



A Sociological Baseline of the Hawai'i Longline Fishery

by Stewart Allen and Amy Gough

National Standard 8 of the Magnuson-Stevens Fishery Conservation and Management Act of 1976 as amended in 1996 (MSA) requires analysis of the impact of proposed fishery regulations and similar activities on "fishing communities." NEPA analysis contained in Environmental Assessments (EA) and Environmental Impact Statements (EIS) requires a similar analysis of the impact of federal projects, including fishery regulations, protected species recovery actions and habitat designations on the human environment.

However, the baseline for such analyses for the Hawai'i longline fishery is slim despite the intensity of interest directed toward that fishery sector, which lands about 2/3 of the islands' commercial fish (measured in pounds; 2002 data). Previous socio-anthropological studies have emphasized the small boat fisheries of Hawai'i and the traditional fisheries of American Samoa, Guam and the Northern Mariana Islands.

The ethnically diverse makeup of longline industry participants in Hawai'i and the transitory nature of the industry highlight the need for primary data on contemporary socio-cultural characteristics. The longline industry has been heavily regulated with little understanding of the socio-cultural impacts of those regulations and management. Project researchers intend to address this problem directly by meeting two main project goals:

- Compiling a comprehensive social profile of the longline fishing industry of Hawai'i, and
- Providing social profile information to decision-makers so they can better understand and manage the effects of regulatory impacts and implementation strategies

Project researchers are conducting personal interviews and, as needed, focus groups with longline captains, owners, crews, and family members, as well as key individuals in associated shoreside businesses (including fishing supply and support industries). The purpose is to compile a demographic profile and network analysis of economic and social interactions which would enrich subsequent NEPA analyses.

Because the study is ethnographic research, not a survey, there is no questionnaire. The interview schedule is a highly flexible document that covers a broad range of topics; in practice, no interviewee is asked the same set of questions. Instead, the focus is on



Crew members at Kewalo Basin enjoying evening time off while in port. (Photo by Amy Gough)

getting people to address social and cultural aspects of longline fishing and the meaning of those characteristics to their lifestyles.

In addition, different approaches to the interview are used for different sectors of the industry. Researchers have conducted interviews with longline captains, owners, crew, family members, and local fishing supplier businesses. Interviewees provide information about their background, how they came to be involved in the fishery, the nature of their job, what they like most and least about their work, perceptions of the industry, and their community. The interviewees' knowledge regarding fishing regulations and management and their adequacy is explored. Information is also collected on interviewees' social networks, particularly regarding social and community ties to the Hawai'i industry.

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Crew members aboard Pier 17 vessel taking a break with Filipino interpreter (center). [Photo by Amy Gough]

With this in mind, some of the questions asked include: history in the fishing industry, how they came to be involved with the Hawai'i-based longline industry, job satisfaction obstacles faced in the longline industry, future plans for involvement in the longline industry in Hawai'i and perceptions of its viability. Additionally, researchers investigate the level of information participants have regarding fishing regulations and

management, where they get information, perceptions of the adequacy and accuracy of that information, personal involvement in management issues affecting the longline industry and suggestions for fishery managers.

Preliminary Characterizations

Many interviews remain to be conducted and full analysis has not begun so these results are preliminary. As of March, 2004 project researchers have interviewed 211 individuals involved with Hawai'i's longline industry, reflecting slightly more than 60% of Hawai'i-based longline vessels. These 211 participants included 70 vessel owners and captains, representing slightly more than 70% of the Hawai'i longline owners and captains, along with 141 crew members, representing over 40% of the Hawai'i longline crew.

Vessel owners and operators are composed primarily of individuals of Vietnamese-descent, Korean-descent, and Caucasian U.S. citizens (roughly one-third of each). Researchers have completed interviews with representatives from all Vietnamese operated vessels, approximately 60% of Korean operated vessels, and approximately 50% of Caucasian operated vessels. Vessels are concentrated in three distinct locations within the Port of Honolulu, and researchers also plan to analyze differences across these three locations.

Vessel Owners

The three ethnic divisions of captain/owners display distinct differences in interaction. There are 27 Vietnamese boats presently in Hawai'i, owned by approximately 22 individuals. Researchers to date have spoken with 32 Hawai'i based longline owners and captains, and with five families owning vessels previously fishing in Hawai'i longline, but now fishing longline for swordfish out of California.

