

# **JIMAR Annual Report for Fiscal Year 2010**

## **Plans for next Fiscal Year**

### **Equatorial Oceanography**

#### **Penetration of Anthropogenic CO<sub>2</sub> in the Oceans Based on Analysis of Recent WOCE/JGOFS/OACES Carbon Data Using the Remineralization Ratios Obtained by the New Three-End-Member Mixing Model**

P.I.: Yuan-Hui Li

The project is near completion. Attention is now focused on the partition of elements between solid and liquid phases in the ocean and other aquatic systems. A paper is currently in preparation—Li, Y.H., 2010, Partition of elements between liquid and solid phases in aquatic environments (to be submitted to *Aquatic Geochemistry*).

#### **University of Hawaii Sea Level Center**

P.I.: Mark A. Merrifield

The project intends to increase the number of operational stations in the GLOSS and GCOS networks through new installations and upgrades in the Caribbean, and Central and South America. Many of these new stations will be installed with partial support from tsunami funding agencies. We will conduct maintenance trips to 12-15 stations and UHSLC technicians will provide on-site training to local agencies during these visits. The UHSLC will continue to provide quality assessment of tide gauge data on daily, monthly, and annual cycles. Further progress for GPS monitoring at GCOS tide gauges requires a coordinated international effort. At most remote tide gauge sites, real-time communications are not in place to bring GPS data back in a time frame suitable for routine processing at IGS centers. In addition, the specification of vertical rates at GPS@TG stations requires additional research and development to achieve a common global reference frame. These issues were discussed at a GPS workshop at the GLOSS Group of Experts meeting in Paris in 2009. The GLOSS community is attempting to develop a strategy for delayed mode GPS processing at several centers dedicated to GPS@TG data. The project plans to prepare a joint proposal with international partners to establish GPS capabilities at the majority of GCOS stations.

## **Tsunami Research**

### **Archive of Rapidly Sampled Hawaiian Sea Level**

P.I.: Douglas S. Luther

Considering the continuing importance of the rapidly-sampled sea level records in HiOOS, efforts to diagnose the causes of harbor sea level variations as well as coastal inundation events, the collection, processing, archiving, and dissemination (through ARSHSL) of rapidly sampled Hawaiian sea level remain our highest priorities for this low-budget activity. Depending on the amount of effort needed to maintain the archive, enhancements to the archive will be undertaken, including one or more of the following: (i) updating the archive's technical report; (ii) updating files of concatenated, quality-controlled, hourly-averaged sea level data for low-frequency studies; and, (iii) disseminating the datum histories of the PTWC gauges.

### **Three-dimensional Model of Tsunami Generation and Near-field Characteristics**

P.I.: Thomas A. Schroeder [Kwok Fai Cheung]

The project has achieved the first two objectives listed in the annual report and is currently working on the third. The research work complements a long-term project of the PI to update the tsunami inundation and evacuation maps for the Pacific basin. The improved modeling capability will allow accurate description of local tsunamis and their impacts in Pacific island communities, thereby providing critical information to civil defense agencies in the development of emergency response and recovery plans.

### **University of Hawaii Sea Level Center – Tsunami Research**

P.I.: Mark A. Merrifield

As part of the tsunami network upgrades, the project intends to install new gauges at Callo, Talara and Matarani, Peru, La Libertad, Ecuador, and Acajutla, El Salvador in the Pacific, and Curaçao, Netherlands Antilles, Roseau, Dominica, and Sauteurs, Grenada in the Caribbean.

## **Climate Research**

### **Changes in the Tropical Pacific Climate Variability during the Last Millennium: External Forcing versus Internal Variability**

P.I.: Axel Timmermann

The project will study the meridional asymmetry of the ENSO recharging process, which apparently plays an important role in the ENSO-cycle, in more detail. During a La Niña, most of the heat that recharges the tropical Pacific slowly originates from the Southern Hemisphere. It is hypothesized that this asymmetry can be traced back to an asymmetry in the nonlinear wind-

response to an equatorially symmetric SST anomaly. The project will demonstrate the importance of these mechanisms to the issue of externally modulated ENSO variability.

### **Development of an Extended and Long-range Precipitation Prediction System over the Pacific Islands**

P.I.: Hariharasubramanian Annamalai

Results from seasonal hindcasts and forecasts will be placed in a map room at the UH (a website is being prepared). The project will examine the National Center for Environmental Prediction (NCEP) Climate Forecast System's (CFS) ability in hindcasting strong Madden Julian Oscillation events (extract and transfer required daily data from Climate Prediction Center to UH). CFS's skill in extended-range prediction of rainfall over the U.S.-affiliated Pacific Islands (USAPI) will be assessed. A detailed examination of CFS's ability in capturing the weather events over the USAPI will be performed.

### **Enhancement of Data and Research Activities for Climate Studies at the International Pacific Research Center**

P.I.: Kevin Hamilton [Peter Hacker, James Potemra]

The APDRC plans to continue the activities organized around its three main goals: providing integrated data server and management systems for climate data and products; developing and serving new climate-related products for research and applications users; and conducting climate research in support of the IPRC and NOAA research goals. Activities within the first goal include: operate and maintain multiple, integrated web-based servers; continue server upgrade and development; partner with other data sites on data-server interoperability; acquire, prepare, and document data and products for the local archive; and link to remote products and necessary metadata. Activities within the second goal include ongoing activities to develop integrated data products, and development of model- and observation-based analyses and indices to improve prediction studies for atmospheric processes in the Indo-Pacific region.

