

# PACIFIC ISLANDS FISHERIES SCIENCE CENTER



## PIFSC Science Plan (2013)

Samuel Pooley

March 2013

Administrative Report H-13-01



## **About this report**

Pacific Islands Fisheries Science Center Administrative Reports are issued to promptly disseminate scientific and technical information to marine resource managers, scientists, and the general public. Their contents cover a range of topics, including biological and economic research, stock assessment, trends in fisheries, and other subjects. Administrative Reports typically have not been reviewed outside the Center. As such, they are considered informal publications. The material presented in Administrative Reports may later be published in the formal scientific literature after more rigorous verification, editing, and peer review.

Other publications are free to cite Administrative Reports as they wish provided the informal nature of the contents is clearly indicated and proper credit is given to the author(s).

Administrative Reports may be cited as follows:

Pooley, S.  
2013. PIFSC Science Plan (2013). Pacific Islands Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Pacific Islands Fish. Sci. Cent. Admin. Rep. H-13-01, 22 p.

---

## **For further information direct inquiries to**

Chief, Scientific Information Services  
Pacific Islands Fisheries Science Center  
National Marine Fisheries Service  
National Oceanic and Atmospheric Administration  
U.S. Department of Commerce  
2570 Dole Street  
Honolulu, Hawaii 96822-2396

Phone: 808-983-5386  
Fax: 808-983-2902

Pacific Islands Fisheries Science Center  
Administrative Report H-13-01

PIFSC Science Plan (2013)

Samuel Pooley  
Pacific Islands Fisheries Science Center  
National Marine Fisheries Service  
Directors Office  
2570 Dole Street  
Honolulu, Hawaii 96822

March 2013



## CONTENTS

Purpose.....	1
Context.....	2
Background.....	4
Priorities and Research Themes.....	10
Strategic Choices .....	19
Conclusion .....	22

(This page is left blank intentionally.)

## PURPOSE

The Pacific Islands Fisheries Science Center (PIFSC)<sup>1</sup> 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 provide the framework for organizing and prioritizing our research and monitoring activities and communicate this framework in a way that:

- shows the full suite of research under major themes so that the public, our key stakeholders, and our staff can see how the work of one part of PIFSC contributes to PIFSC as a whole and to our applied scientific information mission, and
- identifies our strategic mandates that lead to our key research and monitoring activities and inform our budget planning process.

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 systematic nature and transparency of these decisions both within the agency and for the public. We expect this plan, and the planning process it incorporates, including input from our stakeholders and the general public<sup>2</sup>, to better position PIFSC in meeting these challenges by more clearly stating our core and desired research activities, providing increased focus, and enabling a concentration of PIFSC resources to meet our obligations for providing high-quality, timely scientific information for conservation and management.

---

<sup>1</sup> Government agencies swim in a world of acronyms. Departing from normal practice, we have spelled those out in many cases throughout the document, rather than just in their first occurrence, to make reading the document easier.

<sup>2</sup> The draft plan was provided to other NOAA offices as well as our stakeholders and the general public in October 2012. [<http://www.pifsc.noaa.gov/media/>]

## CONTEXT

The PIFSC Science Plan, and indeed PIFSC research and monitoring activities, occurs 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<sup>3</sup> and the NOAA Annual Guidance Memorandum<sup>4</sup>.

Not all aspects of NOAA's strategic plan are immediately relevant to PIFSC, but we are a part of the greater NOAA whole and our contributions 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, and is increasingly making major contributions to the NOAA Fisheries mission related to fisheries and protected species management. Our science products and our scientific staff are also utilized within the NOAA Sanctuary program for their conservation goals.

We 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.

NOAA has also initiated Regional Collaboration networks<sup>5</sup> across the nation whose objectives include synthesizing regional trends, needs, and capabilities to achieve NOAA's mission priorities and in which PIFSC is fully involved. PIFSC research capabilities could be applied more fully to a number of NOAA missions, including sanctuaries, marine protected areas, and marine national monuments, sentinel sites, coastal and watershed ecosystems, and climate change, and this provides an additional venue for programmatic coordination for NOAA science in the Pacific islands.

