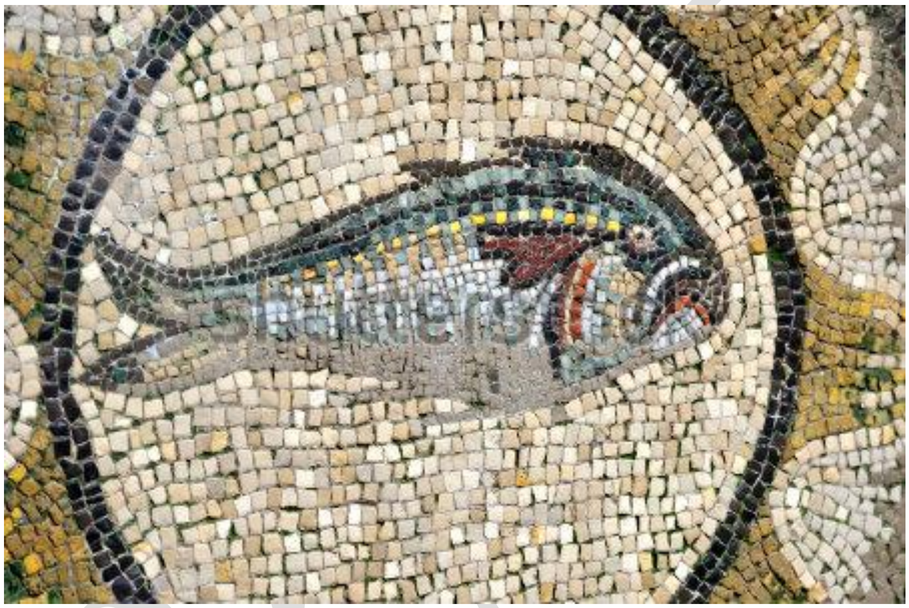
FISHERY ECOSYSTEM PLAN
for the
PACIFIC PELAGIC FISHERIES



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PREFACE

In 2005, the Council recommended to establish and implement fishery ecosystem plans for archipelagic, pelagic, and remote island areas in the Western Pacific Region. Previously, the Council managed fisheries in these areas using the single-species (or multispecies complex) management paradigm focusing on direct impacts of harvest on yield. Ecosystem-based fisheries management (EBFM) addresses a geographically-specified system of fishery-associated organisms (including humans), and the environment and the processes that control its dynamics. It includes noncommercial and commercial fisheries, and recognizes the physical, biological, economic and social interactions among the affected components of the ecosystem. Perhaps most importantly, EBFM seeks to manage for a spectrum of goals society has for fishery ecosystems – some of which may be in competition.

The Council's first fishery ecosystem plans were approved by the Secretary of Commerce in September 2009. However, ecosystem-based fishery management has an extended prior history in our region. For example, the Council's Executive Director, Kitty Simonds, was an active participant in one of the National Oceanic and Atmospheric Administration NOAA's first ecosystem management workshops, in 1986. In 2001, the Council took final action to recommend the first fishery ecosystem management plan in the nation. This was the Coral Reef Ecosystem Fishery Management Plan, which covered coral reef fishery ecosystems in the U.S. Pacific Islands. Among other things, the plan established a process to assess and control ecosystem effects of reef fish (other than those managed under the bottomfish plan), precious coral, and crustacean fisheries operating in reef environments in federal waters, that were then extensively open to fishing.

The Pelagics FEP is the framework under which the Council will manage fishery ecosystem resources of the tropical and temperate ocean. Unlike the four archipelagic plans the Pelagics FEP is not place-based in terms of a single island or archipelago, but is based on the range of the highly migratory species under the Plan's jurisdiction. This includes tunas and associated species, and the integration of vital ecosystem elements important to decision-making. These elements include social, cultural, and economic dimensions, protected species, habitat considerations, climate change effects, and the implications to fisheries from various spatial uses of the marine environment. Successful ecosystem-based fisheries management requires an increased understanding of a range of natural and social scientific issues, including the societal goals for resource management, biological and trophic relationships, ecosystem indicators and models, and the ecological effects of non-fishing activities on the marine environment. An ecosystem management framework facilitates the use of these data in plan amendments and flexible, evolving management will advance the implementation of ecosystem science and principles. In this regard, the success of the EBFM approach relies heavily on the data collection and synthesis process established by the pelagic and archipelago annual fishery ecosystem reports (SAFE Reports). In 2015, the Council, in partnership with the National Marine Fisheries (NMFS) Pacific Islands Fisheries Science Center, local fishery resource management agencies, and the NMFS Pacific Islands Regional Office, agreed to revise and expand the contents of future annual reports to include the range of ecosystem elements described above.

