



# NOAA Fisheries Service

Pacific Islands Fisheries Science Center

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## Report to the Western Pacific Regional Fishery Management Council February 2008

*The Pacific Islands Fisheries Science Center (PIFSC) conducts research in a wide variety of programs that may be of interest to the Western Pacific Regional Fishery Management Council (Council). This report is organized around the five basic research divisions of the PIFSC as a series of highlights. More substantive reports on some topics from PIFSC may be found in the Council's agenda book for this meeting. Council members and the general public are invited to request further information on any topic.*

### PROTECTED SPECIES DIVISION (PSD)

#### Marine Mammal Research Program

##### Hawaiian Monk Seal Research Unit

Population Assessment: Staff and equipment from monk seal field camps in the Northwestern Hawaiian Islands (NWHI) were picked up by the NOAA Ship *Oscar Elton Sette* in September at the end of the field season and transported to Honolulu. Field data from the 6 primary seal reproductive sites were processed and preliminary summaries and analyses prepared for the Hawaiian Monk Seal Recovery Team Meeting held in February. In 2007, 151 pups were counted at the sites, 43 born at French Frigate Shoals (FFS), the largest reproductive site, and 40 born at Laysan Island, the second largest site. In addition, at least 10 pups were born at Nihoa and 4 or more at Necker Island. Mean beach counts of seals from the main reproductive sites totaled 292 seals, excluding pups. Counts have declined over 2001-2007. Moreover, the composition of the counts is dominated by adults and pups, which bodes poorly for reproduction in the near future. Juvenile survival remains poor and high mortality of immature seals appears to have led to the shift in age composition, particularly at FFS where shark predation continues unabated. At FFS, 16 seals were confirmed bitten by sharks in 2007, and seven of the injured seals were nursing or weaned pups. Of these pups, 4 died or disappeared, 2 were severely amputated and have a low chance of long-term survival, and the other pup escaped with minor injuries.

Program staff and cooperating scientists concluded several activities to enhance recovery of the species in the NWHI, including disentangling seals from marine debris, translocating weaned pups between islets within FFS to decrease their risk of shark predation, halting incidents of male aggression (mounting) of weaned pups at Laysan and Kure Atoll, and other activities.

Excluding the Island of Ni'ihau, at least 13 pups were born in the Main Hawaiian Islands (MHI) in 2007, the highest number on record. Another pup was sighted on Ni'ihau during an aerial survey, bringing the total number of confirmed births to 14. In addition, 4 seals are known to have died last year; an adult male and 3 female seals (an adult, a subadult, and a pup). Tracy Wurth, our monk seal sighting coordinator, has been busy responding to calls, training volunteers, and tagging the late-born pups.

Foraging Ecology: Staff continued to monitor and identify the diet of monk seals in the MHI and NWHI. In collaboration with the Bishop Museum, we expanded our diagnostic prey library and identified prey from over 150 spew and fecal samples. Two students are working on Masters degree projects, one to identify the foraging behavior and diet of Hawaiian monk seals in the MHI, and the other to identify variation in diet of monk seals in the NWHI in relation to El Niño.



**Can you hear me now? Monk seal with multi-function GPS telemetry tag fastened to pelage. The tag transmits archived data to shore-based computers using cell phone technology.**

NMFS worked with The Sea Mammal Research Unit (SMRU) to modify a novel telemetry tag for use in the United States. The tag uses global position system (GPS) technology to increase the quality and amount of data gathered in marine mammal telemetry studies. The global system for mobile communications (GSM) and GPS telemetry tag for tracking marine mammals contains a hybrid GPS system called Fastloc (Wildtrack Telemetry Systems) capable of acquiring GPS pseudo-range data within a snapshot window of only 0.2 seconds. In addition, the tag also collects and stores detailed data on dive and haulout behavior as well as

temperature up-cast profiles. These tags also have a GSM modem (cellular phone) to relay stored data ashore via existing commercial cell phone networks for later analysis. The advantages of using a GSM data relay over Argos satellite transmissions are low running costs and vastly increased energy efficiency and data bandwidth. While the tag must be within approximately 20km of a GSM base station for a data call to be



established, data can be stored in the device for up to six months between calls, allowing animals to move large distances from base stations while collecting detailed behavioral data.

The tag was deployed on an adult female seal in September and has been phoning back data ever since. The location and dive data provided are of higher quality than researchers have previously been able to record and receive remotely.

### Cetacean Research Unit

The cetacean research program has been analyzing acoustic data generated by high-frequency acoustic recording package (HARP) instruments deployed on the seafloor at Cross Seamount and Ladd Seamount in the NWHI. Species detected at these locations on the basis of acoustic signatures include minke, pilot, beaked, and false killer whales and several unidentified delphinids.

A project to predict the locations of North Pacific right whale calving habitat, funded through the North Pacific Research Board, was initiated in collaboration with Caroline Good of Duke University.

The Center's collaborative photo-ID project (PIPIN) was handed over to the Hawaii Marine Mammal Consortium, a local non-profit organization.

### **Marine Turtle Research Program**

#### Hawaiian Archipelago/Special Research Unit

In partnership with Jerry Wetherall, a 4th Quarter Milestone was completed entitled "Determination of the number of green turtles nesting at East Island, French Frigate Shoals, during the 2007 nesting season." Mathematical extrapolation procedures are based on statistical methods developed by the PIFSC during a series of saturation surveys conducted from 1988-92. The estimates of nesting activity at East Island are used to provide an index of abundance for the Hawaiian green turtle population and to monitor population trends and recovery status. The field survey conducted this year was under the leadership of Irene Nurzia-Humburg. The survey was conducted for 32 nights during the period of June 6 - July 8, 2007. Using passive integrated transponder (PIT) tags, a total of 334 individual nesters were observed during the survey. The season's total nesting population for East Island is estimated as 348 nesters. The overall long-term upward trend continues for the population. These results extend the time series of East Island green turtle nesting population estimates to 35 years, providing a sound basis for monitoring recovery.

Presentations were made at the 2008 Sea Turtle Symposium entitled "Use of microsatellite markers for matching green turtle nests to females on Molokai in the Hawaiian Islands" by Amy Frey, Peter Dutton, and George Balazs and "Hawaiian green



turtles dive to record depths during oceanic migrations" by Marc Rice and George Balazs.

Karen Frutchey, Sea Turtle Liaison at the Pacific Islands Regional Office (PIRO), accompanied George Balazs for field work at Punaluu Bay in the Kau District of the island of Hawaii. Fifteen green turtles were successfully captured and examined in collaboration with students and faculty of the University of Hawaii at Hilo's Marine Option Program. In addition, to inspire interest in the biological sciences, 35 4<sup>th</sup> grade students and teachers from Kau's Pahala Elementary School were hosted to observe the work and interact with the scientists one-on-one. Photos of the project are posted on the UH Hilo MOP Web site:

<http://www.uhhmop.hawaii.edu/turtletagging/11Nov07/index.htm>

George Balazs and Stacy Kubis conducted field studies on the island of Hawaii at the long term study site of Kaloko-Honokohau National Historical Park. Participants also included students and staff of the Hawaii Preparatory Academy and personnel of the National Park Service. Twenty five green turtles were captured, weighed, measured, and examined to determine health status. No signs of fibropapilloma tumor disease were found. However, many of the turtles were deficient in body condition robustness.

Shawn Murakawa completed a comprehensive two-year updating of the "Bibliography of Fibropapillomas in Marine Turtles." This useful research tool is available in several forms on the Turtle Trax Web site: [www.turtles.org](http://www.turtles.org).