Activities within the third goal include: post-GODAE model evaluation; ecosystem assessments with high-resolution regional modeling; ocean processes and regional climate impact; atmosphere/ocean coupled processes and product development; climate change modeling and product development; and downscaling of global forecast models in support of IDEA Center activities.

### **Investigating the Transport and Transformation Mechanisms of Atmospheric Mercury in the Remote Central North Pacific Marine Free Troposphere**

P.I.: Thomas A. Schroeder [Darryl T. Kuniyuki]

Due to funding cuts at EPA, the mercury studies will also be supported by NOAA's Air Resources Laboratory (ARL). New ARL procedures may be used in the operations of the project for next year. The AIM will be sent back to the EPA at the beginning of July 2010.

## **Pacific ENSO Applications Center**

P.I.: Thomas A. Schroeder

Further studies are needed to understand the causes of recent sea-level rise in the USAPI, therefore the activities related to downscaling the results of the IPCC-AR4 model output will continue in the FY 2011. The results may indicate features of SSTs, sea level, and climate in greater spatial detail. A comparison of these results with recent observations may make possible a better understanding and confidence in why the pattern of recent increases in sea level has been taking place.

## **Pacific RISA Integrated Climate Program Support**

P.I.: Cheryl L. Anderson

The plan for the next fiscal year is to continue with each of the activity areas. The work on developing the CLIDDSS tool will progress with increased collaboration from the Southwest RISA program and the Hawaii hazards community so that they will have increased accessibility on approval of the plans. Workshops will be conducted to address decision making for drought. Stakeholder engagement, specifically through the website will continue.

## **Profiling CTD Float Array Implementation and Ocean Climate Research**

P.I.: Thomas A. Schroeder [Gregory C. Johnson]

In FY 2011, collaboration with PMEL and other Argo partners will continue, with testing, deployment, and performance monitoring for more floats. Ocean climate studies will continue using Argo data, including analysis of global ocean heat and, possibly, freshwater content variations.

## **Remote versus Local Forcing of Intraseasonal Variability in the IAS Region: Consequences for Prediction**

P.I.: Shang-Ping Xie

The project will move forward following its proposal. Specifically, a regional atmospheric model has been configured for IAS and will be integrated for 10 years from 1997-2006. The model output will include some fields at four times daily intervals to evaluate its skills in simulating tropical storms. The project will evaluate the model simulation, and begin conducting some experiments to explore ISO dynamics.

## **Roles of Ocean-Atmosphere-Land Interaction in Shaping Tropical Atlantic Variability and Toward Reducing Climate Model Biases in the Equatorial Atlantic and Adjacent Continents**

P.I.: Shang-Ping Xie

The evolution of tropical Atlantic biases will be investigated by using the GFDL seasonal forecast output. Physical processes leading to error growth on various timescales will be examined. Investigation into global warming dynamics will continue.

## **Tropical Meteorology**

### **Development of Real-Time Precipitable Water Capability Using the Global Positioning System**

P.I.: James H. Foster

A new site will be installed on Midway Atoll in collaboration with the NOAA COOPS group and NGS CORS. Permission has been given to add equipment to the National Monument, and a special monument is currently being designed. The SkyNet network of GPS receivers will continue to be maintained and equipment and processing software will be upgraded as necessary. A near-real-time data stream from the Kilo Moana will be configured and a processing stream initiated to develop the configuration and tuning necessary to produce usable precipitable water estimates from this platform.

### **National Weather Service Fellows**

P.I.: Thomas A. Schroeder

Jessica Garza has refined her M.S. thesis topic and is progressing towards completion of her thesis this coming year. She is working with Professor Pao-Shin Chu of the Department of Meteorology.

### **National Weather Service International Pacific Training Desk**

P.I.: Thomas A. Schroeder

The Pacific Region and World Meteorological Organization are considering an adjustment in training strategies, which may include traveling instructors and/or a change of central facility to Guam. These are under consideration at the time of this report.

# Fisheries Oceanography

## Climate Change and Ecosystem Variability in the North Pacific Ocean and the Dynamics of Marine Resource Populations

P.I.: Thomas A. Schroeder [Franklin B. Schwing]

The West Coast Regional Node of Coastwatch is proposing an ambitious plan to increase the number of derived products that better address the needs of resource managers while maintaining the near-real-time products that are familiar to long-term data users. The proposed work plan for FY 2011 has been divided into specific tasks, each targeted to meet specific needs identified through interactions with our user community.

### *Task 1. Expand suite of basic geophysical/bio-geochemical parameters*

- *Task 1-a.* Post ASCAT data on THREDDS server
- *Task 1-b.* Post MERIS pigment products on server
- *Task 1-c.* Post POES-GOES Blended SST (OSDPD) on server

### *Task 2. Develop and serve feature-based derived products*

- *Task 2-a.* Chlorophyll-a derived frontal products for West Coast (WCRN)
- *Task 2-b.* SST derived frontal products
- *Task 2-c.* SSH Lagrangian Coherent Structures (LCS)

### *Task 3. Synthesis products*

- *Task 3-a.* Expand and improve El Niño Watch
- *Task 3-b.* Integrated Ecosystem Assessments (IEAs) for West Coast

### *Task 4. Outreach and Education*

- *Task 4-a.* Satellite Applications Class at Oregon State University
- *Task 4-b.* SMILE program at Oregon State University

### *Task 5. Infrastructure Improvements*

- *Task 5-a.* Provide load balancing/on-line redundancy for web services

The research emphasis for this project in FY 2011 will continue to focus on the following areas: 1) the characterization of ocean “hot spots” and their utilization by marine pelagic predators; 2) understanding the impact of large-scale climate variability on mesoscale ocean structure and its consequences to marine populations; 3) developing satellite-based data products that define physical and biological attributes of ocean habitat; and 4) developing indicators of climate and environmental variability that can be incorporated into ecosystem models and resource management strategies. A particular emphasis will be the contribution of data products to a California Current Integrated Ecosystem Assessment. A number of ongoing collaborative projects with marine ecologists from NOAA and various academic institutions are likely to yield manuscripts in FY 2011, including work describing the ecology of a number of protected and managed species, including green turtles, Laysan albatross, swordfish, salmon sharks, and a number of cetaceans.