---

<sup>3</sup> National Oceanic and Atmospheric Administration, Next Generation Strategic Plan (December 2010) <http://www.ppi.noaa.gov/ngsp/>

<sup>4</sup> NOAA Annual Guidance Memorandum [<http://www.ppi.noaa.gov/agm/>]

<sup>5</sup> <http://www.ppi.noaa.gov/regional-collaboration/>

We are not starting from the beginning here in the central Pacific when it comes to strategic planning. When the NOAA Fisheries Pacific Islands Region was established in 2003, a strategic planning process was initiated with PIFSC, the NOAA Fisheries Pacific Islands Regional Office (PIRO), and the Western Pacific Fishery Management Council (WPFMC). That process led to that plan that identified 12 goals in all within the scope of the following topics:

- Develop an integrated and comprehensive science-based approach to marine resource management
- 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.<sup>6</sup>]

Several years later, the Hawaiian Archipelago Marine Ecosystem Research plan (HAMER<sup>7</sup>), an interagency plan including PIFSC, the Hawaii Division of Aquatic Resources, the Papahānaumokuākea Marine National Monument, the University of Hawaii, the U.S. Fish and Wildlife Service, and the Western Pacific Fishery Management Council, was an effort to identify the broad themes that should guide ecosystem research in the Hawaiian Archipelago. The HAMER plan laid out an ambitious menu of ecosystem-oriented research opportunities. These research themes remain relevant, and in many cases the HAMER approach is found in our current orientation. Subsequently other planning exercises were conducted within different programs within PIFSC, as well as a robust round of external reviews that provided independent advice in which direction PIFSC should take some of these programs<sup>8</sup>.

---

<sup>6</sup> [[http://www.pifsc.noaa.gov/do/dir\\_pir\\_strategic\\_plan\\_final.pdf](http://www.pifsc.noaa.gov/do/dir_pir_strategic_plan_final.pdf)]

<sup>7</sup> [Hawaiian Archipelago Marine Ecosystem Research (HAMER), 2008.  
[http://www.pifsc.noaa.gov/tech/NOAA\\_Tech\\_Memo\\_PIFSC\\_14.pdf](http://www.pifsc.noaa.gov/tech/NOAA_Tech_Memo_PIFSC_14.pdf)]

<sup>8</sup> [http://www.pifsc.noaa.gov/do/reports.php#external\\_reviews](http://www.pifsc.noaa.gov/do/reports.php#external_reviews)

## **BACKGROUND**

### **Function and Mission of PIFSC**

The Pacific Islands Fisheries Science Center (PIFSC)<sup>9</sup> is responsible for research on 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 marine ecosystems. PIFSC monitoring, research and operations are authorized by several important legislative and executive obligations:

- Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA, reauthorized in 2006 as the Magnuson Act)
- 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).

### **History**

PIFSC has evolved from 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 in La Jolla, CA. In more than 6 decades of scientific studies, PIFSC staff and their predecessors have engaged in oceanographic research, fishery resource exploration, fisheries development, fisheries biology, ecology, and stock assessment, socioeconomic and human dimensions research, and protected species recovery research and conservation throughout the Pacific and as far away as the Indian Ocean. Since 2000, PIFSC has established an extensive program in coral reef ecology through collaboration with NOAA's Coral Reef Conservation Program.

---

<sup>9</sup> More detailed information on PIFSC and each of its research programs can be found on our website at: <http://www/pifsc.noaa.gov/>

## 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 Fisheries' jurisdiction. The U.S. Exclusive Economic Zone (EEZ) within this 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.