## FISHERY BIOLOGY AND STOCK ASSESSMENT DIVISION (FBSAD)

### ISC Billfish Working Group

The Intersessional Workshop of the Billfish Working Group (BILLWG) of the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC) was convened in Honolulu, Hawaii from January 8-15, 2008. Nineteen scientists from Japan, Taiwan (Chinese Taipei), and the U.S., including staff from the Council and the Inter-American Tropical Tuna Commission (IATTC) participated in the workshop (Figure 1). Goals of the workshop were 1) to review "new" striped marlin catch per unit of effort (CPUE) data from the Eastern Pacific Ocean (EPO), and assess the utility of updating the group's previous striped marlin assessment using the new CPUE data, 2) review research to determine if striped marlin in the North Pacific can be designated a "northern stock" as defined by the Western and Central Pacific Fisheries Commission (WCPFC), 3) compile swordfish and blue marlin fishery statistics in preparation for their future use in stock assessments, and 4) review comparative analyses assessing the impacts of gear configurations and fishing characteristics on catch by hook position, depth, and habitat, as well as on CPUE standardization. In addition, the Blue Marlin Steering Committee met to discuss logistical requirements and collaborations necessary for a Pacific-wide blue marlin stock assessment in 2010. Because the Pacific blue marlin stock is pan-Pacific, completion of the assessment





requires a collaborative approach. The BILLWG recognizes this and is willing to provide a leadership role in this endeavor. A full report of the January workshop is being compiled and reviewed and should be available shortly. Summaries of the primary research presented and discussed are presented below.

One of the key presentations was an analysis of stock boundaries for striped marlin in the North Pacific by Kevin Piner and Ray Conser (both of SWFSC). The work was requested at the Western Central Pacific Fishery Committee (WCPFC) SC3 and Third Northern Committee meetings held last year. Results of the 2007 stock assessment of



**The ISC Billfish Working Group met in Honolulu to discuss research on striped marlin in the North Pacific. Participating were scientists from Japan, Taiwan, and the U.S.**

striped marlin were used to estimate the proportion of spawning biomass occurring north of 20°N. The analysis employed estimates of population number-at-age, selectivity patterns, and catchability coefficients derived from the Japanese distant-water longline fleet. Results indicate that a majority of striped marlin stock in the western and central North Pacific occurs north of 20°N. This conclusion is consistent with the distribution of fishery catches since the 1960s.



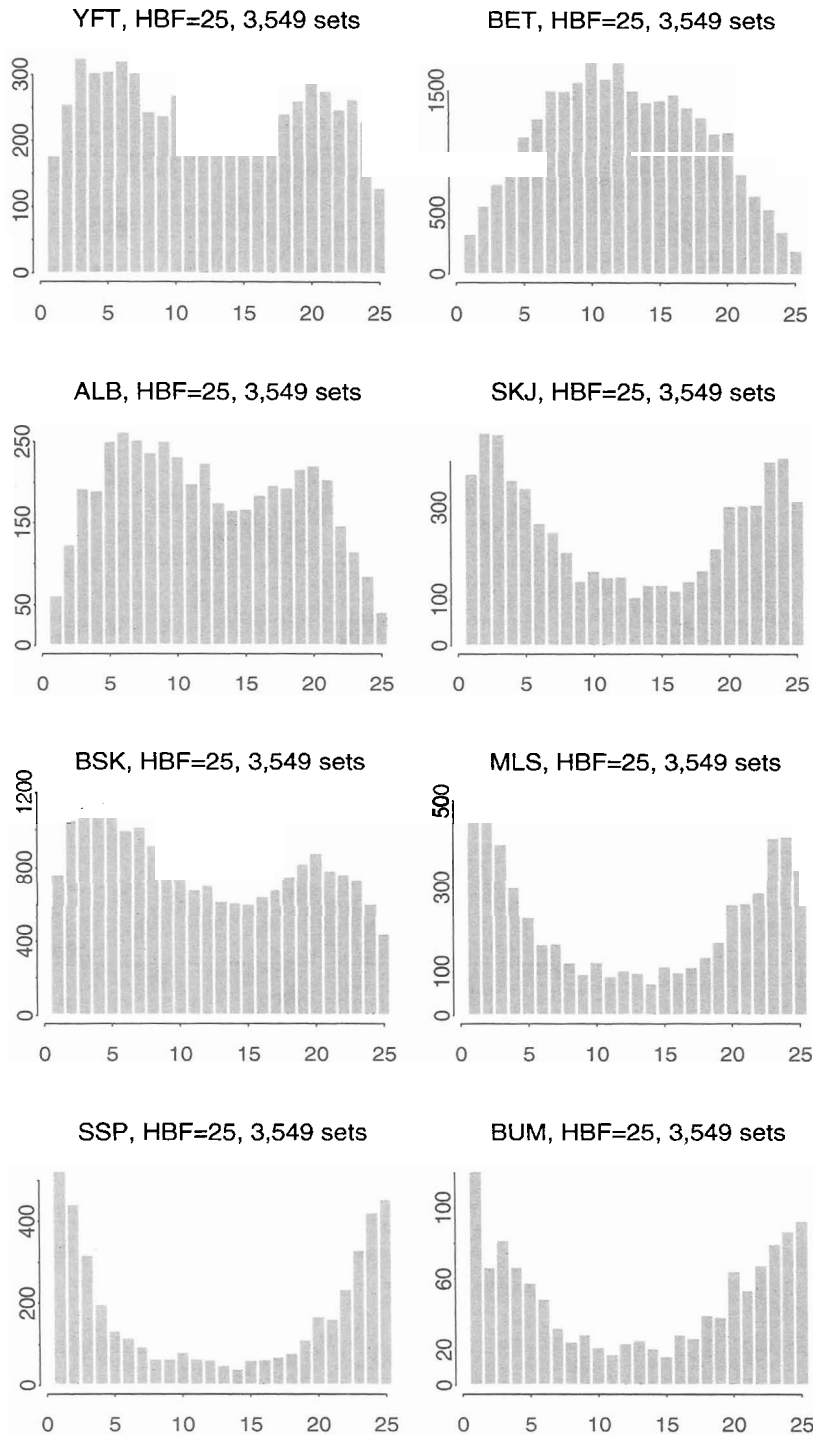
In a second key presentation, Minoru Kanaiwa (Tokyo University of Agriculture), Keith Bigelow (PIFSC) and Kotaro Yokawa (National Research Institute of Far Seas Fisheries, Shimizu, Japan) compared gear configuration and number of fish caught by hook position, depth and habitat for Japanese training vessels and Hawaii-based tuna longline vessels. These represent the two largest data sets from at-sea observed longline fisheries in the tropical and sub-tropical Pacific Ocean. Gear configuration differed markedly between the two fleets in attributes such as hooks deployed between floats, floatline and branchline lengths, distance between hooks, and catenary angle (sag ratio). Data from time-depth recorders (TDRs) provided estimates of longline gear depth and analysis of concurrent observer data provided information on the number of fish caught by hook position (order of the hook on the longline), depth and habitat.

In the analysis of catch by hook position, summary statistics were generated from all observed sets for the Hawaii tuna longline fishery. Results suggested similar depth distributions for various species as determined from the subset of TDR-monitored sets. Bigeye tuna catches are highest on the deepest hooks. Catches of billfish are substantially higher on the shallowest hooks adjacent to the longline floats than on the deeper hooks. Skipjack catch was highest on the 2<sup>nd</sup> or 3<sup>rd</sup> hooks closest to the float. Blue shark, yellowfin tuna, and albacore catches are highest on intermediate hooks, though differences between adjacent hooks are not as large as in other species.