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EXECUTIVE SUMMARY

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) is the primary domestic legislation governing management of the nation's marine fisheries. The United States Congress has amended and reauthorized the MSA several times since 1976. In 1996, it reauthorized the Magnuson-Stevens Act to include, among other things, a new emphasis on fisheries ecosystems and the precautionary approach. In 2006, an annual catch limit requirement was written in. The MSA contains ten national standards, with which all fishery management plans and plan amendments must conform. The MSA also requires U.S. fisheries management be consistent with the requirements of other regulations including the National Environmental Policy Act, Marine Mammal Protection Act, the Endangered Species Act, the Migratory Bird Treaty Act, and several other Federal laws and Executive Orders.

Under the Magnuson-Stevens Act, the Western Pacific Regional Fishery Management Council (Council) is authorized to prepare and submit to the Secretary of Commerce for approval, disapproval or partial approval, a Fishery Management Plan (FMP) and any necessary amendments for fisheries that are under its authority and that require conservation and management. The Council transitioned to Fishery Ecosystem Plans (FEPs) from FMPs in 2009. The Council conducts public hearings so that all interested persons may have opportunities to participate in the development of FEPs and amendments.

The Pacific Pelagic FEP (P-FEP) governs Pacific pelagic federal fisheries in the Council's jurisdiction, either directly or in concert with international fisheries organizations operating in the Pacific. The management area is the United States (U.S.) Exclusive Economic Zone (EEZ) and high seas in which U.S. pelagic fisheries in the western, eastern, central, and South Pacific Ocean. The Plan covers longline, troll, handline purse seine and pole-and-line fisheries targeting commercially important pelagic species such as bigeye, yellowfin, skipjack and albacore tunas, billfish such as swordfish and marlins, and other pelagic species such as wahoo, mahimahi, opah and monchong. The P-FEP also contains measures to minimize impacts to protected species such as the Hawaii monk seal, sea turtles and seabirds.

The P-FEP bans the use of drift gillnetting, while promoting sustainable and environmentally responsible longline fisheries, handling, trolling and pole-and-line fishing. It includes commercial, recreational and charter fishing for pelagic species. Management of the longline fisheries has included limited entry programs, vessel monitoring system (VMS), spatial management to prevent interactions between large longline vessels and small vessel pelagic fisheries. Spatial management has also been used to minimize interactions with protected species.

Other measures to minimize protected species bycatch include gear modifications, safe handling and release of protected species bycatch and annual workshops to inform and train fishermen in minimizing and dealing with protected species bycatch. The P-FEP defines "overfishing" and "overfished" based on fishing mortality and biomass associated with the maximum sustainable yield (MSY), and contains definitions of essential fish habitat (EFH) and habitat of particular concern (HAPC). Besides domestic fishery management measures, the P-FEP has also addressed the international management of PMUS in the Western and Central Pacific Ocean (WCPO) and

Eastern Pacific Ocean (EPO).

The Pacific Pelagic FEP was first implemented on September 24, 2009. It replaced a set of species-based FMPs that covered the Western Pacific Region. This version of the P-FEP was implemented on ____, following a year-long process to review and improve the Plan. These improvement include strengthening the ecosystem-based fishery management approach, providing the public with additional information regarding the management process, conforming to new information requirements. The revised plan should provide for a clearer understanding of relevant fishery conservation and management measures promulgated by the FEP and subsequent amendments to it.

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1 INTRODUCTION

1.1 Mission

The Western Pacific Regional Fishery Management Council (Council) is a federal organization established and authorized by Congress in 1976. Its mission is to "plan, coordinate and realize all responsibilities as delegated under the MSA for effective conservation and prudent development of the region's fishery resources for the benefit of the region and the nation." To meet this mission, the Council established the following Guiding Principles:

1. Support quality research and obtain the most complete scientific information available to assess and manage fisheries;
2. Promote an ecosystem approach in fisheries management, including reducing waste in fisheries and minimizing impacts on marine habitat and impacts on protected species;
3. Conduct education and outreach to foster good stewardship principles and broad and direct public participation in the Council's decision making process;
4. Recognize the importance of island cultures and traditional fishing practices in managing fishery resources and foster opportunities for participation;
5. Promote environmentally responsible fishing and the utilization of sustainable fisheries that provide long term economic growth and stability;
6. Promote regional cooperation to manage domestic and international fisheries; and
7. Encourage development of technologies and methods to achieve the most effective level of monitoring, control and surveillance and to ensure safety at sea.