All Hawai'i-based vessels dock at Pier 17, space permitting. The Vietnamese owners and captains rely on a great deal of solidarity within their network. There are two Vietnamese supply store owners, from whom the Vietnamese owners purchase based on availability of products. Vietnamese communicate about business (fishing) when at sea, and about business and pleasure while in port. An informal Vietnamese Longline Association does exist, although it was more active in the past. Most information is passed on verbally, with community leaders providing focal points for activity.

There exist a limited number of divisions between Vietnamese longline vessel owners; overall they exhibit a strong degree of unity. Vietnamese owners express concern over the 2001 swordfish closure, where Vietnamese boats previously focused their efforts. Boats were forced to begin tuna longline fishing, or leave the Hawai'i fishery and feel there are now too many boats to allow for economic prosperity, with only one market (tuna).

There are approximately 35-40 Korean-owned vessels, representing about 30 boat-owning families. Research to date includes interviews with 17 Korean owners and captains reflecting approximately 21 Korean-owned vessels. Almost all Korean vessels dock at Kewalo Basin. Among the Korean longliners, considerably more factions are evident. When at sea, Korean vessel owners communicate but to a limited extent. Many Korean vessel owners complain of the lack of solidarity among longline vessel owners. There are two Korean supply store owners; owners report purchasing from these vendors, as well as Vietnamese suppliers, and Caucasian suppliers when supply requires such.

A formal Korean Longline Association (KLA) does exist, catering to approximately 50% of the Korean fishermen. The KLA provides written publications and translations of important events surrounding the longline industry. The remaining 50% rely on verbal dissemination of information. Members within the various subgroups do socialize however there is virtually no overlap between subgroups. Korean owners express concern with a diminishing work force, increasing expenditures, and increasing competition within the Hawai'i longline fleet.

Most Caucasian-owned longlining boats dock at Pier 35 and 36, while four boat owners prefer Kewalo Basin and several others prefer Pier 17. Research to date includes interviews with 16 owners and captains reflecting 18 of the approximately 39 Caucasian longline vessels in Hawai'i. These vessels report strong divisions within the Caucasian fleet, often based on place of origin (mainland East coast /West coast), amount of time in the

Hawai'i longline fleet, and personal differences. Supplies are purchased almost entirely at a Caucasian supplier which is located close to the docks.

The Hawai'i Longline Association (HLA) is the dominant source of information to these owners. HLA provides information to the other ethnic groups as well through its meetings, publications, and verbal contacts; typically Vietnamese and Korean leaders relay information as stated above. Caucasian owners express concern with finding reliable crew and struggle with unreliable price fluctuations.

Vessel Crew

The majority of crew members, about 75%, are Filipinos who commit to a one-year contract, working and living on the vessel while their families remain in the Philippines. With the help of one of the four manning agencies, crew members are recruited and brought to Hawai'i utilizing transit visas. These visas restrict crew from leaving their "home" pier, making them desirable workers as they tend to the vessel while in port.

Salaries start at \$385/month and are arranged prior to arrival between the owner, manning agency, and individual. The crew members are generally satisfied with the average salary of \$475. The majority of crew have worked in a number of commercial fisheries outside the Philippines, and because of comparatively improved working conditions, most strongly prefer the Hawai'i longline fishery to many outside fisheries.

Half of the Filipino crew have formal training and education in a marine field, but with the intention of working on a cargo/commercial vessel, which the majority would strongly prefer to longline. The Filipino crews are subject to immigration regulations and enforcement that sporadically deny their entry into the U.S., often leaving them worried about their future opportunities.

Filipino crew working in the Hawai'i longline fleet are not necessarily faced with similar living, working, and personal situations. Vessels operated by Vietnamese, Koreans, and Caucasians have distinctly different methods of operation, and crew members have personal preferences regarding which vessels they find most appealing. What the crew call "Vietnamese Style," "Korean Style," or "Local Style" imply dramatically different methods of operation. Within the pier area, specific rules and regulations for a crew's behavior both during work and after work are determined by the vessel owner/captain.