## **Contribution, Linkages and Impacts of the Fisheries Sector to the Economies of Hawaii and Other U.S.-Affiliated Pacific Islands: An Extended Input-output Analysis**

P.I.: PingSun Leung and Minling Pan

The project will complete the fishery SAM model and analysis for Hawaii and prepare a technical report documenting the fisheries linkages and impacts in the economy. An annual cost survey of the American Samoa's longline fleet will also be conducted; this task is currently underway. The project economist, Shawn Arita, is currently in American Samoa implementing the survey. A database will be put together for the collected cost information. A statistical summary will then be prepared and the results will be summarized in a technical report.

### **Data Administration of Pelagic Fisheries Data**

P.I.: Thomas A. Schroeder [Samuel G. Pooley, Karen Sender]

*Hawaii Longline Observer Data System (LODS):* Ongoing maintenance and enhancement of the Hawaii Longline Observer Data System (LODS). Tasks: a) assist in LODS production support with problem diagnosis and resolution for the production and test systems; b) fix critical LODS defects within 20 work days; c) with direction from the LODS Steering Committee, evaluate and plan for needed system requirements in support of the Hawaii and American Samoa longline observer programs; d) provide high-value, low-effort LODS enhancements, if the budget allows; e) record trouble ticket/issues log for support and maintenance problems and resolution; f) provide quarterly technical support reviews to PIFSC and PIRO through the LODS Steering Committee; g) provide partial hardware and software license refreshment in support of LODS architecture.

*Hawaii Longline Logbook Data System:* Continue development of the Hawaii Longline Logbook Data System (LLDS) to support integration of LODS, LLDS, and other data in order to enable timely and accurate estimation of protected species interactions, fish by-catch, and quota-regulated catch levels in the Hawaii longline fishery as required under the Endangered Species Act, Magnuson-Stevens Act, and/or international agreements for tuna fisheries management in the Pacific Ocean. Tasks: a) develop and test the data entry application; b) develop and test the data upload utilities for electronic logbook submissions; c) design a web interface for access to applications, training resources and system documentation.

### **Fisheries Oceanography: Ecosystems Observation Research Program**

P.I.: Thomas A. Schroeder [Samuel G. Pooley, Michael P. Seki]

The project will continue to focus on improving management of the Science Center data streams and moving forward with the vision to enable the datasets to feed and contribute to the Integrated Ocean Observing System. The project will support ecosystem-level projects addressing fishery biology and stock assessment. Examples include projects with a focus on multi-species stock assessments, protected species-fisheries interactions, and life history and

ecology studies that support the stock assessment models (e.g., age and growth, distribution, movement, etc.).

Research will be aimed at understanding the relationship between the abiotic environment (including oceanographic characterization, climate, and benthic habitat) with the living marine resource inhabitants and the parameters that drive an ecosystem's dynamics; e.g., food webs and trophic flow. Commercial and recreational fisheries and the impact of ecosystem-based fisheries policies (e.g., developed by the Western Pacific Fisheries Management Council) will be monitored and analyzed. The project will support outreach and education efforts to improve public awareness of the program science and monitoring efforts in support of resource management. Life history staff will undertake ageing of pink snapper, *Pristipomoides filamentosis*, via annual growth mark and begin documentation of UFA size sampling results and managing the biosampling database efforts.

### **Fisheries Oceanography: Methods Aimed to Reduce Sea Turtle-Longline Interactions: Tests of Modified Baits and Fishing Gear**

P.I.: Thomas A. Schroeder [Samuel G. Pooley, Yonat Swimmer]

The project will continue to coordinate funding and provide logistics for the experimental field trials, with the primary objective to acquire data related to fisheries bycatch. During the second half of 2010, the project will coordinate field trials in Costa Rica, Uruguay, Spain, and Vietnam in order to complete data sets for analysis. Towards this end, work with the various contracted scientists, managers, and fisheries industry representatives will continue to test modified fishing gear in commercial fisheries. Once complete, various modeling approaches will be used to analyze factors most influential in reducing the capture rate on non-target species on fishing gear. Funding from federal sources has been secured to enable us to continue field trials.

### **Fisheries Oceanography: Protected Species Investigation: Marine Turtle Research Program**

P.I.: Thomas A. Schroeder [Samuel G. Pooley, Stacy A. Hargrove, George Balazs]

Major emphasis will continue to be placed on studying the pelagic ecology and movements of sea turtles to develop management strategies to reduce fisheries bycatch. Continued research with colleagues in Japan, Taiwan, and New Caledonia are slated for FY 2011. Forty-two (42) North Pacific stock loggerhead juveniles and subadults from Japan were satellite tagged and released in FY 2010. Tracking, data management, and mapping expertise will continue to be provided by NMFS and JIMAR as a joint effort with our international colleagues.

Captive care and rehabilitation will also continue as an important part of the stranding and salvaging research program. JIMAR MTRP Biological Technicians are responsible for the care of captive rehabilitated animals, and are instrumental in the administration and conduction of the stranding and salvage research program.