The Council is responsible for developing fishery management policies for the western Pacific region, which includes the State of Hawaii, Territories of American Samoa and Guam, the Commonwealth of the Northern Mariana Islands and other U.S. Pacific remote island areas (Figure 1). All management plans, amendments to them, and regulations implementing them, must comply with the MSA and all other applicable laws – such as the National Environmental Policy Act (NEPA). The Council's primary responsibility is to develop and recommend fishery management measures for any federal managed fishery, stock, or stock complex, as well as measure to protect important ecosystem components, such as protected species and fish habitat.

Our region's archipelagos have distinct cultures, communities, and marine resources. For thousands of years, the indigenous people of these islands relied on healthy marine ecosystems to sustain themselves, their families, and their island communities. Although the past century has brought enormous advancements in transportation and diet, these islanders continue to depend on healthy marine ecosystems, owing to the remoteness of the islands, and their intact cultural practices. Even in the modern period, much ecological, economic, and social benefit is realized from sustainably managing island resources.

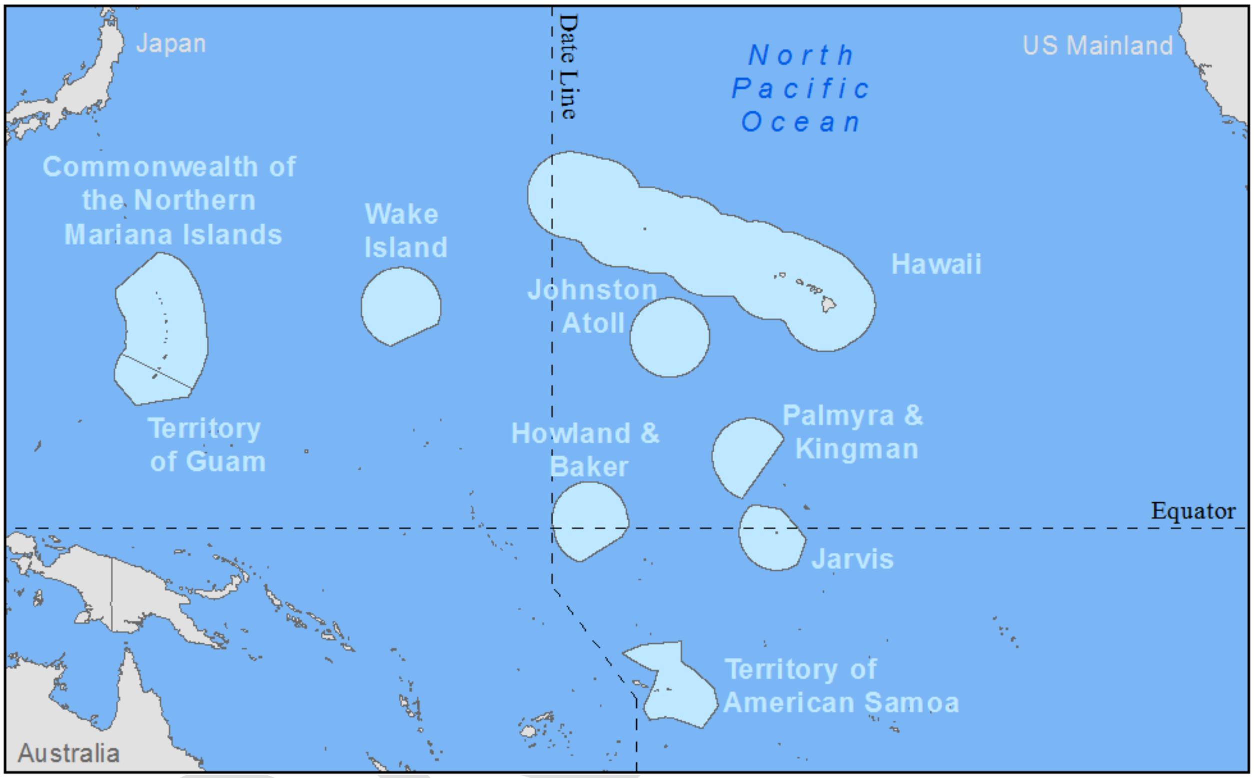

Figure 1. Map of the Western Pacific Region with the US EEZ in light blue

Since all of these Plans are interconnected, the Council opted in the mid-2000s to take an archipelagic ecosystem-based approach, and spent several years revising its five existing species/complex-based FMPs (Precious Corals FMP became effective in September 1983; Crustaceans FMP (March 1983); Bottomfish and Seamount Groundfish (August 1986); Pelagics FMP (March 1987); Coral Reef Ecosystems FMP (February 2004)) to place-based FEPs. The five FEPs approved by the Council in 2007 and implemented in 2009 include the American Samoa Archipelago FEP, Mariana Islands Archipelago FEP, Hawaii Archipelago FEP, Pacific Remote Island Area FEP, and Pacific Pelagic FEP.

Unlike archipelagic resources, the Council collaborates with international Regional Fishery Management Organizations (RFMOs) to manage pelagic resources. In 2004, the Western and Central Pacific Fisheries Commission (WCPFC) was established to manage tunas and other transboundary pelagic fishery resources. This complements the longstanding role of the Inter-American Tropical Tuna Commission (IATTC) in the eastern Pacific. All US fisheries for RFMO-managed species can be subject to binding measures with respect to data collection and reporting, catch quotas, fishing gears, bycatch mitigation, or other matters, enacted by the WCPFC and IATTC in their respective areas of competence, when operating both inside or outside the US EEZ.