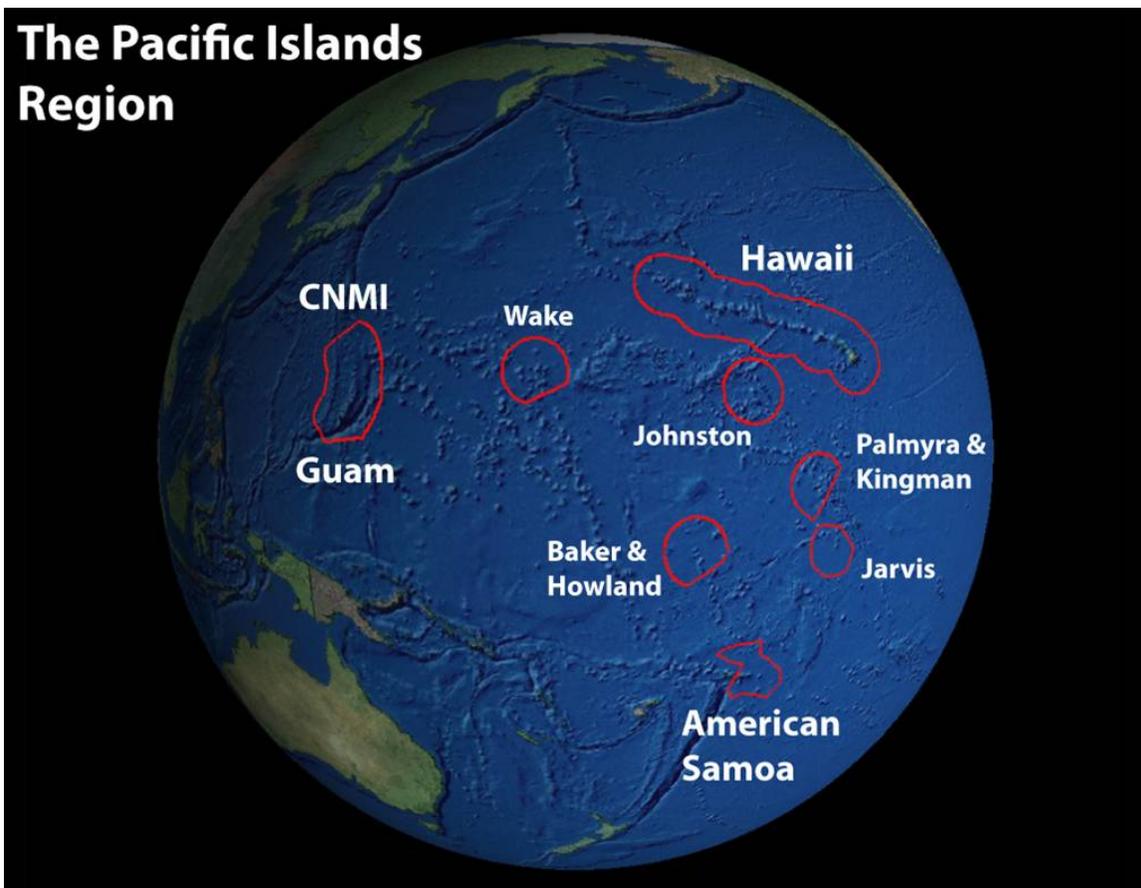


Figure 1.—PIFSC area of responsibility.

## Organization

PIFSC is organized into four major research divisions as well as one separate research group and several support programs. Public affairs and outreach are shared with the NOAA Fisheries Pacific Islands Regional Office.

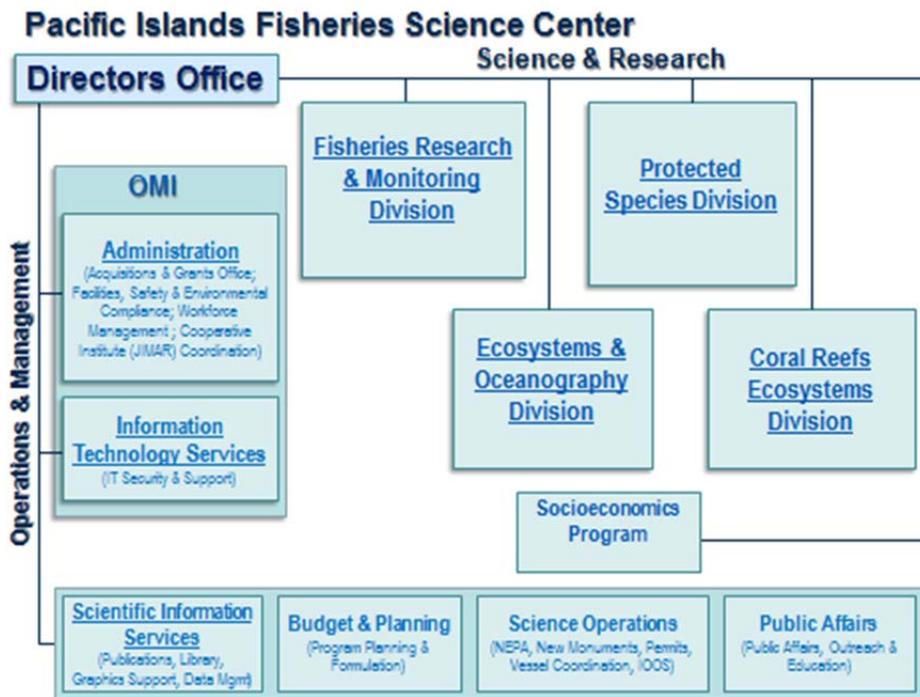


Figure 2.—PIFSC organizational structure.