#### National Science Foundation (NSF)-sponsored Ecosystems Modeling Group

The NSF-sponsored ecosystems modeling group convened their annual meeting at PIFSC in January. The featured research topics were a study of the effects of longline fishery closures and recreational catch-and-release for marlin fisheries. The project, undertaken by Olaf P. Jensen, Michael L. Domeier, Sofia Ortega-Garcia, Steven J.D. Martell, Carl J. Walters, and James F. Kitchell looked at the striped marlin fishery off Baja California in Mexico. The effects of spatial closures for highly migratory fish species are thought to be diluted by the extensive movements of the fish. However, as described in 1990 by Jim Squires and David Au of the Southwest Fisheries Science Center, a series of longline fishery closures instituted by Mexico appeared to improve recreational fishing for striped marlin in the region. The NSF-sponsored research group took a more quantitative approach to analysis of this situation, using data from the Japanese longline fishery and the recreational billfish fishery in a stock reduction analysis (SRA) model. They showed that the temporary closures of Mexico's EEZ to longlining during 1976–1980 and 1984–1985 had a rapid effect on local striped marlin





**Number of fish caught (vertical axis) by position of hook (horizontal axis) for yellowfin tuna (YFT), bigeye tuna (BET), albacore (ALB), skipjack tuna (SJK), blue shark (BSK), striped marlin (MLS), shortnose spearfish (SSP), and blue marlin (BUM) in the Hawaii longline fishery. Based on observer data. Hooks at positions 1 and 25 are closest to surface floats. Hook at position 13 is deepest (theoretically).**

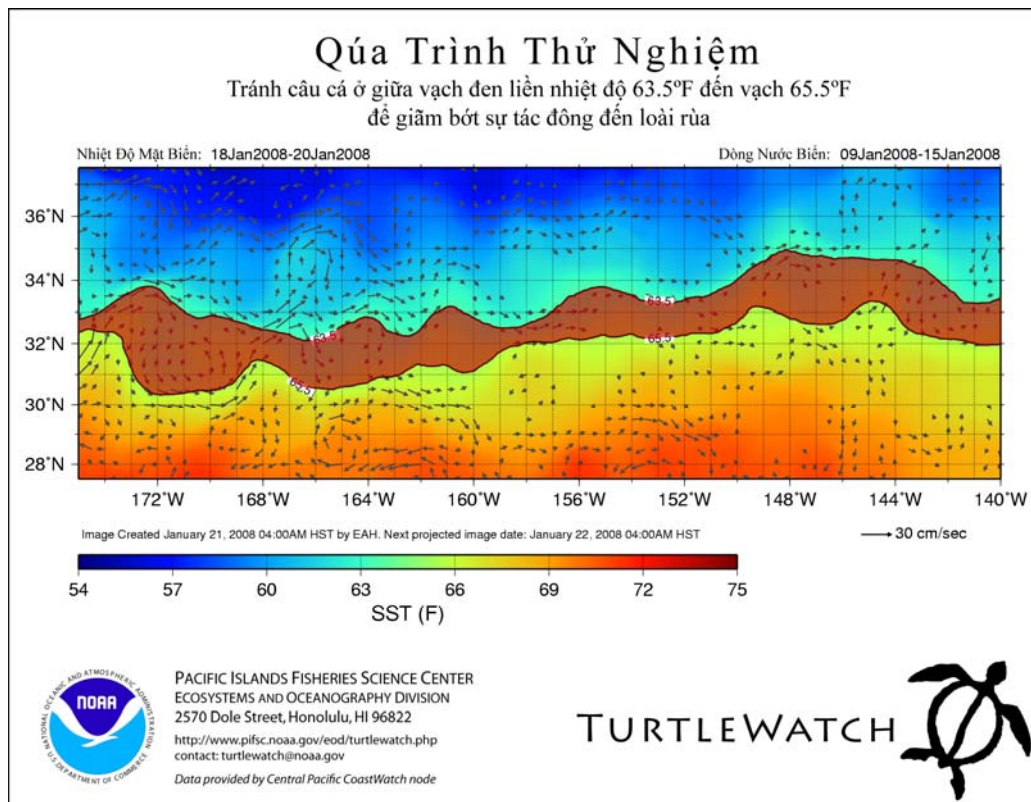


abundance. Regional striped marlin abundance likely increased by 15%–26% during each of the two closures. Increases near Baja California may have been even larger. Looking at the recreational fishery impact on striped marlin, catch-and-release practices appear to have a more modest effect because recreational catches are substantially smaller than historic longline catches. A 100% release rate over the period for which recreational catch data were available would likely have increased regional abundance by 3%–13% relative to no recreational release. There is also evidence of a modest effect of the El Niño–Southern Oscillation on recruitment or net immigration of striped marlin. A similar modeling approach is planned to examine local effects on blue marlin abundance in Hawaii, where blue marlin appear to be much more mobile and transient than striped marlin off Mexico.

## ECOSYSTEM & OCEANOGRAPHY DIVISION (EOD)

### The PIFSC TurtleWatch Updated for the 2008 Season

TurtleWatch was first released at the beginning of the 2007 Hawaii longline swordfish fishing season. With a full year of observer data and feedback from industry now in hand, Evan Howell has produced a slightly revised product for the 2008 season. The



**The TurtleWatch product is now released in a Vietnamese language version, as well as the English version.**





new version has narrowed the region where the probability of interactions with loggerheads is predicted to be highest as the area within the 17.5°C–18.5°C sea surface isotherms in the central North Pacific. This is the band shown in brown in the accompanying figure that fishers are advised to avoid.

During the first quarter of 2007, longline fishers made shallow sets to the north of the area between these isotherms with no sea turtle interactions. As the fleet moved into the area between the 17.5°C–18.5°C isotherms, interactions with turtles increased. TurtleWatch is now available daily in both English and Vietnamese. These products are distributed electronically to managers and people in the fishing industry (e.g., via the PIFSC Web site), and also handed out to swordfish captains by PIFSC fishery monitoring staff as they make their daily rounds distributing and collecting logbooks from the longline fleet.

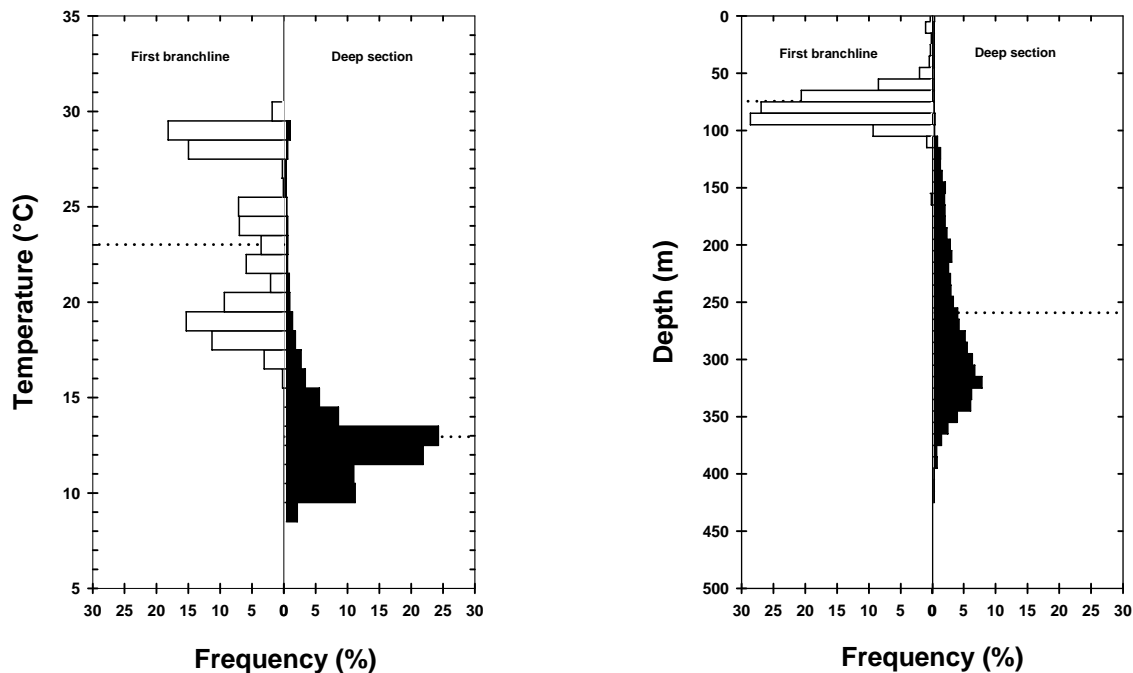
#### Depth and temperature of bigeye tuna longline sets

Don Hawn has been providing TDR's to captains in Hawaii's longline fishery since June 2007 to collect data on the temperature and depth of waters where they deploy their gear. Based on data from 13 longline trips targeting bigeye tuna over the period June–December 2007, Don generated the temperature and depth distributions of the shallowest hook (first branchline) and deepest hook (deep section). The shallowest hooks cover a wide range of temperatures from about 17–29° C while the deepest hooks are largely at 19–13° C. The shallowest hook is in the depth range 50-100 m (mean 75.1 m) while the deepest hooks are in the range of about 150 – 400 m (mean 258 m). Thus when bigeye tuna are targeted the majority of hooks are distributed from about 75-250 m.