Due to the transit visa restrictions keeping crew members within their specific pier area, a local community of Filipinos has emerged within the pier area to sell, trade, and socialize. Many local Filipinos are related to longline crew and therefore frequent particular ports, often accompanied by local friends, further extending the network available to longline crew.

Although confined to the pier, Filipino crew members purchase or barter with local Filipinos for phone cards, clothes, electronics, music, and other goods. Crew members have considerably



Pier 17 vessel arriving in port. (Photo by Amy Gough)

different relationships with this local community of Filipinos, often determined by the rules imposed by a "Vietnamese Style," "Korean Style," or "Local Style" vessel. The configuration and location of each pier also affects the nature of day-to-day life and community among the crew members.

A strong majority of Filipino crew members have been longline fishing in various countries for more than five years. Many crew members have been working together in a variety of countries, and there are familial interactions among crew based in Hawai'i longline vessels.

Among Korean, Vietnamese, and Caucasian boats, finding reliable crew is a dominant concern. Korean vessels further report considerable problems in finding captains, as many captains are growing older. Finding local crew is reportedly not easy, and most vessels opt to supplement Filipino crew with Micronesian laborers. Local or Micronesian crew are paid a percentage of the earnings rather than a set salary, and vessel owners often complain they are unable to cover trip expenses when utilizing local crew. Vessel owners continue to seek new opportunities for expanding the pool of available, reliable crew.

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Web Sites Related to Pelagic Fisheries

- Hawaii Seafood Buyer's Guide – A technical reference including seasonal availability, shelf life, product forms and yields, suggested quantities of purchase and methods of preparation for tuna, billfish, other open ocean species, and bottomfish; information about biology, availability, fishing methods, catch distribution, substitution potential, quality control, color, taste, texture, and preparation for 16 major species, Hawaii Ocean Resources Branch: <http://www.hawaii-seafood.org>
- Inter-American Tropical Tuna Commission – Responsible for the conservation and management of fisheries for tunas and other species taken by tuna-fishing vessels in the eastern Pacific Ocean, La Jolla, CA: <http://www.iattc.org/HomeENG.htm>
- International Tuna Conference – Sponsored annually by the U.S. National Marine Fisheries Service and the Inter-American Tropical Tuna Commission, is an international meeting of persons with scientific or commercial interest in tunas and tuna fisheries. It is a forum for discussing progress in research on all aspects of tunas and other large pelagic marine species, Lake Arrowhead, CA: <http://swfsc.ucsd.edu/tunaconf.html>
- MULTIFAN-CL – A length-based, age and spatially structured model for fisheries stock assessment: <http://www.multifan-cl.org>
- National Marine Fisheries Service, Pacific Islands Fisheries Science Center-Honolulu Laboratory (NMFS, PIFSC-HL) – Part of the National Oceanic and Atmospheric Administration (NOAA). Programs support the domestic and international conservation and management of living marine resources, Honolulu, HI: <http://www.nmfs.hawaii.edu>
- National Marine Fisheries Service, Southwest Fisheries Science Center (SWFSC) – The research arm of the National Marine Fisheries Service Southwest Region, consists of three laboratories that conduct marine biological, economic, and oceanographic research for protection and management of resources to ensure that fish, marine mammal, and sea turtle populations remain at sustainable and healthy levels and effective fishing regulations and international fisheries treaties are implemented, La Jolla (headquarters), CA: <http://swfsc.ucsd.edu>
- Pacific Marine Environmental Laboratory (PMEL) – PMEL Fisheries Oceanography Coordinated Investigations – interdisciplinary scientific investigations in oceanography and atmospheric science. Current programs focus on open ocean observations in support of long-term monitoring and prediction of the ocean environment on time scales from hours to decades, Seattle (WA) and Newport (OR): <http://www.pmel.noaa.gov>
- Pacific Ocean Research Foundation – Conducts research on billfish, tuna and other game fishes of the Pacific, Kailua-Kona, HI: <http://www.holoholo.org/porf/>
- Pelagic Fisheries Research Program – Provides scientific information on pelagic fisheries for use in development of fisheries management policies. The term “pelagic” generally refers to fish that live in the near-surface waters of the ocean, often far from shore. Some of the more important (economically, socially, culturally) fish include tuna, billfish and other species, Honolulu, HI: <http://www.soest.hawaii.edu/PFRP>
- Secretariat of the Pacific Community (SPC), Oceanic Fisheries Programme (OFP) – Provides member countries with the scientific information and advice necessary to rationally manage fisheries exploiting the region's resources of tuna, billfish and related species, Noumea, New Caledonia: <http://www.spc.org.nc/OceanFish>
- Smithsonian National Museum of Natural History-Division of Fishes – The largest fish collection in the world, with approximately 3.5 million specimens, Washington, D.C.: <http://nmmnhgoph.si.edu/vert/fish>
- State of Hawaii FADS Program – The State of Hawaii has placed Fish Aggregating Devices (FADs) in the waters surrounding the main Hawaiian Islands. These buoys attract schools of tuna and other important pelagic fishes, such as dolphinfish (mahimahi), wahoo (ono), and billfish. FADs allow fishermen to easily locate and catch these species, Hawaii Institute of Marine Biology: <http://www.hawaii.edu/HIMB/FADS>
- Tuna Research and Conservation Center – Promotes cooperative ventures that educate the public about the conservation and biology of tunas, Hopkins Marine Station, Monterey, CA: <http://www.tunaresearch.org>
- Western and Central Pacific Fisheries Convention Preparatory Conference – Organized for the establishment of the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific: <http://www.ocean-affairs.com>
- Western Pacific Regional Fishery Management Council – Management of fisheries in the exclusive economic zone around the State of Hawaii, the Territory of Western Samoa, Territory of Guam, the Commonwealth of the Northern Mariana Islands, and U.S. Pacific island possessions, Honolulu, HI: <http://www.wpcouncil.org>