### Budget and Staffing

In fiscal year (FY) 2012 the PIFSC budget was \$30 million and supported a staff of 220 researchers, technical personnel, and administrative employees, including a mixture of Federal and non-Federal staff. Some scientists and seasonal technical staff are 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 through private contractors. Many students work at PIFSC or are engaged in graduate research with PIFSC projects, and PIFSC scientists serve as affiliate and adjunct faculty and are on graduate student committees within the University of Hawaii and other universities and institutions around the world.

Approximately one third of PIFSC’s budget represents permanent allocations under the NOAA Fisheries budget, one third represents annual (temporary) allocations from NOAA Fisheries headquarters offices (primarily the Office of Science and Technology and the Office of Protected Resources), and one third represents annual (temporary) allocations from outside of NOAA Fisheries (primarily through the NOAA Coral Reef Conservation Program and relationships with other Federal agencies).

Table 1.—Pacific Islands Fisheries Science Center FY10-12 budget summary and comparison.

	FY-10	FY-11	FY-12
Protected Species (Hawaiian monk seal, sea turtles, cetaceans)	\$ 8,212,377	\$ 6,012,919	\$ 6,572,552
Fisheries (Monitoring, assessments, biology, oceanography, Monuments, socioeconomics)	10,519,077	11,163,379	13,807,957
Center Operations	4,826,448	4,555,660	6,151,522
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	\$30,419,531

Table 2.—Pacific Islands Fisheries Science Center staffing.

	Federal	Non-Feds	Total
Directors Office	30	14	44
Operations, Management & Information	17	2	19
Ecosystems & Oceanography Division	6	5	11
Fisheries Research & Monitoring Division	25	29	54
Protected Species Division	16	28	44
Coral Reefs Ecosystem Division	5	45	50
TOTAL	99	123	222

## 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's Manoa campus. PIFSC marine mammal, socioeconomics, Western Pacific Fishery Information Network (WPacFIN), and scientific operations programs are located in offices adjoining the NOAA Fisheries regional office on Kapiolani Boulevard in downtown Honolulu. A small seawater research facility was located at Kewalo Basin on the Honolulu waterfront that for over 40 years enabled research on live, large pelagic fishes, monk seals, and sea turtles. This location is now the site of most of the PIFSC corals program. Offices and laboratories supporting fish biology and life history research 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 (see below).



Figure 3.—PIFSC Dole Street facility.

Our small boat and research cruise missions are now staged from the new NOAA facility on Ford Island where the NOAA ships are berthed there. A new sea water system for research on fish, turtles, seals, and corals is also coming on line there. PIFSC staff are also stationed in American Samoa, Guam, and the Northern Mariana Islands as well as on the continental U.S. and conducting research and operations in foreign countries.

A NOAA-wide consolidation facility for Honolulu is scheduled for completion in late 2013 or 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 new NOAA facility will be located on Ford Island on the U.S. Navy Base Pearl Harbor in renovated historic World War II hangers. The facility will house not just PIFSC but almost all NOAA offices on Oahu.



Figure 4.—NOAA Inouye Regional Center at Ford Island under construction.

The NOAA ship *Oscar Elton Sette* is the primary research vessel supporting PIFSC's extensive field activities. PIFSC staff also conduct benthic habitat mapping and other coral reef ecosystems investigations 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 and ship-based research. Both NOAA ships as well as the small boats are based at the Ford Island facility.



Figure 5.—NOAA Ship *Oscar Elton Sette*.

## 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 key Federal regulatory mandates for which NOAA Fisheries is primarily responsible:

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

These mandates relate directly to our two primary stakeholders: the NOAA Fisheries Pacific Islands Regional Office (PIRO) that is responsible for conservation and management policy for all three mandates, and the Western Pacific Fishery Management Council (WPFMC) that is responsible for fisheries management policy in this region. PIFSC provides scientific information and collaborates with other resource management agencies in the region, including the governments of American Samoa, Guam, Hawaii, and the Northern Mariana Islands, the other offices of NOAA, and other Federal offices such as the U.S. Fish and Wildlife Service (FWS), but PIRO and WPFMC are our primary clients for scientific information and advice. PIFSC also collaborates with a range of scientific advisory committees, both regionally, nationally, and internationally.

The fisheries science mission is a key element in providing the scientific information used by fishery managers for ending and avoiding overfishing through the implementation of annual catch limits (ACLs), monitoring Federally regulated fisheries on an ongoing basis, and evaluating the effectiveness and social costs and benefits of these regulatory systems. We are working on further improvements and efficiencies in our scientific operations and assessments that inform management through advanced sampling technologies and next-generation population assessments. We also need to be more efficient to quickly transform available data streams into scientific advice for evaluating and adjusting management measures where required by the resource management agencies (including of course PIRO and the WPFMC).