Table 1. Water depth and temperature where the first branchline and deep section of the gear were located during 168 Hawaii longline operations in the central North Pacific. Statistics presented include sample size (number of measurements), range, mean, standard deviation, median, and mode (10 meter and 1°C bins).

Position	Sample size	Depth (m)				
		Min-max	Mean	S. D.	Median	Mode
First branchline	195,737	0 - 203.2	75.1	18.4	74.7	80.0
Deep section	202,952	0 - 438.6	258.0	74.7	275.5	320.0
Position	Sample size	Temperature (°C)				
		Min-max	Mean	S. D.	Median	Mode
First branchline	195,737	13.9 - 36.4	23.5	4.1	23.1	22.0
Deep section	202,952	8.4 - 35.9	13.1	3.5	12.3	13.0





Temperature (°C) and depth (m) distributions of first branchline (n = 195, 737) and deep section of gear (n = 202, 952) taken from 13 Hawaii tuna longline trips within waters of the central North Pacific. Dotted lines represent mean values.

## FISHERIES MONITORING SOCIOECONOMIC DIVISION (FMSSD)

### Western Pacific Fisheries Information Network (WPacFIN)

WPacFIN staff travelled to Guam and the Commonwealth of the Northern Marianas Islands (CNMI) during August-September 2007 to provide a variety of support services. Accomplishments included:

1. Staff installed the WPacFIN-developed Vessel Registration System (VRS) at the CNMI Department of Public Safety, Bureau of Motor Vehicles (BMV) and trained local staff to operate the software. This system replaces BMV's manual paper registration processes and provides new tools to retrieve vessel information and create vessel registration summary reports. Vessel registration and identification data will then be shared with the Division of Fish and Wildlife. BMV could also share the data with other government entities, such as NMFS and U.S. Coast Guard (USGS).



2. While on CNMI, WPacFIN also worked with the Department of Fish and Wildlife to develop plans to collect Federal longline fishing logs from Northern Marianas Fisheries, Inc., a newly formed company based on Rota whose business is to conduct longline fishing around the Mariana Islands and export fresh fish out of CNMI. This firm began fishing operations in October 2007 and Roberto has been facilitating receipt and transmission of logbook data to FMSD.

During the first quarter of FY 2008, data collecting and processing systems for commercial landings of Deep-7 bottomfish species caught in the main Hawaiian Islands (MHI) were significantly improved. The State of Hawaii, Department of Aquatic Resources (DAR) and WPacFIN established a team to expedite processing of commercial MHI Deep-7 bottomfish catch data received by DAR from fishermen and fish dealers and update databases. The new team includes a project coordinator, two data processors, and a fish dealer coordinator. Establishing the team is the first major phase of monitoring the total allowable catch (TAC) for MHI Deep-7 bottomfish species.

In supporting the TAC monitoring of this fishery, WPacFIN will be working with Council staff to provide total landings summaries and graphs of the MHI Deep-7 bottomfish catch by species for posting on the Council's bottomfish informational website.

### **Fisheries Monitoring and Analysis Program (FMAP)**

For the third year, the Barbless Circle Hook Project was invited by the Atlapac Fishing Club and the Windward Shorecasters Fishing Club to attend their annual winter Oio (bonefish) outings. Club members voluntarily participated in the barbless circle hook project's data gathering by filling out catch and effort data forms. Both clubs chose the same weekend to have their outing due to the favorable tides and moon phases.

The results mirrored previous research that showed no statistical differences in hooking or catch rates when using the barbless circle hooks, compared with ordinary barbed circle hooks. The Atlapac members spread out around Oahu and the winning oios were all caught using barbless circle hooks. At least one angler reported losing multiple fish on barbed circle hooks. The Windward Surfcasters concentrated their efforts at Bamboo Ridge, a famous eastern Oahu deep-water slide baiting spot. The winning oios there were caught using barbed circle hooks. A number fish were reported lost on the barbless circle hooks. Some members of both clubs participate in the State's Ulua Tagging Project and both clubs released the smaller fishes of all species that were caught.

Kurt Kawamoto attended the 2008 Izuo Brothers new products show. The Barbless Circle Hook project, the HDAR Ulua Tagging project, the Pacific Islands Fishery Group (PIFG), and Hawaii Fishing News (HFN) were included in the show again this year. National and international tackle manufacturers, distributors, and local wholesalers



and retailers from all islands had a chance to be educated on the projects and Hawaii's fisheries issues and concerns.

## Economics Program

A system to monitor retail fresh fish markets in Honolulu achieved its first completed year of data collection. The system was established to better understand the economic contribution of local fisheries to the Hawaii economy and market impacts of regulations. Impacts are determined exploring how price changes travel through the fish 'value chain' from the fisherman to the consumer. A sample of representative retail outlets, about eight stores in Honolulu, were chosen to reflect the diversity of viable consumer outlets including locally owned grocery stores, seafood specialty shops, and large national chain supermarkets. While originally developed to monitor the retail prices of bottomfish, our databases include retail-level price data for ahi and reef fish prevalent in the marketplace and associated information on product form and origin. Retail market data were collected once per week through direct market observations.

The retail market data collected through the monitoring system are unique and important to fishery management in the region. Currently, PIFSC economists Justin Hospital and Minling Pan and PIRO economist Myles Raizin have used the data to analyze market impacts of the May–September 2007 seasonal closure of the fishery for Deep-7 MHI bottomfish species. A preliminary description of the bottomfish retail market and the market impacts of the seasonal closure regulation will be presented during the council's 97<sup>th</sup> Scientific and Statistical Committee (SSC) meeting in Honolulu in March 2008.



Before the May–September 2007 closure of the Main Hawaiian Islands (MHI) bottomfish fishery, locally caught Deep-7 species were often available in retail stores. However, during the seasonal closure, no locally-caught bottomfish were observed in the retail stores, even though the Northwestern Hawaiian Islands bottomfish fishery still was open during the period.



## Human Dimensions Research Program

On a project funded through Preserve America Initiative Grant (PAIG), Social Research Project Manager Arielle Levine is collaborating with agencies in American Samoa to document traditional methods of fishing and marine management in American Samoa. Partner agencies include American Samoa's Department of Marine and Wildlife Resources (DMWR), the National Park Service (NPS), the Pacific Islands Regional Office (PIRO), and the American Samoa Historic Preservation Office (ASHPO).

The project has three main elements:

1. Interviews with elders to document local knowledge regarding marine use and management and changes over time. Bert Fuiava and Fialoa Maiava (DMWR), Fatima Sauafea-Leau (PIRO), and Fale Tuilagi (NPS) are conducting in-depth interviews with elder fishermen from villages throughout American Samoa. Over 40 interviews have been conducted on the island of Tutuila, with additional interviews scheduled for the Manu'a islands in late February. Each interview is unique, as each person shares his or her own knowledge and areas of expertise.
2. Archival research regarding historical accounts of fishing and marine resource management in American Samoa. David Herdrich (ASHPO) has been researching information on historic fishing practices and methods of marine use and management. Working in collaboration with Karen Armstrong (University of Helsinki, Finland), he has reviewed archival records at the Historic Preservation Office, as well as early explorer accounts of American Samoa on file at the University of Hawaii's Hamilton library and the Bishop Museum in Honolulu. Herdrich's final report, expected in April, will focus on fishing and resource management techniques in American Samoa prior to 1950, and will include a collection of old photographic records of fishing history.
3. Video documentation of traditional fishing methods still practiced in American Samoa.