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Comparing the Environmental Baggage of Longline Fisheries

by Noreen Parks

Worldwide, pelagic longlining has earned a reputation as environmentally harmful for its considerable incidental catch of seabirds and sea turtles. However, longlining is not a single fixed method of fishing. It varies with location (e.g., coastal versus open-water) and operational practices such as how and when gear is set and whether measures are taken to avoid interactions with protected species. Thus, longlining effects on these species also vary.



Tuna longlining. Courtesy of NOAA.

Sponsored by the Pelagic Fisheries Research Program, project researchers John Kaneko and Paul Bartram assessed and compared the incidental catch rates of sea turtles and non-target fish species in Hawai'i's longline fishery and other domestic and selected foreign longline fisheries that supply U.S. markets with the same seafood products. The purpose is to put the bycatch associated with the Hawai'i pelagic longline fishery into perspective by using a comparable standard of ecological impacts to make comparisons with other fisheries for the same target species available in the U.S. seafood market.

The researchers collected information on the longline gear type, configuration and fishing methods in fleets operating in the Pacific (Australia, California, China, Japan, Taiwan, Mexico and Costa Rica), as well as Brazil and South Africa. They used data from NMFS, the Secretariat of the Pacific Community and scientists in countries where comparisons were made, as well as personal communication with scientists, fleet managers, commercial fishermen and longline gear suppliers.

Comparisons of longline fishing methods revealed that the critical factor in turtle catch is the depth to which hooks are set. Longliners fishing for bigeye tuna typically set hooks to depths of 50–400 meters (about 160–1,300 feet), while those targeting swordfish set in depths ranging 35–80 meters (about 115–265 feet). Shallower still are longline gear sets for swordfish, shark and mahimahi in the eastern Pacific, which are commonly 5–30 meters (16–100 feet) deep. According to the data, on average shallow line-setting hooks ten times as many turtles as deep sets.

Next the researchers calculated bycatch-to-catch ratios based on 100 metric tons (mt) of the targeted species. This ratio provides

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Upcoming Events

4th World Fisheries Congress

May 2-6, 2004, Vancouver, BC

Contact: Advance Group Conference Management Inc.

Online information: www.worldfisheries2004.org

55th Tuna Conference

May 24-27, 2004, Lake Arrowhead, CA

Contact: Kevin T. Hill at TunaConf2004@noaa.gov. Online

information: <http://swfsc.uscd.edu/tunaconf>

PACON 2004, Eleventh Pacific Congress on Marine Science & Technology

May 30-June 4, 2004, Waikiki Beach Marriott, Honolulu

Contact: PACON International at pacon@hawaii.edu.