Necropsy of dead turtles, biological sample collection, and management of biological samples are also major responsibilities of JIMAR MTRP Biological Technicians and will continue to be an important part of their routine tasks.

JIMAR MTRP employees will conduct Longline Observer Training sessions as requested by NOAA's Pacific Islands Regional Office. Training sessions include a 30-minute classroom training session on marine turtle biology and hands-on training in measurements, tagging, and biological sample collection. Two or more training sessions will be conducted in FY 2011.

JIMAR MTRP employees will participate in field captures of marine turtles on Oahu and periodically on the outer islands on an as needed basis. Participation in this research includes hand-capturing turtles, performing health assessments, measuring, tagging, collecting biological samples, and releasing the turtles back into the wild.

The MTRP will be hiring replacements for two JIMAR vacancies in FY 2011. One position is a Marine Turtle Stranding Associate and the other is a Marine Turtle Research Associate, which involves conducting fieldwork on nesting turtles in the remote Northwestern Hawaiian Islands for up to 12 weeks at a time each year.

### **Fisheries Oceanography: Protected Species Research Program**

P.I.: Thomas A. Schroeder [Samuel G. Pooley, Frank Parrish, Charles Littnan, Erin Oleson]

*Hawaiian Monk Seal Research Program (HMSRP)*: The HMSRP will continue its standard NWHI field camps. In addition, further efforts to survey more remote and possibly important habitats in the MHI will be pursued. A second year of the Laysan Island de-worming trial and winter camp will be conducted and an over-winter camp to help identify causes of low juvenile survival at Kure Atoll will be deployed. Further efforts to better assess the monk seals using Necker and Nihoa Island, the latter with the aid of a remote camera system, will be conducted. Finally, the program hopes to have a new captive facility for care of injured or diseased monk seals in place.

*Cetacean Research Program (CRP)*: In FY 2011, the CRP studies will include continued population monitoring and assessment, and characterization of habitat use. Specific goals are: a) the completion of HICEAS (Hawaiian Islands Cetacean Ecosystem Assessment Survey, b) small boat surveys for cetaceans in American Samoa, and c) continued involvement in the spinner dolphin photo-identification project.

### **Marine Resource Dynamics and Assessment Program (MARDAP): Economics of Fisheries Initiative**

P.I.: Thomas A. Schroeder [Samuel G. Pooley, Minling Pan]

The plan for FY 2011 is to continue the ongoing research programs in assessing and monitoring changes in key economic indicators in the Hawaii-based and American Samoa longline fisheries. Research efforts to expand economic data collection programs to the fisheries in Guam and Commonwealth of the Northern Mariana Islands (CNMI) will continue. Market research on the seafood preference study on wild caught versus aquacultural/farmed products will also continue.

### **Marine Resource Dynamics and Assessment Program (MARDAP): Research Support**

P.I.: Thomas A. Schroeder [Samuel G. Pooley, Susan Kamei]

This project will be expanded to include scientific editing and technical writing services, fisheries data processing, and data quality assurance.

### **Marine Resource Dynamics and Assessment Program (MARDAP): Research Support— Fisheries Data Monitoring**

P.I.: Thomas A. Schroeder [David Hamm]

Fishery monitoring support will continue at the same high level, responding to additional catch limit monitoring requirements by modifying or expanding duties as needed.

### **Marine Resource Dynamics and Assessment Program (MARDAP): Research Support SIS**

P.I.: Thomas A. Schroeder [Samuel G. Pooley, Jerry Wetherall]

*Scientific Editing:* The Scientific Editor will provide comprehensive professional editing services to program staff. The editor will review and update Center guidelines for manuscript submission and clearance and continue to provide regular reports on manuscript status to research staff and program managers. As part of the Center's goals in education and outreach, the editor will continue to develop Web versions of printed in-house scientific reports and to make the work of Center and JIMAR scientists more accessible to the non-technical public.

*Scientific Information:* The Scientific Information Specialist will continue to provide technical support to the PIFSC Scientific Information Services group on various aspects of Data Services. The specialist will recruit new student workers as needed, train them, and oversee their data entry work. The specialist will provide technical support for data services request tracking, data access, and Web-based management of metadata for Center and JIMAR scientists. The specialist will continue to explore training to develop skills in Web-based data management and delivery.

### **Marine Resource Dynamics and Assessment Program (MARDAP): Sociocultural Profile of Pacific Islands Region Fishing Ports**

P.I.: Thomas A. Schroeder [Samuel G. Pooley, Stewart Allen]

The next steps are to complete the remaining eight modules, solicit reviewer feedback, and pre-test the modules in conjunction with planned training of Hawaiian community-based natural resource management organizations.

## **Marine Resource Dynamics and Assessment Program (MARDAP): Stock Assessment Research Program**

P.I.: Thomas A. Schroeder [Samuel G. Pooley, Gerard DiNardo]

The project will conduct the NWHI lobster resource survey in May 2011. The fishery-independent pilot survey, and biological data collection and tagging programs for bottomfish stocks in the Main Hawaiian Islands will be continued. The project will plan and participate in two ISC Billfish Working Group workshops (scheduled for December 2010/January 2011 in Hawaii and May 2011 [venue to be determined]) and the 11<sup>th</sup> meeting of the ISC Plenary in July 2011 (venue to be determined). Stock assessment methodologies for pelagic species in the North Pacific Ocean and insular species in the Pacific Islands Region will be further developed.