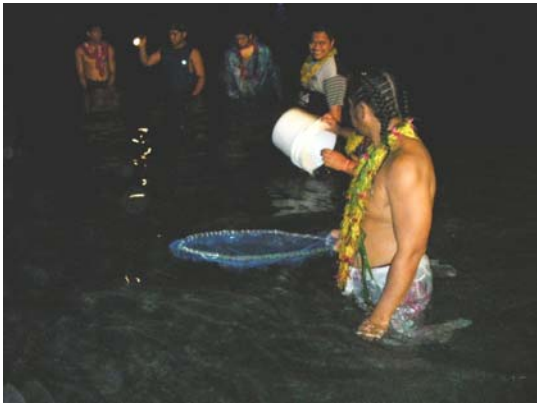
An additional outcome of the project will be a short video documenting traditional fishing techniques unique to the Samoa islands including those still used in American Samoa today. The three techniques to be featured in this video center around mass spawning events, including:

- *palolo fishing*: mass spawning of a polychaete worm that lives in coral and is a traditional Samoan food source
- *atule (bigeye scad) fishing*: this species aggregates to spawn in several Samoan bays; fishing for this species is an event which mobilizes the entire village
- *i'asina (juvenile goatfish) fishing*: a fishing technique involving the use of traditional hand-woven basket weirs which is now unique to the Manu'a islands





Video footage of the palolo fishing event was collected in late October and early November and featured a family preparing for palolo fishing using traditional methods,



**Pololo fishing in American Samoa using traditional methods is a family affair.**

night footage of palolo fishing, interviews on the significance of palolo fishing as a Samoan tradition, underwater footage, post-fishing activities, and preparation of palolo as a traditional meal. I'asina fishing will be filmed this spring, and atule footage will be collected later in the year. The final documentary will be made available for education and outreach to illustrate American Samoa's strong marine heritage and traditional reliance on marine resources.

## CORAL REEF ECOSYSTEM DIVISION (CRED)

### Malolo 1 Completes Successful Unmanned Test Flights

CRED hosted Airborne Technologies, Inc. in Honolulu for three days of field tests for a prototype Unmanned Aircraft System (UAS). The Resolution UAS was developed by Airborne Technologies Inc. for PIFSC's and the Papahānaumokuākea Marine National Monument (Monument) and was dubbed the *Malolo 1*. The name is based on the Hawaiian word for 'flying fish'.

A series of test flights were conducted in December, 2007, in the restricted airspace maintained by the U.S. Army at Schofield Barracks range facility and in the restricted airspace off the North Shore controlled by the U.S. Navy. The *Malolo 1* was successfully deployed



An artist's conception of the unmanned aircraft *Malolo 1* operating off of a NOAA vessel.



and recovered from a small boat (32 feet). Flights were 500-1000 feet above the sea surface. The Resolution has a 7-foot wingspan, weighs less than 10 pounds, employs a color video camera system, and currently has an estimated battery life of 1 hour. The UAS design provides a compact, robust, efficient and stable platform for instrument payloads of up to 5 pounds. Video and flight data can be continuously telemetered back to the base station.

The UAS is being developed for shipboard deployment to enhance the efficiency of at-sea survey and recovery of marine debris. The UAS can identify marine debris targets for open-ocean recovery or attachment of satellite-tracked marker buoys. Sea trials are scheduled to take place aboard the NOAA Ship *Oscar Elton Sette* on a two-week cruise in the spring of 2008 to the convergence zone (North Pacific Subtropical Gyre), an area north of the Hawaiian Archipelago where there is a high degree of marine debris accumulation. The marine debris conglomerates located by the UAS will then be tagged with satellite-tracked drifter buoys, or be removed and transported back to Honolulu.

#### Guam/CNMI Marine Natural Resources Monitoring Design Workshop

CRED hosted the Guam/CNMI Marine Natural Resources Monitoring Design Workshop on December 7-10, 2007. This four-day workshop was conducted in partnership with the Navy, University of Guam Marine Laboratory, the University of Miami's Rosenstiel School of Marine and Atmospheric Science, and the University of Hawaii's Hawaii Institute of Marine Biology in order to develop long-term scientific monitoring protocols for Apra Harbor, Guam.

The Navy plans to extend Kilo Wharf in Apra Harbor, and hopes this partnership would allow scientists and resource managers to better understand any impacts the expansion would cause on local coral reef ecosystems. Scientists collaborated to develop a monitoring protocol that would effectively document any changes to the benthic habitat in the harbor.

The result of this collaborative effort is the workshop report, *Monitoring Strategy and Preliminary Survey Design for Guam/CNMI Coral Reef Ecosystem Studies with a Focus on Apra Harbor and Kilo Wharf* provided to the Navy in February 2008. This PIFSC Internal Report presents a general monitoring strategy for Apra Harbor, with a focus on the Kilo Wharf area, but the strategy can be applied to other sites. The strategy is based upon a combination of the random stratified sampling design approach and a subset of permanent stations for monitoring benthic organisms, fish and oceanographic variables in the region. The report is available upon request from the PIFSC Science Director.

## RAMP Research Expedition to the U.S. Equatorial Pacific and American Samoa

The NOAA Ship *Hi'ialakai* departed Honolulu on January 24, 2008 with a team of scientists for a 75-day investigation of Johnston Atoll, the U.S. Phoenix Islands, the islands of American Samoa, and the U.S. Line Islands in the tropical Pacific Ocean. This expedition is a cooperative study among NOAA scientists, local agencies, University of Hawaii collaborators, and US Fish and Wildlife Service partners. It will focus on assessing and monitoring the coral reef resources of these seldom explored areas. The study is part of the biennial monitoring in the region by the PIFSC. This research cruise supports monitoring components of the Coral Reef Ecosystem Integrated Observing System (CREIOS) under the direction of the PIFSC.

The *Hi'ialakai* expedition is part of a comprehensive marine research and education program sponsored by the NOAA Coral Reef Conservation Program (CRCP). The CRCP is a partnership between the National Ocean Service (NOS), NMFS, and other NOAA agencies with the objective of improving the understanding and management of coral reef ecosystems.

The expedition is divided into several cruises. The first research cruise (22 sea days) will cover Johnston Atoll and Howland and Baker islands. The second cruise (30 sea days) will cover American Samoa and is divided into two legs. A third cruise (23 sea days) will cover Jarvis, Palmyra, and Kingman Reef before the ship returns to Honolulu. While the *Hi'ialakai* is working in American Samoa waters, 2 additional sea days will be devoted to an education and outreach project for local high schools directed by staff of the National Marine Sanctuaries Program, NOS. Special guests on the American Samoa cruise will be Governor Togiola Tulafono, Governor of American Samoa, and Lelei Peau, Deputy Director of the American Samoa Dept. of Commerce.

During each cruise of the research expedition, the scientists will conduct comprehensive monitoring surveys of the shallow-water marine resources. Teams of specialists will conduct Rapid Ecological Assessments (REA) for fish, corals, algae and marine invertebrates while SCUBA diving from small boats launched from the *Hi'ialakai*. Fine scale assessments will be conducted by divers surveying along 25-meter transect lines, and larger scale assessments will be conducted by towed-diver surveys. Oceanographers will collect oceanographic data using various monitoring equipment, including long-term data telemetry moorings, subsurface moored instruments, and shipboard sensors. Seawater samples will be collected to examine carbonic chemistry associated with ocean acidification. As time permits, benthic habitat mapping will also be conducted using a shipboard multi-beam sonar system.

This is the fourth PIFSC expedition to American Samoa in recent years and the sixth to the U.S. Line and Phoenix Islands. Accordingly, it will allow the research team to revisit sites of particular interest that were identified during previous expeditions and explore new areas. The expedition will provide valuable data to increase our understanding of



the ecological and environmental processes affecting coral reef ecosystems in U.S.-related islands across the Pacific Ocean.

CRED's monitoring report for American Samoa is available at:  
<http://www.pifsc.noaa.gov/cred/hmapping/amsareport.php>

### Bathymetric Maps for Marianas

During research cruises in 2003 and 2007 to the Mariana Archipelago, PIFSC collected multibeam sonar data of the bathymetry at Guam, Rota, Aguijan (Goat), Tatsumi Reef, Tinian, Saipan, Marpi Bank, Anatahan, Sarigan, Guguan, Alamagen, Pagan, Agrihan, Asuncion, Maug, Supply Reef, and Uracus (Farallon de Paragos). Bathymetric grids of these data are now available at [www.soest.hawaii.edu/pibhmc/pibhmc\\_cnmi.htm](http://www.soest.hawaii.edu/pibhmc/pibhmc_cnmi.htm). In most locations the bathymetric data are continuous from depths of less than 20 m to more than 2000 m; however, around Guam, Rota, and Aguijan, shallow surveys still need to be completed in the 20-300-m depth range. The available grids include 60-m regional grids as well as more detailed 5-m, 10-m and/or 20-m grids of individual islands in both NetCDF and Arc ASCII formats.