We must develop new and improved methods for assessing the abundance, distribution and evaluation of the impacts of various anthropogenic threats, and for recovery science, of species such as the Hawaiian monk seals, central Pacific cetaceans, and currently protected under the MMPA and ESA, as well as loggerhead, leatherback and green sea turtles protected under the ESA. Particular areas of additional research focus include by-catch reduction research related to loggerhead and leatherback sea turtles and understanding what activities would enhance the recovery of Hawaiian monk seals. 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, habitat and climate science, 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 Fisheries. The Coral Reef Conservation Act and the NOAA Habitat Blueprint<sup>10</sup> 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 overarching strategic perspective, we have chosen to organize our priorities for addressing these mandates through a series of overarching themes and topics.

## Themes

Three main themes define our work. The first two drive our research orientation while the third focuses on how we do 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 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.

Within the context of mandate-driven, applied marine ecosystem science, activities under Theme 1 (Monitor and Assess) tend to take precedence over those in Theme 2 (Environment and Ecosystems) although the latter are expected to play an increasingly critical role in understanding population dynamics in the near future, particularly in a world of changing climate, as well as underpinning our understanding of the ecosystems in which the agency's conservation and management decision-making is placed which is an important NOAA priority.

---

<sup>10</sup> [www.habitat.noaa.gov/blueprint/faq.html](http://www.habitat.noaa.gov/blueprint/faq.html)

In developing this strategic plan, we chose not to mirror our existing budget and program structure. Instead we asked the staff in the PIFSC research divisions to identify activities that currently exist or should comprise our research and monitoring portfolio. We compiled these activities into 15 topics and collectively these topics and their underlying monitoring and research activities helped frame the 3 research and monitoring themes.

We do not have the resources to do everything that is required to complete work under all of these topics and in cases where we have identified future work that we could conduct, our expectations must be tempered by fiscal reality. But this is 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.

### **Theme 1: Monitor and Assess**

#### Theme 1 Topics:

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

### **Theme 2: Environment and Ecosystems**

#### Theme 2 Topics:

- Conducting oceanographic research
- Understanding physical and biological linkages between the environment, species and ecosystems
- Assessing and predicting changes to marine ecosystems, including climate change

### **Theme 3: Maximizing Effectiveness**

#### Theme 3 Topics:

- Managing 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 are the Topics under each theme and *typical* but not comprehensive activities that illustrate each Topic.

## **Theme 1: Monitor and Assess**

Population assessments are key ingredients to marine resource management in NOAA Fisheries, including fishery<sup>11</sup> and marine mammal<sup>12</sup> population assessments for the Pacific islands region as well as qualitative assessments for potential ESA listings where a full population assessment is not available (e.g., the Status Review of 82 species of corals<sup>13</sup>) and demographic censusing of monk seals<sup>14</sup>. These population assessments provide PIRO and the WPFMC, as well as international fisheries organizations, with the current status of a population or subpopulation its long-term trend and in some cases, in relationship to the ecosystem's carrying capacity for that stock. The assessments indicate how much mortality (catch or interactions in terms of marine mammals and sea turtles) is sustainable while maintaining a healthy population, and what steps are required to rebuild the population to healthy abundance levels.

These assessments, as well as a range of national and international reporting requirements, require robust and timely monitoring programs and research on the underlying life history parameters of these species.

### Typical Activities under Theme 1: Monitor and Assess

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

- Fishery dependent data collection via logbooks, observers, vessel monitoring system (VMS), electronic data submission, State and Territorial agency data collection and surveys, and recreational fishing surveys
  - Insular domestic fisheries
  - Pelagic high-seas fisheries
- Fast-track quota monitoring and forecasting of regulated fisheries
- Bio-sampling of life history parameters to enhance stock assessments
- Enhancing the Western Pacific Fishery Information Network (WPacFIN) program for fishery dependent data
- Consolidating and reporting U.S. fishery information for the Western and Central Pacific Commission

#### *Conducting sea-going surveys and laboratory studies*

- Fishery-independent insular resource surveys using cooperative research with fishermen and advanced technologies
- Conducting annual census of Hawaiian monk seals
- Conducting surveys of cetacean populations the central Pacific
- Conducting surveys to monitor the status of the region's coral reef ecosystems
- Conducting surveys of marine recreational and noncommercial fishing activities