Online information: <http://www/hawaii.edu/pacon>

Inter-American Tropical Tuna Commission Annual Meeting

June 7-18, 2004, Lima

Contact: IATTC at (858) 546-7100; Fax: (858) 546-7133

Online information: www.iattc.org

Ecosystem-based Fishery Management Workshop

July 20-23, 2004, Western Pacific Regional Fishery Management Council office, Honolulu

Contact: Jarad Makaiau at Jarad.Makaiau@noaa.gov. Online

information: www.wpcouncil.org

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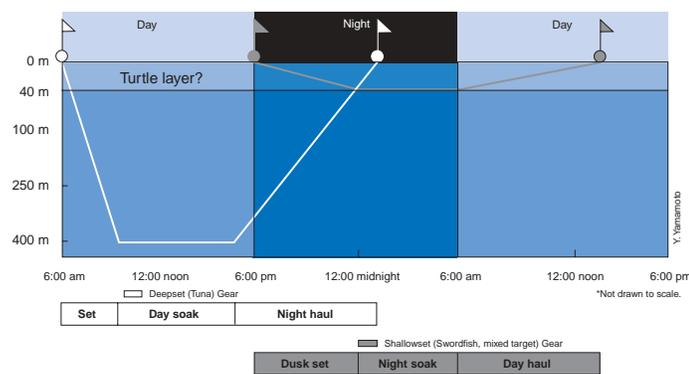
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A summary of key differences in longline fishing methods that impact incidental catch and bycatch rates. Courtesy PacMar, Inc.

a common denominator for comparing marketed fish caught by different methods. The results showed that Japan and Hawai'i longliners using deep line-setting for bigeye tuna average about two turtle captures per 100 mt of tuna. Hawai'i longliners setting shallow for swordfish had approximately 15 turtle takes per 100 mt of swordfish. Longline vessels using shallow sets for a mixture of species (tuna, billfish, sharks and mahimahi) ranged from seven turtle captures (Australia) to as high as 1,450 (Costa Rica) and 2,320 (Brazil) turtles per 100 mt of target species.

Restricting fishing may transfer the impacts for which regulations are imposed to other regions. This appears to have occurred with the 1999 broad-scale restriction of shallow-set swordfish longlining in Hawai'i. After the fishery closure, many Hawai'i longliners simply relocated to California and continued to fish for swordfish in international waters. While NMFS data show that turtle takes declined by nearly one-half (about 340 turtles) after the fishery was closed, at the same time U.S. seafood wholesalers substituted swordfish from other locales to replace the lost supply. This likely resulted in a net adverse impact on turtle populations, as some of the substituted swordfish came from fisheries with substantially higher rates of sea turtle interactions. For example, swordfish fisheries of Mexico, Costa Rica and Panama average 3–100 times higher rates of turtle capture.

The study results suggest that fishery managers should consider the relative ecological trade-offs that result when fishing effort is transferred or the market shifts the supply of fisheries products. The findings also imply that informed consumers can exert market pressure to encourage and support turtle-safe fishing and fishery products.

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PUBLICATIONS OF NOTE

Adam, M.S., J.R. Sibert, D. Itano and K. Holland. 2003. Dynamics of bigeye (*Thunnus obesus*) and yellowfin tuna (*T. albacares*) in Hawaii's pelagic fishery: analysis of tagging data with a bulk transfer model incorporating size specific attrition. *Fish. Bull.* 101(2):215-228.

Antonelis, G.A., J.D. Baker, and T.C. Johanos. 2003. Hawaiian monk seal (*Monachus schauinslandi*): Status and conservation issues. [Abstr.] 15th Biennial Conference on the Biology of Marine Mammals, Johnathon S. Coury Convention Center, Greensboro, North Carolina, December 14-19, 2003.

Brill, R. and Y. Swimmer. 2003. Laboratory Experiments Aimed at Reducing Pelagic Longline Interactions with Marine Turtles. In: *Proceedings of the 54th Annual Tuna Conference*. Lake Arrowhead, California, May 13-16, 2003.