These data were collected to complement additional multibeam data collected by NOAA's Ocean Exploration program during its "Ring of Fire" surveys in 2002, 2004, and 2006. A poster presentation, [Shallow Seafloor Mapping in the Mariana Archipelago for Coral Reef Ecosystem Research](#), that incorporates both PIFSC and Ocean Exploration data can also be downloaded from [http://www.soest.hawaii.edu/pibhmc/pibhmc\\_documentation.htm#other\\_pubs/](http://www.soest.hawaii.edu/pibhmc/pibhmc_documentation.htm#other_pubs/)



## Recent & Forthcoming Scientific Research Cruises

### NOAA Ship, *Oscar Elton Sette*

	<b>Depart</b>	<b>Return</b>	<b>Days at Sea</b>
PSD Forage (NWHI)	2/26/08	3/18/08	22days
EOD/CRED (MHI)	3/24/08	4/09/08	17 days
EOD HMS Oceanography	4/15/08	5/10/08	26 days
PSD Camps (NWHI)	5/16/08	6/03/08	19 days

### NOAA Ship, *Hi'ialakai*

CRED (ASRAMP)	2/18/08	3/06/08	18 days
CRED (ASRAMP leg II)	3/10/08	3/21/08	12 days
CRED (ASRAMP leg III)	3/24/08	4/15/08	23 days
CRED (Mapping)	4/29/08	5/28/08	30 days





## Recent Publications

- Baker, J. D., J. J. Polovina, and E. A. Howell.  
2007. Effect of variable oceanic productivity on the survival of an upper trophic predator, the Hawaiian monk seal *Monachus schauinslandi*. Mar. Ecol. Prog. Ser. 346:277-283.
- Bigelow, K. A., and M. N. Maunder.  
2007. Does habitat or depth influence catch rates of pelagic species? Can. J. Fish. Aquat. Sci. 64:1581-1594.
- Chaloupka, M., K. A. Bjorndal, G. H. Balazs, A. B. Bolten, L. M. Ehrhart, C. J. Limpus, H. Sukanuma, S. Troëng, and M. Yamaguchi.  
2007. Encouraging outlook for recovery of a once severely exploited marine megaherbivore. Global Ecol. Biogeogr. (2007) p. 1-8.
- DeMartini, E. E., J. H. Uchiyama, R. L. Humphreys, Jr., J. D. Sampaga, and H. A. Williams.  
2007. Age and growth of swordfish (*Xiphias gladius*) caught by the Hawaii-based pelagic longline fishery. Fish. Bull. 105:356-367.
- Domokos, R., M. P. Seki, J. J. Polovina, and D. R. Hawn.  
2007. Oceanographic investigation of the American Samoa albacore (*Thunnus alalunga*) habitat and longline fishing grounds. Fish. Oceanogr. 16:6, 555-572.
- Gilman, E., D. Kobayashi, T. Swenarton, N. Brothers, P. Dalzell, I. Kinan-Kelly.  
2007. Reducing sea turtle interactions in the Hawaii-based longline swordfish fishery. Biol. Conserv. 139:19-28.
- Johnston, D. W., M. E. Chapla, L. E. Williams, D. K. Mattila.  
2007. Identification of humpback whale *Megaptera novaeangliae* wintering habitat in the Northwestern Hawaiian Islands using spatial habitat modeling. Endang. Species Res. Vol. 3:249-257.
- Parke, M.  
2007. Linking Hawaii fisherman reported commercial bottomfish catch data to potential bottomfish habitat and proposed restricted fishing areas using GIS and spatial analysis. U.S. Dep. Commer., NOAA Tech. Memo. NOAA-TM-NMFS-PIFSC-11, 37 p.
- Parrish, F. A.  
2007. Density and habitat of three deep-sea corals in the lower Hawaiian chain. Bulletin of Marine Science, No. 5477, 185-194.

- Parrish, F. A., and A. R. Baco.  
2007. State of the U.S. deep coral ecosystems in the western Pacific Region: Hawaii and the United States Pacific Islands. pp. 155-194. *In*: S. E. Lumsden, T. F. Hourigan, A. W. Bruckner, G. Dorr (eds.), *The State of Deep Corals Systems of the United States*. NOAA Technical Memorandum CRCP-3. Silver Spring, MD, 365 pp.
- Parry, M.  
2007. Trophic variation with length in two ommastrephid squids, *Ommastrephes bartramii* and *Sthenoteuthis oualaniensis*. *Mar. Biol.* (2008) 153:249-256.
- Polovina, J. J., D. Hawn, and M. Abecassis.  
2007. Vertical movement and habitat of opah (*Lampris guttatus*) in the central North Pacific recorded with pop-up archival tags. *Mar. Biol.* (2008) 153:257-267.
- Snover, M. L., L. Avens, and A. A. Hohn.  
2007. Back-calculating length from skeletal growth marks in loggerhead sea turtles *Caretta caretta*. *Endang. Species Res.* 3:95-104.
- Swimmer, Y., and J. H. Wang (eds.).  
2007. 2006 sea turtle and pelagic fish sensory physiology workshop, September 12-13, 2006. U.S. Dep. Commer., NOAA Tech. Memo. NOAA-TM-NMFS-PIFSC-12, 35 p.
- Uchiyama, J. H., and C. H. Boggs.  
2007. Length-weight relationships of dolphinfish, *Coryphaena hippurus*, and wahoo, *Acanthocybium solandri*: seasonal effects of spawning and possible migration in the central North Pacific. *Mar. Fish. Rev.* 68:1-4.
- Van Dam, R. P., C. E. Diez, G. H. Balazs, L. A. Colón, W. O. McMillan, and B. Schroeder.  
2007. Sex-specific migration patterns of hawksbill turtles breeding at Mona Island, Puerto Rico. *Endang. Species Res.* Vol 3, 1-10.
- Walsh, W. A., K. A. Bigelow, and R. Y. Ito.  
2007. Corrected catch histories and logbook accuracy for billfishes (Istiophoridae) in the Hawaii-based longline fishery. U.S. Dep. Commer., NOAA Tech. Memo. NOAA-TM-NMFS-PIFSC-13, 39 p.
- Wilson, S. G., B. S. Stewart, J. J. Polovina, M. G. Meekan, J. D. Stevens, and B. Galuardi.  
2007. Accuracy and precision of archival tag data: a multiple-tagging study conducted on a whale shark (*Rhincodon typus*) in the Indian Ocean. *Fish. Oceanogr.* 16:6, 547-554.

Zardus, J. D., and G. H. Balazs.  
2007. Two previously unreported barnacles commensal with the green sea turtle, *Chelonia mydas* (Linnaeus, 1758), in Hawaii and a comparison of their attachment modes. *Crustaceana* 80(11):1303-1315.

### **Administrative Reports**

Hamm, D. C., N. T. S. Chan, and C. J. Graham.  
2007. Fishery statistics of the western Pacific, volume 22. Pacific Islands Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Pacific Islands Fish. Sci. Cent. Admin. Rep. H-07-03, 200 p.

Moffitt, R. B., J. Brodziak, and T. Flores.  
2007. Status of the bottomfish resources of American Samoa, Guam, and Commonwealth of the Northern Mariana Islands, 2005. Pacific Islands Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Pacific Islands Fish. Sci. Cent. Admin. Rep. H-07-04, 52 p.

### **Abstracts**

Antonelis, G. A.  
2008. Monk seal research and recovery effort: how crittercam revolutionized our understanding of monk seal ecology. [Abstr.] National Geographic's Animal-borne Imaging Symposium, Washington, D.C., October-13, 2007. Presentation to be written in the Symposium Proceedings.

Antonelis, G. A., J. D. Baker, C. L. Littnan, and D. W. Johnston.  
2007. Terrestrial habitat loss in the Northwestern Hawaiian Islands: a threat to the conservation of Hawaiian green turtles and other biota. [Abstr.] 28<sup>th</sup> Annual Symposium on Sea Turtle Biology and Conservation, Loreto, Mexico, January 22-25, 2008.

Asher, J., J. Kenyon, B. Vargas-Angel, and S. Vogt.  
2007. Baseline assessment of coral communities at Wake Atoll before and after Supertyphoon Ioke. [Abstr.] 11<sup>th</sup> International Coral Reef Symposium, Fort Lauderdale, Florida, July 7-11, 2008.