#### *Assessing populations and stocks*

- Assessment of the status and dynamics of monk seal and cetacean populations
- Assessment of the status and dynamics of sea turtle populations

---

<sup>11</sup> <http://www.pifsc.noaa.gov/fbsab/programs.php>

<sup>12</sup> <http://www.pifsc.noaa.gov/cetacean/>

<sup>13</sup> [http://www.nmfs.noaa.gov/stories/2012/05/07\\_coral\\_documents\\_page.html](http://www.nmfs.noaa.gov/stories/2012/05/07_coral_documents_page.html)

<sup>14</sup> [http://www.pifsc.noaa.gov/hawaiian\\_monk\\_seal/population\\_at\\_a\\_glance.php](http://www.pifsc.noaa.gov/hawaiian_monk_seal/population_at_a_glance.php)

- Interdisciplinary coral reef ecosystem assessments
- Assessment of the status of insular fishery stocks as well as pelagic fisheries stocks through international collaborations

*Investigating socioeconomic dynamics and human dimensions*

- Conducting regular cost-earnings studies and surveys of fishing communities
- Estimating benefits, costs and externalities of conservation and management measures
- Surveying seafood channels and cultural use of fish
- Analyzing the effect of non-fishery developments on the marine ecosystem and its human communities, e.g., Guam military buildup, American Samoa cannery closures, aquaculture and aquarium fish collection, shoreline development, and restricted access to coastal sites.

*Researching fisheries interactions (bycatch)*

- Estimating bycatch and understanding factors that might mitigate bycatch through analysis of fishery dependent data
- Analyzing bycatch mitigation techniques through laboratory and fishery testing of modified fishing methods, and investigation of post-release survival using NOAA fishery research vessels, cooperative research and contracted vessels

**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 capacity 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 human communities may respond to climate change. PIFSC needs to develop and conduct baseline habitat and ecosystem 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 Act requires NOAA Fisheries to designate EFH and minimize the effects of fishing and non-fishing activities on these habitats while the ESA requires the Federal government to consider Critical Habitat for any species listed as endangered.

Another key consideration under Theme 2 is the archipelagic nature of the environment and indeed the cultures of the Pacific islands, including the differences between individual islands, atolls, and islets, as well as offshore banks, within a particular archipelago, and the differences between the three main archipelagos (Hawaiian, Mariana and Samoan) 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.

## Typical Activities for Theme 2: Environment and Ecosystems

### *Conducting oceanographic research*

- Conducting oceanographic cruises to obtain baseline oceanographic and ecosystem data
- Preparing integrated oceanographic forecasts for by-catch mitigation (e.g., Turtle Watch)
- Conducting in-situ research on ocean acidification

### *Understanding physical and biological linkages between the environment, species and ecosystems*

- Investigating how spatial and trophic components structure and affect marine populations and ecosystems
- Evaluating change in fish community dynamics
- Modeling fishery and protected species spatial habitat and describe how oceanography, ocean features, and ocean dynamics affect fish and protected species populations
- Mapping bottom habitat to support monitoring for spatial analysis
- Modeling marine debris movement, including source/sink relationship, pathways, and detection/mitigation capabilities
- Investigating economic and social impacts of climate change in marine ecosystems and on marine species

### *Assessing and predicting changes to marine ecosystems*

- Assessing, understanding, and predicting impacts of climate, ocean acidification, fish population density and composition, and other human activities on coral reef ecosystems.
- Developing Integrated Ecosystem Assessment (IEA) approaches to Pacific island and high seas ecosystems
- Applying climate modeling (downscaled to archipelagic or smaller scale) to marine ecosystems
- Collaborating with NOAA partners such as NOAA Sentinel Sites<sup>15</sup> and marine sanctuaries
- Developing research programs for marine national monuments

---

<sup>15</sup> <http://oceanservice.noaa.gov/sentinelsites/>

### **Theme 3: Maximizing Effectiveness**

PIFSC has a broad science enterprise that has developed substantially over the past decade. Growing the procedural and physical infrastructure required to provide an efficient research enterprise 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.