Maunder, M.N. and G.M. Watters. 2003. A-SCALA: an age-structured statistical catch-at-length analysis for assessing tuna stocks in the eastern Pacific Ocean. *IATTC Bulletin*, Vol. 22, No. 5.

Musyl, M.K., R.W. Brill, C.H. Boggs, D.S. Curran, M.P. Seki and T.K. Kazama. 2003. Vertical movements of bigeye tuna (*Thunnus obesus*) associated with islands, buoys, and seamounts of the Hawaiian Archipelago from archival tagging data. *Fish. Oceanogr.* 12:152-169.

Olson, R.J. and G.M. Watters. 2003. A model of the pelagic ecosystem in the eastern tropical Pacific Ocean. *IATTC Bulletin*, Vol. 22, No 3.

O'Malley, J.M. and S.G. Pooley. Economics and Operational Characteristics of the Hawaii-Based Longline Fleet in 2000. SOEST Publication 03-01, JIMAR Contribution 03-348.

Sibert, J., M. Musyl, and R. Brill. 2003. Horizontal movements of bigeye tuna (*Thunnus obesus*) near Hawaii determined by Kalman filter analysis of archival tagging data. *Fish Oceanogr.* 12(3).

Swimmer, Y., R. Brill, R. Arauz, L. Mailloux, M. Musyl, K. Bigelow, A. Nielsen, and J. Sibert. 2003. Survivorship and Behaviors of Sea Turtles after their release from Longline Fishing Gear. In: *Proceedings of the 54th Annual Tuna Conference*. Lake Arrowhead, California, May 13-16, 2003.

Ocean Atlases to Provide Data for Fisheries and Resource Management of the Pacific

by Priscilla Billig

Efforts to develop a broad ecosystem approach to fisheries and living marine resource management are not hindered by a lack of information. Rather, there is a baffling profusion of information from a multitude of sources, including satellites, sensors, ships and moorings, often with no consistent coding or formatting standards and requiring a variety of software for access.

In an attempt to provide environmental data from these many sources in forms that are useful and accessible to scientists, resource managers and the general public, the Pelagic Fisheries Research Program has established the Pacific Ocean Atlas project, whose principal investigators are John Sibert, Russell Brainard and Dave Foley. Researchers are developing a series of oceanographic atlases for all of the U.S. Pacific island exclusive economic zones (EEZ) and regions of the Pacific Basin important for pelagic and highly migratory species fisheries management.

“The atlas should be an indispensable aid for fisheries modelers to interpret the role of ocean structure in mediating tuna catches,” said John Sibert, manager of the Pelagic Fisheries Research Program.

Coordinated by Russell Moffitt, distribution of the full data sets will be conducted primarily over the Internet. CD-ROM and limited print versions will be made available for resource managers and researchers in those areas lacking the resources for large Internet transfers.

One of the fundamental goals of the Pacific Ocean Atlas project is the development of science-quality historical time series and climatologies using data handled by CoastWatch. Satellites orbiting the Earth send data back to the National Oceanic and Atmospheric Administration (NOAA); CoastWatch, operating within NOAA's National Environmental Satellite Data Information Service (NESDIS), processes this raw data so that others may use it.

The three most common data types managed by CoastWatch are those that show sea surface temperature, ocean surface winds, or ocean color. Sea surface temperature data are used to locate fishing spots and forecast weather; ocean surface wind data are used primarily by meteorologists and boaters; and ocean color data help scientists track changes in the ocean.

Data from existing projects will adequately provide the larger scale context within which the finer scale information, when available, may be more effectively analyzed. These projects include the Comprehensive Ocean-Atmosphere Data Set (COADS), the most extensive collection of surface marine data available for the world ocean over the past century and a half.

The Pacific Ocean Atlas project also is attempting to include other sources of reliable in situ oceanographic data, such as the U.S. Navy Master Oceanographic Observations Data Set (MOODS).

Researchers report that even with all of the available oceanographic data, some regions are generally extremely sparse and not sufficient to describe the physical environment at the level required for most ecosystem-based models.