Brainard, R. E., and Colleagues at CRED.  
2007. Pacific Reef Assessment and Monitoring Program (RAMP): integrated ecosystem observations of coral reef ecosystems of the U.S. Pacific Islands. [Abstr.] 11<sup>th</sup> International Coral Reef symposium, Fort Lauderdale, Florida, July 7-11, 2008.



- Braun, C., and P. Vroom.  
2007. Examination of algal diversity and benthic community structure at Palmyra Atoll, U.S. Line Islands. [Abstr.] 11<sup>th</sup> International Coral Reef Symposium, Fort Lauderdale, Florida, July 7-11, 2008.
- Frey, A., P. H. Dutton, and G. H. Balazs.  
2007. Use of microsatellite markers for matching green turtle nests to females on Molokai in the Hawaiian Islands. [Abstr.] International 28<sup>th</sup> Sea Turtle Symposium, Loreto, Mexico, January 22-25, 2008.
- Hall, A., R. Brainard, J. Caley, S. Godwin, L. Harris, N. Knowlton, T. Lotufo, J. Martin, K. McCoy, M. Moews, R. Moffitt, G. Paulay, and L. Plaisance.  
2007. Autonomous reef monitoring structures (ARMS): a tool for monitoring indices of biodiversity. [Abstr.] 11<sup>th</sup> International Coral Reef Symposium, Fort Lauderdale, Florida, July 7-11, 2008.
- Hoeke, R., and J. Aucan.  
2007. Sea-level rise, flooding, flushing and wave heights at a coral atoll. [Abstr.] 2008 Ocean Sciences Meeting, Orlando, Florida, March 2-7, 2008.
- Hoeke, R., and C. Storlazzi.  
2007. Hydrodynamic modeling of a fringing reef embayment: Hanalei Bay, Hawaii. [Abstr.] 11<sup>th</sup> International Coral Reef Symposium, Fort Lauderdale, Florida, July 7-11, 2008.
- Hospital, J., M. Pan, and M. Raizin.  
2008. Price determinants for Hawai'i bottomfish and welfare effects of seasonal closures in the main Hawai'ian Islands. [Abstr.] 7<sup>th</sup> National Economics and Social Sciences Workshop, Port Townsend, Washington, May 6-8, 2008.
- Hospital, J., M. Pan, and M. Raizin.  
2008. Price determinants for Hawai'i bottomfish and welfare effects of seasonal closures in the main Hawai'ian Islands. [Abstr.] International Institute of Fisheries, Economics and Trade (IIFET) 2008 Conference, Nha Trang, Vietnam, July 22-25, 2008.
- Keenan, E., R. Brainard, and L. Basch.  
2007. Historical and present status of the pearl oyster, *Pinctada margaritifera*, in the Northwestern Hawaiian Islands. [Abstr.] 11<sup>th</sup> International Coral Reef Symposium, Fort Lauderdale, Florida, July 7-11, 2008.
- Kenyon, J., M. Dunlap, C. Wilkinson, K. Page, P. Vroom, G. Aeby, and O. Dameron.  
2007. Coral community structure at Pearl and Hermes Atoll in the Northwestern Hawaiian Islands: unique conservation challenges in the Hawaiian Archipelago. [Abstr.] Hawaii Conservation Conference, Honolulu, Hawaii, July 25-27, 2007.



- Merritt, D., K. Wong, M. Parke, C. Kelley, and J. Drazen.  
2007. Technique to monitor and study fish and their habitat that are beyond scientific diving depths. [Abstr.] 11<sup>th</sup> International Coral Reef Symposium, Fort Lauderdale, Florida, July 7-11, 2008.
- Miller, J., J. Gove, and J. Maragos.  
2007. The effects of geology, oceanography and anthropogenic activities on the coral reef ecosystems of the Pacific Remote Island Areas. [Abstr.] 11<sup>th</sup> International Coral Reef Symposium, Fort Lauderdale, Florida, July 7-11, 2008.
- Moffitt, R., R. Brainard, J. Caley, S. Godwin, A. Hall, L. Harris, E. Keenan, N. Knowlton, T. Lotufo, J. Maragos, J. Martin, S. McKeon, M. Moews, G. Paulay, C. Pittman, A. Sherwood, J. Starmer, and B. Zgliczynski.  
2007. Biodiversity census at French Frigate Shoals, a baseline diversity study. [Abstr.] 11<sup>th</sup> International Coral Reef Symposium, Fort Lauderdale, Florida, July 7-11, 2008.
- Myhre, S.  
2007. Marine debris density on coral reefs around U.S.-affiliated Pacific Islands. [Abstr.] 11<sup>th</sup> International Coral Reef Symposium, Fort Lauderdale, Florida, July 7-11, 2008.
- Nadon, M. O., B. L. Richards, B. J. Zgliczynski, R. E. Schroeder, and R. E. Brainard.  
2007. Central Pacific survey suggests lower reef shark density near human population centers. [Abstr.] 11<sup>th</sup> International Coral Reef Symposium, Fort Lauderdale, Florida, July 7-11, 2008.
- Page-Albins, K., P. Vroom, M. Albins, R. Hoeke, and C. Smith.  
2007. Patterns in benthic communities at a remote subtropical atoll along a wave exposure gradient. [Abstr.] 11<sup>th</sup> International Coral Reef Symposium, Fort Lauderdale, Florida, July 7-11, 2008.
- Page-Albins, K., P. Vroom, C. Smith, E. DeMartini, and S. Godwin.  
2007. Top-down factors explain benthic community structure on a near-pristine coral reef ecosystem. [Abstr.] 11<sup>th</sup> International Coral Reef Symposium, Fort Lauderdale, Florida, July 7-11, 2008.
- Pan, M., and S. Li.  
2008. Fisheries policy designs in response to climate changes -- a case study of the Hawaii-based longline swordfish fishery. [Abstr.] Coping with Global Change in Marine-Ecological Systems, Rome, Italy, July 8-22, 2008.



- Pan, M., and S. Li.  
2008. Fisheries policy designs in response to climate changes -- a case study of the Hawaii-based longline swordfish fishery. [Abstr.] International Institute of Fisheries, Economics and Trade (IIFET) 2008 Conference, Nha Trang, Vietnam, July 22-25, 2008.
- Pan, M., K. Boehle, L. Cox, and W. Hu.  
2008. Evaluation of consumer choices on spinner dolphin excursions and the implications for spinner dolphin conservation. [Abstr.] International Institute of Fisheries, Economics and Trade (IIFET) 2008 Conference, Nha Trang, Vietnam, July 22-25, 2008.
- Plaisance, L., C. Meyer, G. Paulay, R. Brainard, A. Hall, J. Caley, and N. Knowlton.  
2007. Standardized sampling and molecular approaches for assessing marine biodiversity of coral reefs. [Abstr.] 11<sup>th</sup> International Coral Reef Symposium, Fort Lauderdale, Florida, July 7-11, 2008.
- Rice, M., and G. Balazs.  
2007. Hawaiian green turtles dive to record depths during oceanic migrations. [Abstr.] Presentation to the 28<sup>th</sup> Sea Turtle Symposium, Loreto, Mexico, January 22-25, 2008.
- Richards, B., E. Lundblad, B. J. Zgliczynski, R. E. Schroeder, and R. E. Brainard.  
2007. Where have all the big fish gone? Distribution of remaining large reef fishes in the Hawaiian Archipelago. [Abstr.] 11<sup>th</sup> International Coral Reef Symposium, Fort Lauderdale, Florida, July 7-11, 2008.
- Richards, B., E. Lundblad, B. J. Zgliczynski, R. E. Schroeder, and R. E. Brainard.  
2007. Where have all the big fish gone? [Abstr.] 2008 ESRI International Users Conference, San Diego, California, August 4-8, 2008.
- Rooney, J., E. Lundblad, and M. Parke.  
2007. Mapping coral communities at Garapan Anchorage, Saipan, CNMI: Implications for mapping benthic habitats in coral reef ecosystems. [Abstr.] 11<sup>th</sup> International Coral Reef Symposium, Fort Lauderdale, Florida, July 7-11, 2008.
- Schroeder, R., M. O. Nadon, B. L. Richards, B. J. Zgliczynski, and M. Sabater.  
2007. Reef fish densities inversely follow human population levels across American Samoan Islands. [Abstr.] 11<sup>th</sup> International Coral Reef Symposium, Fort Lauderdale, Florida, July 7-11, 2008.
- Schroeder, R. E., B. L. Richards, M. O. Nadon, B. J. Zgliczynski, and R. E. Brainard.  
2007. Pacific-wide collapse of reef fish biomass near human population centers. [Abstr.] 11<sup>th</sup> International Coral Reef Symposium, Fort Lauderdale, Florida, July 7-11, 2008.