#### Typical Activities for Theme 3: Maximizing Effectiveness

##### *Managing scientific operations, logistical coordination, methods development, and data management*

- Maintaining 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
- Planning and implementing comprehensive and integrated data collection programs to meet specified objectives and purposes with development of advanced technologies and with responsive adaptation to feedback from data users.
- Implementing enterprise data management systems to optimize data quality and availability across PIFSC and externally to stakeholders and the public

##### *Conducting scientific work in a transparent and conscientious manner*

- Preparing appropriate documents to plan and permit research under the National Environmental Policy Act (NEPA), the Information and Data Quality Act, and similar statutes
- Developing and maintaining safe and productive research infrastructure especially laboratories, ships, small vessels, diving facilities, and live animal care facilities.
- Conducting scientific services for the agency 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
- Enhancing community outreach and scientific education

##### *Enhancing external collaboration and partnerships*

- Working with local jurisdictions, other agencies, academics, international partners, and public interest groups
- Coordinating with other NOAA Fisheries science center on matters of mutual interest (e.g., SWFSC concerning cetaceans) and with other NOAA offices (e.g., Sanctuaries concerning joint science activities).
- Conducting joint assessments through international scientific committees related to regional fishery management organizations (e.g., International Scientific Committee for Tuna and Tuna-like Species; Scientific Committee of the Western and Central Pacific Fisheries Commission)
- Enhancing public outreach and media capability.

- Conducting international multilateral and bilateral scientific collaboration (e.g., Coral Triangle Initiative and PICES (North Pacific Marine Science Organization))

*Evaluating and employing emerging technologies*

- Developing and implementing emerging technologies such as acoustics, biotelemetry, optics, gliders and rovers
- Employing advanced quantitative methods

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

- Conducting internship programs for high school and college students
- Enhancing PIFSC capacity in American Samoa, Guam and the Northern Mariana Islands, as well as the neighbor islands of Hawaii, across our research programs
- Helping build scientific capacity in the region through exchanges and technical assistance
- Supporting local undergraduate and graduate education through participation in graduate committees, providing guest lectures, and serving as adjunct faculty

*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, bycatch reduction, etc.

### **Life Cycle Aspects of Research and Monitoring**

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 feedback) is repeated on an ongoing and regular basis. Thus, there are many core activities under the first Theme that are long-term, ongoing activities that are critical to the success of the population assessment process. In strategic terms, this means that some activities are strongly interrelated and a failure to invest in “up-stream” activities will impoverish “down-stream” activities, increasing the uncertainty and/or timeliness of the scientific information we provide for conservation and management.

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 may represent some research life cycles, at present they represent a broader look at the processes of the ecosystems underlying the population assessments of Theme 1.

### **Research Infrastructure and Support**

PIFSC research activities require the active development and improvement of our 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 and the PIFSC scientific support programs.

### **Science and Support Staff**

Similarly, PIFSC research activities require dedicated, motivated 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, collegial, 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 is critical to PIFSC'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 has established a cross-program 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 data management directives. Additionally this committee is responsible for the development and oversight of best practices procedures and metrics to ensure data stewardship, preservation, and access.

## **STRATEGIC CHOICES**

PIFSC, like any organization, faces strategic choices on how to employ resources in the present as well as how to invest for the future. We are driven by mandates and the quest for scientific discovery while we are enabled and constrained by our scientific and organizational skills and capabilities and by our funding levels and funding structure. These strategic choices are multidimensional reflecting the species and ecological groups we research—fish, corals, marine mammals and sea turtles—as well as the spatial and jurisdictional scope of our research—coastal, Exclusive Economic Zone, and high seas and remote island areas, as well as the four island jurisdictions (American Samoa, Guam, Hawaii, the Northern Mariana Islands). There are additional choices related to how many resources we allocate to the environmental and ecological milieu in which these species exist, how much effort we apply to long-term monitoring and analysis versus short-term responses to management issues, our involvement in education and outreach, collaboration with other organizations, domestically and internationally, etc. Our stakeholders have similar prioritization issues and the ongoing aspect of this Science Plan is clearer communication with them on the strategic choices we all face.

We framed some of these choices in exercises with PIRO and the Western Pacific Fishery Management Council as a way of judging their perspectives since they both have overlapping interests across our strategic choices. We also received input on strategic choices from a number of stakeholder organizations and the public (although not within the choice structure we outline here).

This is an example of the binary choice tool we used:

Is the first activity (A) more important than the second activity (B)?

A > B      A = B      A < B

**A) Conduct fishery-independent insular resource surveys using cooperative research with fishermen**

**Or**

**B) Conduct post-hooking mortality rate by-catch research and analysis (longline fisheries)**

---

We did not have the capability of utilizing a transitive modeling choice framework for narrowing the choices, but the discussion of the content and comparison of each binary pair was illustrative of stakeholder interests. We illustrate two of these choices here, decisions concerning international and domestic fisheries research and monitoring, and decisions focusing on Hawaiian monk seals and cetaceans.