1.2 Authorities and Primary Management and Process Drivers

1.2.1 MSA

In 1976, the United States Congress passed the Fishery Conservation and Management Act to promote domestic fisheries and establish management authority over fishery and related resources within the 200 mile federal Exclusive Economic Zone (EEZ). The statute has been subsequently amended and reauthorized over the ensuing years and is now known as the Magnuson-Stevens Fishery Conservation and Management Act (MSA). It is the primary law governing federal management of United States fisheries.

Under the MSA, the U.S. has exclusive fishery management authority over all fishery resources found within its EEZ. For purposes of the MSA, the inner boundary of the U.S. EEZ typically extends from the seaward boundary of each coastal state to a distance of 200 nautical miles from the baseline from which the breadth of the territorial sea is measured.

The management system created by the MSA is unique in U.S. natural resource management. In order to avoid top-down, centralized fishery resource management, Congress established eight regional fishery management councils and provided them with responsibility for developing fishery management plans and recommending amendments to those plans on an ongoing basis, as well as regulatory language for implementation. As such, the Councils have a unique relationship with their primary partner federal agency, the National Marine Fisheries Service (NMFS). Councils are composed of federal, state, and territorial fishery management officials, participants in commercial and recreational fisheries, and other individuals with experience, scientific expertise, or training that give them knowledge about fishery conservation and management or commercial or recreational harvest. In addition, the MSA mandates certain advisory bodies (and authorized the Councils to creates others) so as to provide the Councils with technical advice and guidance in fishery policy decision making. The MSA mandates an open, public process for developing fishery management measures and actions.

As in other regions, responsibility for managing marine resources in the western Pacific is shared by a number of federal and local government agencies. At the federal level are the Council, the NMFS (also known as the NOAA Fisheries Service), the National Oceanic and Atmospheric Administration (NOAA), the U.S. Fish and Wildlife Service (U.S. Department of the Interior) and the U.S. Department of State. The U.S Coast Guard, in the U.S. Department of Homeland Security, as well as the Department of Defense, through the Air Force, Army, Navy and Marine Corps, also controls access, enforcement, and use of various marine waters throughout the region.