## **Marine Resource Dynamics and Assessment Program (MARDAP): Western Pacific Stock Assessment Review Process**

P.I.: Thomas A. Schroeder [Samuel G. Pooley, Gerard DiNardo]

Additional staffing needs for the WPSAR process to be determined. WPSAR will convene to assess the utility of available bottomfish data in Hawaii, Guam, American Samoa, and CNMI for stock assessment purposes.

## **Marine Turtle Conservation and Management Initiative**

P.I.: Thomas A. Schroeder [Charles Karnella]

The Extension Agent will continue education-outreach activities to provide information to the public about the three species of sea turtles occurring in New Caledonia. Outreach efforts will continue at the Aquarium de Nouméa, and Aquarium staff will continue to visit and provide outreach at village sponsored fairs, including a “portable” version of the sea turtle exhibition that will be presented at various townships.

## **Mesophotic Reef Ecosystems of Hawaii’s Au’au Channel**

P.I.: Thomas A. Schroeder [Samuel G. Pooley, Jeffrey J. Polovina, Frank Parrish]

Current efforts are directed at preparing for the last of the NOAA cruises (July 2010) that will support this mesophotic grant and a planned cruise to use the Pisces submersibles in the spring, after which efforts will be directed at analysis and report writing.

## **Pacific Islands Monitoring and Sampling Program**

P.I.: Thomas A. Schroeder [David Hamm]

Pilot studies are just getting off the ground in Saipan and American Samoa. The approach has been a phased-in increase in sampling effort throughout the region, beginning with

Guam. The lessons learned in Guam will have more direct bearing on species selection and methods suitable for Saipan (CNMI), where sampling will increase in year two. While Guam's pilot project has been in development, significant progress on logistics for Saipan has been made. The Guam CFBS (JIMAR) will continue to develop and will interface with CFBS in other regions. A cooperative plan with CNMI is being put together, based on a very different set of logistics, including the lack of a centralized fish processor on Saipan. Scoping for American Samoa's CFBS has identified a whole new set of logistics and other options are being pursued to implement the CFBS there via a grant with American Samoa and separate "mini-contracts" with fishermen.

Length-and-weight frequency data from a wide range of species has been obtained on Guam. Screening is in progress and the project plans to complete biosampling for the full size range for five of these species and progressively advance to others. In-depth research cannot be conducted for all 100+ species available at the market and the logistics involved in obtaining the widest possible size range and sufficient replicate otoliths within size classes may require additional thought. Because the species selected will be those for which there is little or no information available, it is anticipated that time will also need to be invested in improving techniques for removing otoliths from different species.

An additional contractor has been hired to provide technical assistance on Guam and the project will work closely with the University of Guam Marine Laboratory on these aspects. The focus for the next year will be on obtaining a full size range of otoliths, with gonadal tissue samples, to complete age, growth, and sexual maturity determinations for five or more species that comprise a majority of the commercial catch.

### **Pacific Islands Regional Observer Program**

P.I.: Thomas A. Schroeder [Kevin Busscher]

From July 2010 through June 2011, the project plans to complete a minimum of 400 observed trips through the final data editing stage. These 400 observed trips include the Deep Set Hawaii Longline Fishery, the Shallow Set Hawaii Longline Fishery, and the American Samoa Longline Fishery. Plans include completing a minimum of two 30-day research cruises to test marine mammal take reduction methods. The project also plans to complete three observer training sessions in the South Pacific in order to enhance and develop observer programs in the Forum Fisheries Agency.

### **Pelagic Fisheries Research Program (PFRP): Program Management**

P.I.: John R. Sibert and Kevin Weng

Funds will be disbursed to successful projects proposed during FY 2010 RFP. These projects are: a) The Role of Social Networks on Fishermen Economic Performance in Hawaii's Longline Fishery; b) Biological, Economic, and Management Drivers of Fishery Performance: A Global Meta-analysis of Tuna and Billfish Stocks; c) Age and Growth of Striped Marlin, *Kajikia audax* Caught in the Hawaii-based Longline Fishery; d) Integrating Electronic and Conventional Tagging Data into Modern Stock Assessment Models; e) Integrating Conventional and Electronic Tagging Data into the Spatial Ecosystem and Population Model SEAPODYM; f)

Early Life Stage Dispersal of Yellowfin tuna, *Thunnus albacores*, in the Central North Pacific; g) Biotelemetry Tag Retention in Pelagic Tunas; and h) Ocean Acidification Impacts on Tropical Tuna Populations. PFRP will also provide funding for Analyses of Catch Data for Blue and Striped Marlins (Istiophoridae).

The PFRP will continue to support HTTP2 and graduate education in the fishery sciences. One graduate student is being directly supported by the PFRP, while others are supported within PRFP-funded projects.

**PFRP: Analyses of Catch Data for Mahimahi (*Coryphaena hippurus*) and Wahoo (*Acanthocybium solandri*) from the Hawaii-based Longline Fishery and Other Pacific Fisheries**

P.I.: Kevin Weng [William A. Walsh]

The plans for FY 2011 are to conduct the planned analyses and, if time permits, describe and submit the results to a peer-reviewed journal for publication. A letter summarizing the current status of this project and other projects was sent to Kevin Weng, PFRP Program Manager, on March 6, 2010. The letter stated that the project's intentions are to conduct this work as time permits. However, completion of the ongoing shark bycatch work and the upcoming work in support of blue marlin and striped marlin stock assessments, which has recently been awarded PFRP funding for FY 2011, are considered higher priorities.