To help track and facilitate end-user needs, members of the Methods Working Group at the 16th Meeting of the Standing Committee on Tuna and Billfish (STCB) in Honolulu were solicited for their input. The use of model re-analysis products, coupled geophysical models which assimilate observations of a broad range of parameters, was the topic shown most interest.

Ocean Surface Current Analyses-Real time (OSCAR), a useful derived product dataset has become available. OSCAR infers ocean surface currents from a combination of dynamic topography, or currents, and surface wind stress. Mesoscale geostrophic flow is derived from sea surface height data acquired by TOPEX/Poseidon, a satellite operated by Colorado Center for Astrodynamic Research. Mesoscale wind-driven currents are derived from vector wind fields provided by QuickSCAT, NASA's Quick Scatterometer satellite whose onboard SeaWinds instrument is a specialized microwave radar that measures near-surface wind speed and direction under all weather and cloud conditions over the Earth's oceans.

Shifting from the more technical aspects of data acquisition and processing to the various issues associated with data distribution, mechanisms for effective communication are now being defined and assembled. Work has begun on a rudimentary website that will provide access to the Pacific Ocean Atlas data, including climatologies and time series of in situ and satellite datasets.

Atlas Coordinator Moffitt, skilled in scientific visualization and user-friendly web design, will implement the basic suite of web-based services that will integrate the data archives and IT infrastructure established in the first two years of the project with a flexible and accessible user interface, allowing timely access to all Pacific Ocean Atlas products. Moffitt will also work with the project principal investigators to produce regional “hard copy” atlases at a level appropriate for scientific publications.

The Pacific Ocean Atlas project is working to meet emerging NOAA standards that require all data suppliers to furnish metadata compliant with Federal Geophysical Data Commission (FGDC) standards. The Pacific Islands Fisheries Science Center (formerly the Honolulu Lab) of the National Marine Fisheries Service (NMFS) has an initiative in place to manage such data sets. West Coast CoastWatch is developing automated processes to generate FGDC-compliant metadata for all data types used by the Atlas project, and will share these as they are produced.

Since the scope and the application of the Pacific Ocean Atlas project are broad, the project will benefit from ongoing collaboration. A partnership has been recently formed with NOAA's National Environmental Satellite, Data and Information Service (NESDIS), taking advantage of their expertise in managing and distributing environmental datasets and in creating a variety of derived products, such as coral bleaching hotspot maps.

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**Pelagic Fisheries
Research Program**

Pelagic Fisheries Research Program

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Abstract: We present a vessel and target-specific positive mathematical programming model (PMP) for Hawaii's longline fishing fleet. Although common in agricultural economics, PMP modeling is rarely attempted in fisheries. To demonstrate the flexibility of the PMP framework, we separate tuna and swordfish production technologies into three policy relevant fishing targets. We find the model most accurately predicts vessel-specific annual bigeye catch in the WCPO, with an accuracy of 12% to 35%, and a correlation between 0.30 and 0.53. To demonstrate the model's usefulness to policy makers, we simulate the economic impact to individual vessels from increasing and decreasing the bigeye catch limit in the WCPO by 10%. Hawaii-based pelagic longline fishery. Slide Number 3. Slide Number 4. Nature of the Size-Based Cascade in Subtropical Pelagic Ecosystem. Model estimated percent change in size frequency distribution for various levels of fishing mortality relative to the unfished population. Size of entry to fishery 1 kg (1 \leq 15 kg: $F = 0.25F$) and size of full selectivity 15 kg. Nature of the Size-Based Cascade in Subtropical Pelagic Ecosystem. Model estimated percent change in size frequency distribution for various levels of fishing mortality relative to the unfished population. Size of entry to fishery 1 kg and size of full selectivity 1 kg. Percent of fish > 15 kg in catch f... Derelict fishing gear (DFG) is abundant across the remote North Pacific Ocean, accumulating in convergence zones that coincide with the fishing grounds of the Hawai'i-based pelagic longline fishery. Longlines are prone to snagging DFG, providing an opportunistic, yet regular, reporting mechanism by longline fishery observers (fishery-dependent data). We apply a zero-inflated negative binomial model previously used to standardize catch per unit effort (CPUE) for bycatch and incidentally caught species in this fishery to estimate DFG relative abundance and qualitative trends within the longline ...