Sixteen members of the Council include the following:

- Regional Administrator, Pacific Islands Regional Office, National Marine Fisheries Service
- Director, Department of Marine and Wildlife Resources, Territory of American Samoa

- Secretary, Department of Land and Natural Resources, Commonwealth of the Northern Mariana Islands
- Director, Department of Agriculture, Territory of Guam
- Chair, Department of Land and Natural Resources, State of Hawaii
- One obligatory member from each of the four island areas nominated by their respected governors and appointed by the Secretary of Commerce
- Four at-large members nominated by the region's Governors and appointed by the Secretary of Commerce.
- District Commander, US Coast Guard 14th District (non-voting member)
- Director, Office of Marine Conservation, US State Department (non-voting member)
- Director, US Fish and Wildlife Service (non-voting member)

The basic functions of the Council as required by the MSA are diverse. For fisheries under its authority that require conservation and management the Council has the following responsibilities:

1. Prepares and transmits to the Secretary fishery ecosystem plans (FEPs) and amendments to such plans as necessary to address changing needs in conservation and management, including compliance with international conventions such as the WCPFC;
2. Prepares comments on any application for foreign fishing transmitted to the Council, and any fishery management plan or amendment transmitted to the Council;
3. Conducts public scoping, meetings and hearings at appropriate times and in appropriate locations in its geographic area so as to allow all interested persons an opportunity to be heard in the development of FEPs and amendments to such plans, and other matters with respect to the administration and implementation of the provisions of the Magnuson-Stevens Act and other Statutory requirements;
4. Submits to the Secretary such periodic reports as the Council deems appropriate and any other relevant report that may be requested by the Secretary;
5. Reviews on a continuing basis, and revises as appropriate, the following for each fishery within its geographical area of authority: assessments and related specifications with respect to the optimum yield (OY); the capacity and extent to which US fish processors will process US harvested fish; and the total allowable level of foreign fishing;
6. Develops annual catch limits (ACLs) for managed fisheries that may not exceed the fishing level recommendations of its Scientific and Statistical Committee (SSC) or similar peer-review process;
7. Develops, in conjunction with its SSC, five-year research priorities for fisheries, fisheries interactions, habitats and other areas of research that are necessary for management purposes; update them as necessary; and submit them to the Secretary of Commerce (Secretary) and the Pacific Islands Fisheries Science Center (PIFSC) of the National Marine Fisheries Service (NMFS) for their consideration in developing research priorities and budgets for the Pacific Islands/Western Pacific Region;
8. May review and provide comments on any federal or state action that may affect fishery habitat under the Council's jurisdiction; and

9. Conducts any other activities that are required by, or provided for in, the MSA or which are necessary and appropriate to the foregoing functions.

1.2.1.1 National Standards

To carry out the above functions, the Council pays particular attention to 10 National Standards (NS) described in the MSA, against which the Council's recommendations to the Secretary are measured:

1. Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the OY from each fishery for the United States fishing industry.
2. Conservation and management measures shall be based upon the best scientific information available.
3. To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range and interrelated stocks of fish shall be managed as a unit or in close coordination.
4. Conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be fair and equitable to all such fishermen; reasonably calculated to promote conservation; and carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.
5. Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.
6. Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources and catches.
7. Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.
8. Conservation and management measures shall, consistent with the conservation requirements of the MSA (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that meet the requirements of NS 2 in order to provide for the sustained participation of such communities, and, to the extent practicable, minimize adverse economic impacts on such communities.
9. Conservation and management measures shall, to the extent practicable, minimize bycatch and, to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.
10. Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

1.2.1.2 Essential Fish Habitat

In 1996, Congress passed the Sustainable Fisheries Act, which amended the MSA and added several new FMP provisions. From an ecosystem management perspective, the identification and description of essential fish habitat (EFH) for all federally managed species were among the most important of these additions.

According to the MSA, EFH is defined as “those waters and substrate necessary to fish for spawning, breeding or growth to maturity.” This new mandate represented a significant shift in fishery management. Because the provision required councils to consider a MUS’s ecological role and habitat requirements in managing fisheries, it allowed Councils to move beyond the traditional single-species or multispecies complex management to a broader ecosystem-based approach.

In 1999, NMFS issued guidelines intended to assist Councils in implementing the EFH provision of the MSA, and set forth the following four broad tasks:

1. Identify and describe EFH for all species managed under an FMP.
2. Describe adverse impacts to EFH from fishing activities.
3. Describe adverse impacts to EFH from non-fishing activities.
4. Recommend conservation and enhancement measures to minimize and mitigate the adverse impacts to EFH resulting from fishing and non–fishing related activities.

The guidelines recommended that each Council prepare a preliminary inventory of available environmental and fisheries information on each managed species. Such an inventory is useful in describing and identifying EFH, as it also helps to identify missing information about the habitat utilization patterns of particular species. The guidelines note that a wide range of basic information is needed to identify EFH. This includes data on current and historic stock size, the geographic range of the managed species, the habitat requirements by life history stage, and the distribution and characteristics of those habitats. Because EFH has to be identified for each major life history stage, information about a species’ distribution, density, growth, mortality, and production within all of the habitats it occupies, or formerly occupied, is also necessary.