Within our fisheries research and monitoring programs we expend considerable time and effort on pelagic fisheries (tunas, billfish, and sharks) within an international setting through multilateral collaboration in the International Scientific Committee on Tuna and Tuna-like Species (ISC) and the WCPFC's Scientific Committee and to a smaller extent with the IATTC Inter-American Tropical Tuna Commission in the eastern Pacific). This strategic choice reflects the importance of these fisheries both commercially and recreationally. However, in terms of both population assessments, life history sampling and analysis, and fishery dependent data management, this focus on international pelagic fisheries takes away PIFSC scientific resources from monitoring and assessing purely domestic fisheries such as bottomfish and coral reef fisheries.

From a strictly Magnuson Act perspective, it could be argued that more attention should be placed on the purely domestic fisheries, although in many cases the coral reef fisheries, for example, exist wholly or mostly within territorial waters. Nonetheless we have increased our focus on fishery independent sampling of bottomfish populations and in integrating our coral reef ecosystem surveys into our Magnuson Act analyses such as ACL (annual catch limit) development. Similar choices exist in other PIFSC programs, such as our level of involvement in research related to foreign fisheries with bycatch of sea turtles versus research on bycatch of cetaceans in domestic fisheries, although this choice is affected by the structure of bycatch funding and the importance of using appropriations as intended.

In our protected species program the highly endangered Hawaiian monk seal was the priority for 3 decades while cetacean work in the central and western Pacific was conducted by the Alaska and Southwest Fishery Science Centers. PIFSC's first cetacean scientist was not hired until after PIFSC became its own science center in 2003. This could be seen as a reasonable approach given the dire situation and endangered status of the Hawaiian monk seal and the lack of critical cetacean conservation and management issues in the Pacific islands until fishery interactions with cetaceans became a fishery and protected species management concern and the Hawaiian insular stock of false killer whales was petitioned for ESA listing in 2009. The strategic question of allocation of population monitoring and assessment resources, as well as recovery activities, is compounded by the increasing population of monk seals in the main Hawaiian Islands where interactions with humans are increasing while the NWHI population has not recovered. There are at least three interrelated programmatic and funding choices: whether to continue the long-term annual field camp census of monk seal populations in the NWHI, whether to initiate regular censuses of monk seals in the MHI, and where appropriations flexibility allows, whether to shift some marine mammal funding from monk seal research and monitoring to cetacean issues?

These two examples represent choices within the strategic decision to focus our research and monitoring within NOAA Fisheries overarching legislative mandates, the MSFCMA, ESA, and MMPA. We are taking advice from our key management stakeholders in how to pose and how answer these, and similar, questions. If we shift from one activity to another, e.g., from pelagic, high seas to insular fisheries, or from annual to less comprehensive NWHI monk seal surveys, then we will need to do this carefully over a period of years within a scientifically reasonable and defensible approach. This Science Plan poses these questions but does not answer them. Answers will be in PIFSC's annual implementation plan that will be coordinated with PIFSC's annual funding and budget allocation. Some of these choices have been expressed over a number of years through priorities we have indicated to NOAA Fisheries in their budget planning exercises, and these choices should become more transparent through this process. We expect our first implementation plan to be for the Fiscal Year 2014 (October 1, 2013 – September 30, 2014).

### **Consistency with Key Stakeholder Needs and Priorities**

We have reviewed 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 to clarify similarities and differences in research priorities. We provided a draft of this plan to the NOAA offices in the Pacific islands through the NOAA Regional Collaboration Team, and the plan was available for discussion with private sector stakeholders, including our academic partners, and through our website.<sup>16</sup>

---

<sup>16</sup> [http://www.pifsc.noaa.gov/do/pifsc\\_science\\_plan\\_second\\_draft\\_oct\\_5\\_2012.pdf](http://www.pifsc.noaa.gov/do/pifsc_science_plan_second_draft_oct_5_2012.pdf)

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 both broad and specific, and while they overlap with many stakeholder interests and mandates, our priorities are not the same. Implementing a strategic science plan requires an ongoing 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.

## CONCLUSION

This plan lays out broad themes and topics for our work. The next step is the development of an implementation plan outlining resource allocation decisions 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.

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 5 years we have conducted external reviews of facets of our scientific enterprise.<sup>17</sup>

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 ongoing process of which the Science Plan is a key part.

---

<sup>17</sup> [http://www.pifsc.noaa.gov/do/reports/php#external\\_reviews](http://www.pifsc.noaa.gov/do/reports/php#external_reviews)