- Timmers, M. A., R. J. Toonen, M. Takabayashi, and M. J. deMaintenon.  
2007. The molecular population structure of the crown-of-thorns starfish, *Acanthaster planci*, across the Hawaiian Archipelago and the two closest island neighbors, Johnston Atoll and Kingman Reef. [Abstr.] 11<sup>th</sup> International Coral Reef Symposium, Fort Lauderdale, Florida, July 7-11, 2008.
- Vargas-Angel, B., B. Wheeler, J. Kenyon, J. Maragos, and B. DeJoseph.  
2007. Coral health and disease assessment in the U.S.-affiliated Pacific Islands. [Abstr.] 11<sup>th</sup> International Coral Reef Symposium, Fort Lauderdale, Florida, July 7-11, 2008.
- Vroom, P., K. N. Page, J. C. Kenyon, and R. E. Brainard.  
2007. Healthy algal-dominated reefs on remote Pacific Islands? [Abstr.] 11<sup>th</sup> International Coral Reef Symposium, Fort Lauderdale, Florida, July 7-11, 2008.
- Weiss, J., J. Miller, and J. Rooney.  
2007. Seafloor characterization using multibeam and optical data at French Frigate Shoals, Northwestern Hawaiian Islands. [Abstr.] 11<sup>th</sup> International Coral Reef Symposium, Fort Lauderdale, Florida, July 7-11, 2008.
- Zgliczynski, B. J., E. E. DeMartini, R. C. Boland, and A. M. Friedlander.  
2007. Influences of wind-wave exposure on the distribution and abundance of recruit reef fishes on back reefs at Kure and Pearl and Hermes Atolls, NWHI. [Abstr.] 11<sup>th</sup> International Coral Reef Symposium, Fort Lauderdale, Florida, July 7-11, 2008.
- Zgliczynski, B. J., R. E. Schroeder, M. O. Nadon, and B. Richards.  
2007. Pacific-wide status of the rare/endangered humphead wrasse (*Cheilinus undulatus*) and bumphead parrotfish (*Bolbometopon muricatum*). [Abstr.] 11<sup>th</sup> International Coral Reef Symposium, Fort Lauderdale, Florida, July 7-11, 2008.

### **Manuscripts Approved by Science Director to be Submitted for Publication**

- Ackermann, M., M. Koriabine, P. J. De Jong, T. D. Lewis, U. Buchler, T. M. Work, J. Dagenais, G. H. Balazs, and J. C. Leong.  
Detection of a gene encoding sialytransferase in a BAC comprising the genome of the fibropapilloma-associated turtle herpesvirus. *Virology*.
- Arthur, K., C. Limpus, G. Balazs, A. Capper, J. Udy, G. Shaw, U. Keuper-Bennett, and P. Bennett.  
The exposure of green turtles (*Chelonia mydas*) to tumour promoting compounds produced by the cyanobacterium *Lyngbya majuscula* and their potential role in the aetiology of fibropapillomatosis. *Harmful Algae*.

- Baker, J. D.  
Variation in the relationship between offspring size and survival provides insight into causes of mortality in Hawaiian monk seals. *Journal of Animal Ecology*.
- Brodziak, J.  
Fish stocks, overfishing. *Encyclopedia of Islands*, U.C. Press.
- DeMartini, E. E.  
Review of "The Biology and Fisheries of the Slipper Lobster" (K. Lavalli & E. Spanier, eds.). *The Quarterly Review of Biology*.
- Harting, A. L., G. A. Antonelis, B. L. Becker, S. M. Canja, D. F. Luers, and A. Dietrich.  
Galapagos sharks and monk seals: a conservation conundrum. *Ecology and Society*.
- Hu, W., K. Boehle, L. Cox, and M. Pan.  
Economic values in choice of dolphin excursions in Hawaii: application of a mixed error component model. *Canadian Journal of Agricultural Economics*.
- Johanos, T. C., B. L. Becker, J. D. Baker, and T. J. Ragen.  
Impacts of sex ratio reduction on male aggression in the endangered Hawaiian monk seal (*Monachus schauinsland*). *Endangered Species Research*.
- Johnston, D. W., M. McDonald, J. J. Polovina, R. Domokos, S. Wiggins, and J. Hildebrand.  
Temporal patterns in the acoustic signals of beaked whales at Cross Seamount. *Biology Letters*.
- Kenyon, J. C., C. B. Wilkinson, M. J. Dunlap, G. S. Aeby, and C. Kryss.  
Community structure of hermatypic corals at Laysan Island and Lisianski Island/Neva Shoal in the Northwestern Hawaiian Islands: a new layer of scientific exploration. *Atoll Research Bulletin*.
- Kobayashi, D. R.  
Larval retention versus larval reception: marine connectivity patterns within and around the Hawaiian Archipelago. *Marine Biology*.
- Kobayashi, D. R., J. J. Polovina, D. M. Parker, N. Kamezaki, I. Cheng, I. Uchida, P. H. Dutton, and G. H. Balazs.  
Pelagic habitat characterization of loggerhead sea turtles, *Caretta caretta*, in the North Pacific Ocean (1997–2006): insights from satellite tag tracking and remotely-sensed data. *Journal of Experimental Marine Biology and Ecology*.

- Kolinski, S. P., J. Cruce-Johnson, D. M. Parker, K. P. Frutchey, G. H. Balazs., and R. Clarke.  
Identifying migration-based connectivity via satellite telemetry of post-nesting green turtles from Gielop Island, Yap State, Federated States of Micronesia. Endangered Species Research.
- Nowlis, J. S., A. M. Friedlander, E. E. DeMartini, and E. K. Brown.  
Dramatic ecological effects of fishing revealed using a large unfished reference area. Proceedings of the National Academy of Sciences.
- Parrish, F. A., G. J. Marshall, and G. A. Antonelis.  
Foraging interaction between monk seals and other apex predators in the Northwestern Hawaiian Islands. Marine Ecology Progress Series.
- Rice, M., and G. H. Balazs.  
Diving behavior of the Hawaiian green turtle (*Chelonia mydas*) during oceanic migrations. Journal of Experimental Marine Biology and Ecology.
- Russell, D. J., and G. H. Balazs.  
Feeding selectivity by the green turtle *Chelonia mydas* (Reptilia; Testudinata; Cheloniidae) in the Hawaiian Islands; a 28 year study of marine vegetation diet resources in the Kane'ohē Bay Region. Pacific Science.
- Snover, M. L.  
A response to "Using Bayesian state-space modelling to assess the recovery and harvest potential of the Hawaiian green sea turtle stock. Ecological Modelling.
- Snover, M. L.  
Ontogenetic habitat shifts in marine organisms: influencing factors and the impact of climate. Bulletin of Marine Science.
- Van Dam, R. P., C. E. Diez, G. H. Balazs, L. A. Colón, W. O. McMillan, and B. Schroeder.  
Sex specific migration patterns of hawksbill turtles breeding at Mona Island, Puerto Rico. Endangered Species Research.
- Vargas-Angel, B., J. Kenyon, D. Fenner, and R. E. Brainard.  
2006 Rapid ecological assessment of coral diseases on shallow reef habitats of the American Samoa Archipelago: distribution and abundance. Pacific Science.
- Vroom, P. S., C. A. Musburger, S. W. Cooper-Alletto, J. E. Maragos, K. N. Page, and Molly A. V. Timmers.  
Ecosystem-based analyses reveal differences between geographically close equatorial islands: biological assemblages of Howland and Baker Islands, central Pacific. Coral Reefs.