**PFRP: Assimilating *in situ* Bioacoustic Data in a Mid-trophic Level Model and Its Impact on Predicted Albacore Feeding Habitat in the American Samoa Waters**

P.I.: Kevin Weng, Réka Domokos and Patrick Lehodey

Shipboard surveys (cruise 2) will be conducted in the central north Pacific. Acoustic, ADCP, and CTD will be processed, along with satellite altimetry and sea surface chlorophyll from the same time periods. The project will run optimization experiments using acoustic data. The impact of new MTL parameterization on albacore assessment will be tested. The project will write manuscripts based on the results.

**PFRP: Biology and Habitat Use of Monchong (*Eumegistis illustris*) at Cross Seamount, Hawaii**

P.I: Kevin Weng

There will be further tagging of monchong using acoustic and conventional tags. The VR2 acoustic monitoring array at Cross Seamount will be retrieved and downloaded.

**PFRP: Descriptive Assessment of Traditional and Small-scale Fisheries in the Western Pacific**

P.I.: Kevin Weng [Edward W. Glazier]

Fieldwork and preliminary data analysis were initiated early in 2010. These activities will be ongoing through FY 2011.

**PFRP: Development of Business Card Tags: Inter-Individual Data Transfer**

P.I.: Kevin Weng [Laurent Dagorn, Kim N. Holland]

Tags currently in hand will be deployed, and the project will meet with the tag manufacturer to discuss potential avenues to push the technology forward.

**PFRP: Describing the Vertical Habitat of Bigeye and Albacore Tunas and Post Release Survival for Marlins in the Central Pacific Longline Fisheries with Pop-up Archival Transmitting Tags**

P.I.: Kevin Weng [Jeffrey J. Polovina, Michael P. Seki]

In FY 2011 the project will continue to support Melanie Abecassis's thesis work to build a spatial ecosystem model for the central North Pacific.

**PFRP: Economic Fieldwork on Pelagic Fisheries in Hawaii**

P.I.: Kevin Weng [Minling Pan]

The final report for the project will be prepared and sent out for publication.

**PFRP: Examining Latitudinal Variation in Food Webs Leading to Top Predators in the Pacific Ocean**

P.I.: Kevin Weng [Jock Young, Robert Olson, Valerie Allain, Jeffrey Dambacher]

In the next fiscal year the project will continue with sample collection, possibly procure a dedicated net for micronekton, and perform laboratory analysis of collected tissues. There is an opportunity to participate in an NSF sponsored research cruise off Hawaii, which should allow for depth discrete mid-trophic level and zooplankton sampling using a multiple net system. Also, Choy and Drazen will travel to Australia to perform lipid biomarker work on select samples to evaluate trophic connections.

### **PFRP: Fishery Dynamics in the Samoan Archipelago**

P.I.: Kevin Weng [Keith A. Bigelow, Adam Langley, John Hampton]

The project is completed and manuscripts based on results are being prepared for publication.

### **PFRP: Hawaii Tuna Tagging Project 2**

P.I.: Kevin Weng [Kim N. Holland, David Itano]

Tagging activities will begin in earnest around the main Hawaiian Islands and additional tagging cruises will be done to place acoustic tags in species associated with the Cross Seamount.

### **PFRP: Impacts of Fishing on Vulnerable Non-target Species at Seamount**

P.I.: Kevin Weng

Sharks will be tagged using acoustic, satellite, and accelerometry tags. Development and testing is planned with both accelerometry developers. The project will retrieve and download the VR2 acoustic monitoring array at Cross Seamount.

### **PFRP: Improved Effectiveness of WCPFC through Better Informed Fishery Decision Maker**

P.I.: Kevin Weng [Simon Hoyle]

Plans for FY 2011 include completion of current objectives and progress towards the following objectives for calendar year 2011: a) develop the installation wizard; b) develop automatic update features, which are necessary to ensure that the most recent versions of the stock assessments and MULTIFAN-CL are being used; c) develop an encrypted database approach to permit analysis of fine-scale spatial and temporal closures; d) allow the user to choose the species (e.g., expand from bigeye to also include skipjack, and yellowfin tuna, and enable multi-species runs) and possibly the model run (e.g., allow scenarios to be run for both the base case and key sensitivity analyses); e) improve options for exporting graphs and tables; f) set up web-based support, e.g., Frequently Asked Questions and e-mail technical support; g) produce user manual; h) release and publicize application; i) publish paper in primary literature on the use of scientific information in fishery decision-making; j) train and support participants (to extent possible), and obtain feedback from: SPC-GEF stock assessment training workshops, SC7, August 2011, FFA management options workshops, Training workshop in Hawaii, and WCPFC Commission meeting, December 2011.

**PFRP: Integrative Modeling in Support of the Pelagic Fisheries Research Program: Spatially Disaggregated Population Dynamics Models for Pelagic Fisheries**

P.I.: John R. Sibert and Kevin Weng

Project will continue modeling work on the effects of FADs on the movement of tagged tunas using recent data collected by the SPC in PTTP, as well as data collected in the Hawaii region during HTTP1 and HTTP2.

**PFRP: Intra-guild Predation and Cannibalism in Pelagic Predators: Implications for the Dynamics, Assessment and Management of Pacific Tuna Populations**

P.I.: Kevin Weng [Tim Essington, Mark Maunder, Robert Olson]

Two draft manuscripts are complete and the project intends to submit both manuscripts to journals within the year.

**PFRP: Investigation of Shark Bycatch in the Hawaii-based Longline Fishery, and an Extension of Analyses of Catch Data from Widely Separated Areas in the Pacific Ocean**

P.I.: Kevin Weng [William A. Walsh, Keith A. Bigelow]

The intention for FY 2011 is to complete the CPUE standardizations for five common shark species in the deep-set sector of this fishery and then prepare the results for publication, along with results from the blue shark analyses currently nearing completion. The upcoming analyses will differ from those with blue shark because the catch data include very large proportions of zeroes (>80%) for all of these species. For this reason, the analyses are likely to utilize 'zero-inflated' models or techniques whereby the zero and positive catches are modeled separately.

