational research is submitted to professional journals. We have conducted confidential surveys of our stakeholders to see how we are progressing and we are engaged in collaborative research with universities and other partners. This is an on-going process of which the science plan is a key part. We look forward to your input.

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