**PFRP: Modeling the Eco-physiology of Pelagic Fishes and Sharks with Archival and Pop-up Satellite Archival Tags (PSATs)**

P.I.: Kevin Weng [Michael K. Musyl, Christina Larsen, Hans Malte, Richard C. Brill]

The project has concluded but project personnel anticipate two additional manuscripts to be completed: a) a manuscript detailing the post-release survival of marlin (blue, stripe and black) from sports fishing and longline gear; and b) movements of marlin in relation to oceanographic conditions. Project personnel will also work to accession PSAT performance data into a public repository housed at the PFRP website (metadata is already available). Lastly, due to the success and inertia of the project, various researchers from many agencies (both domestic and foreign) have expressed an interest in collaboration and/or initiating new projects.

**PFRP: Nursery Origin of Yellowfin Tuna (*Thunnus albacares*) in the Hawaiian Islands**

P.I.: Kevin Weng [Jay R. Rooker, David Itano]

The project ended 6/30/2010; however, the project would like to continue to add to the age-0 baseline and plans to submit two papers for publication in 2010-2011.

**PFRP: Performance of Longline Catchability Models in Assessments of Pacific Highly Migratory Species**

P.I.: Kevin Weng [Keith A. Bigelow, Mark Maunder, Adam Langley, Pascal Bach]

The project is completed and manuscripts will continue within the publication process.

**PFRP: Scaling Up: Linking FAD-Associated Local Behavior of Tuna to Regional Scale Movements and Distribution**

P.I.: Kim N. Holland [Laurent Dagorn, David Itano]

Tagging will continue with the added dimension of using Mini-PATs to provide fisheries independent measures of movement. Analysis of recaptured tags will continue.

**PFRP: Sociological Baseline of Hawaii's Longline Industry**

P.I.: Kevin Weng [Stewart Allen]

Work on the longline fish distribution component was to be completed by June 2010. That portion of the project, however, was not completed due to the departure of the lone JIMAR employee of the Human Dimensions Research Program. The remaining funds, approximately \$12,000, are available in another existing JIMAR account for use by two recently hired JIMAR employees (one of whom will start on Sept. 7, 2010 and the other on Nov. 3, 2010). These funds will be sufficient to complete the longline distribution component of the project in FY 2011. The report will describe the people and businesses involved in the distribution of Hawaii longline caught fish, with a focus on sociocultural variables and their influences on distribution of fish apart from economic influences. The project will also incorporate fish dealers' interpretations of findings from the PIFSC Economic Program's retail fish price monitoring system.

**PFRP: Synchronous Assessment of Bigeye Tuna (*Thunnus obesus*) and Micronekton Biomass, Distribution, and Movement Patterns at Cross Seamount, and the Effects of the Seamount Environment**

P.I.: Kevin Weng [Réka Domokos, Kim N. Holland, Jeffrey J. Polovina]

The bigeye portion of the project report will be submitted for publication in a peer-reviewed journal.

## **PFRP: Trophic Ecology and Structured-associated Aggregation Behavior in Bigeye and Yellowfin Tuna in Hawaiian Waters**

P.I.: Kim N. Holland [Laurent Dagorn, David G. Itano]

Behavioral data analysis from tags already recovered will continue, along with BIA research.

## **Protected Resources Environmental Compliance Initiative**

P.I.: Thomas A. Schroeder [Alecia VanAtta]

The project will implement research activities that affect marine turtle species and their environments, and recommend technical and mitigation measures for impacts on marine turtles found within the State of Hawai'i, Pacific Remote Island Areas (PRIAs), U.S. Territories, and internationally. Research components of the marine turtle recovery plans will be implemented through cooperation with stakeholders and federal/local agencies and governments. The project will develop strategies for conducting research and using research results for outreach and education, and resource management decisions. The project will also develop and coordinate/conduct activities in cooperation with other agencies and local governments to promote watchable wildlife viewing. User groups (e.g., ocean-user community) will be identified and an outreach and education campaign will be developed to promote awareness of federal laws prohibiting interaction with protected marine species.

## **Reducing Shark Bycatch with Electropositive Metals in Hawaii-based Fisheries**

P.I.: Thomas A. Schroeder [Samuel G. Pooley, John Wang]

The project plans to continue the following projects: a) longline experiments outside of Kaneohe Bay in deeper waters to target sandbar, hammerhead, and tiger sharks in order to examine the effects of electropositive metals on shark catch rates; b) laboratory experiments testing the effects of NdPr metal on shark swimming behavior; c) at-sea longline experiments in collaboration with NOAA SWFSC in Southern California Bight and NOAA SWRO in Ecuador.

## **Sustainable Fisheries Initiative**

P.I.: Thomas A. Schroeder [Alvin Katekaru]

The Sustainable Fisheries Outreach and Education Specialist will continue to develop information materials to promote awareness in fisheries conservation and management actions in the western Pacific region. These materials will cover fishing rules, compliance guides, permit instructions, fishery closure notices, protected species placards, etc. The specialist is also responsible for monitoring and updating Sustainable Fisheries Division's website contents containing the informational materials that are easy to read, attractive, and available to viewers. The Sustainable Fisheries Initiative will engage in social science projects in support of Magnuson-Stevens Act mandates and NOAA Fisheries Strategic Plan objectives. These include

human dimensions data collection and analyses required for western Pacific fishery ecosystem plans/amendments, prepared by the Western Pacific Fishery Management Council.

## **Western Pacific Fisheries Information Network Project**

P.I.: Thomas A. Schroeder [Michael M. Quach]

In addition to a wide range of routine tasks, the project staff is actively involved in activities that are required for WPacFIN's daily operations and achievement of the program's objectives and goals. Activities that will be the main focus for FY 2011 are as follows.

*Continue to provide vital WPacFIN technical support and data requests:* a) Maintain and upgrade all existing data collection applications currently in place in the island agencies to meet new changes and requirements; b) develop new data processing applications, when needed, to collect and process data for new emerging fisheries and to support specific fisheries monitoring; c) make support trips to island agencies to conduct data quality control and provide technical training to local fishery staff; d) update the WPacFIN website with the latest available data received from the island agencies; e) produce the FUS data summary reports and create the next volume of the FSWP publication; and f) provide support in creating data summaries for data requests.

*Work with Hawaii Division of Aquatic Resources (DAR) staff* to implement new applications that support the downloading of data from DAR's new FRS online data system. Importing routines, data validation, and data error report programs need to be developed to ensure that downloaded data are compatible and are importing properly into the PC-based Visual FoxPro data system. Data quality controls must be performed to ensure data integrity.

*Upgrade existing American Samoa software applications* to improve user interfaces to make them more user friendly, and improve the normalization of existing databases in these systems.

*Continue to improve existing programs* that produce data summary tables and charts for islanders to complete their fisheries management plans report modules (Pelagic, Bottomfish, and Coral Reef Ecosystem) for all island areas.

*Develop an intranet web-based system to support WPacFIN data requests and summaries.* This system will eliminate the need for WPacFIN staff to manually produce the required reports, especially for most of the routine data requested by internal users.

*Update and revise the WPacFIN website.*

*Improve existing user and technical documentation* and write new user and technical documentation as necessary.

*Continue to develop and improve existing programs* that produce the Coral Reef Ecosystem Plan Team (CREPT) data summary tables and charts. An automation of producing the CREPT reporting module in Microsoft Word document will be implemented once the plan team has decided on a standard format for the Fisheries Management Plan (carry over from last year).

*Expand the Tutuila-based creel systems to incorporate Manu`a data collection.* This item is carried over from last year. Changes in staffing at Department of Marine and Wildlife Resource (DMWR) had pushed back the completion of this activity (carry over from last year).

## **Coastal Research**

### **Applications of Satellite Ocean Remote Sensing to Living Marine Resources (Ocean Remote Sensing)**

P.I.: Thomas A. Schroeder [Samuel G. Pooley, Jeffrey J. Polovina]

In FY 2011, plans are to continue supporting users in Hawaii and around the Pacific Rim with satellite remotely sensed data and products. The project will explore developing and serving additional remotely sensed ecosystem indicators. During this time, OceanWatch will be providing support to the newly designated Kona Integrated Ecosystem Assessment (IEA) located on the west coast of the Island of Hawaii by means of daily customized satellite remote sensing imagery and oceanographic data. In addition, OceanWatch will be providing near real-time sea surface height information for assisting in the surveying and navigation of an underwater glider for surveying eddies off Hawaii.

### **Coral Reef Management Initiative**

P.I.: Thomas A. Schroeder [Alan Everson, John Naughton]

Guam staff will continue with standard duties, in addition to a substantial amount of work involved with the Guam Military Buildup (site assessments, impact analysis, EIS review) and Guam Year of the Reef. Staff will also continue to support the local agencies with the fisheries management LAS, coral reef monitoring, coral reef response team, and marine mammal issues. Plans for the fishery extension agent for next year include finalizing strategic planning and streamlining goals with the Coral Reef Conservation Program, hosting meetings with fishers and scientists, and facilitating some discussions about on-going Roi eradication efforts and research. Likewise, the Fisheries Extension Agent will continue to take classes in the Department of Urban and Regional Planning.

American Samoa plans to hold additional PLA workshops and various outreach events, and finalize the revised fishery management LAS. Other staff plan to continue and build on the accomplishments of the past year.

### **National Environmental Policy Act (NEPA) Initiative**

P.I.: Thomas A. Schroeder [Charles Karnella]

The two NEPA documents that are in progress will be finalized and made available to interested parties and members of the public. Background research will be conducted in anticipation of future NEPA needs, particularly related to climate change, and it is likely that additional NEPA documents will need to be prepared this fiscal year to implement WCPFC decisions.

Research and preparation for and development of appropriate NEPA analyses required to implement decisions of the WCPF Commission and the SPTT will proceed as required.

## **Sustaining Healthy Coastal Ecosystems**

P.I.: Thomas A. Schroeder [Rusty Brainard]

The project will continue a long-term time series of biennial RAMP, marine debris, and mapping cruises in American Samoa, the Pacific Remote Islands Marine National Monument, and the Hawaiian Archipelago (limited NOAA ship availability may impact completion of these cruises). Research methods will be expanded to support collection of additional climate-change-related (e.g., global warming and ocean acidification) oceanographic and biodiversity data. The Coral Reef Ecosystem Monitoring Report for the Mariana Archipelago, 2003 to 2007, and a summary brochure based upon this report will be published. An alternate means for on-going publication of data collected during RAMP and habitat mapping cruises will be developed. The best scientific and commercial information available will be provided to determine extinction risks of 83 coral species and the Bumphead Parrotfish. The project will continue to develop and refine methods for determining ACLs for coral reef fisheries and relating these to associated benthic habitat data.