The guidelines also state that the quality of available data used to identify EFH should be rated using the following four-level system:

Level 1: All that is known is where a species occurs based on distribution data for all or part of the geographic range of the species.

Level 2: Data on habitat-related densities or relative abundance of the species are available.

Level 3: Data on growth, reproduction, or survival rates within habitats are available.

Level 4: Production rates by habitat are available.

With higher quality data, those habitats most utilized by a species could be identified, allowing a more precise designation of EFH. Habitats of lesser value to a species may also be essential, depending on the health of the fish population and the ecosystem. For example, if a species is overfished, and habitat loss or degradation is thought to contribute to its overfished condition, all habitats currently used by the species may be essential.

The EFH provisions are especially important because of the procedural requirements they impose on both Councils and federal agencies. First, for each FMP, Councils must identify adverse impacts to EFH resulting from both fishing and non-fishing activities, and describe measures to minimize these impacts. Second, the provisions allow Councils to provide comments and make recommendations to federal or state agencies that propose actions which may affect habitat, including EFH, of a managed species. In 2002, NMFS revised the guidelines by providing additional clarifications and guidance to ease implementation of the EFH provisions by Councils.

Based on the best available information on pelagic habitats and fisheries, the Council has determined that the fisheries operating in pelagic waters in the Western Pacific region are not expected to have adverse impacts on EFH or Habitat Areas of Particular Concern (HAPC; a subset of EFH) for managed species. Continued and future operations of fisheries under the pelagic FEP are not likely to lead to substantial physical, chemical, or biological alterations to the habitat, or result in loss of, or injury to, these species or their prey.

The description and identification of EFH and HAPC for fisheries managed under this FEP can be found in section 3, Management Regime. Information related to activities that may adversely affect EFH and EFH maps can be found in Appendices H and I. Life history and habitat information on managed species, on which the EFH descriptions are based, may be found in Appendix G.

1.2.2 National Marine Fisheries Service Guidance

Primary authority for implementing and enforcing management action developed under the MSA rests with the U.S. Secretary of Commerce (Secretary), who has delegated this responsibility to the National Marine Fisheries Service (NMFS). The NMFS develops guidance to aid the Councils, fishermen and others to develop, implement and comply with fishery regulations. In addition, the Council and NMFS have established operating agreements to help define specific roles and responsibilities for developing, approving, and implementing fishery management plans and other actions under the auspices of the MSA. Such guidance documents and agreements include, but are not limited to, *Operational Guidelines for Fishery Management Process* and *Regional Operating Agreements*.

1.2.3 The National Environmental Policy Act

The National Environmental Policy Act (NEPA) requires federal agencies to assess and consider the effects of major federal actions on the quality of the human environment by considering the environmental impacts of proposed actions and reasonable alternatives to those actions. The Act also requires that the public be provided the opportunity to help identify, review and comment on such effects, particularly in cases where an environmental impact statement (EIS) is being prepared.

NEPA requires an environmental impact statement (EIS) for major federal actions that significantly affect the quality of the human environment. Agencies may conduct an environmental assessment to determine whether an EIS is necessary or whether a Finding of No Significant Impact (FONSI) or a Categorical Exclusion (CE) is warranted.

At the time of the final decision (and in the case of an EIS, at least 30 days after the Final EIS is noticed and at least 90 days after the Draft EIS is noticed), agencies must have prepared a record of decision (ROD), FONSI, or determined that a CE applies. It is important to be aware of the interaction of NEPA and MSA timing requirements. For example, the deadline for the Secretary to approve, disapprove, or partially approve a Council-submitted FMP or Amendment (i.e., 30 days after the close of the comment period on the FMP or Amendment and often referred to as "Day 95") should not occur prior to signing the ROD or the FONSI. If it is an FEIS, the ROD may not be signed sooner than 30 days after noticing the availability of the FEIS.

1.2.4 Endangered Species Act

The Endangered Species Act (ESA) provides for the conservation of species that are endangered or threatened, and the conservation of the ecosystems on which they depend. Section 7(a)(2) of the ESA requires each federal agency to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat of such species. To "jeopardize" means to reduce appreciably the likelihood of survival and recovery of a species in the wild by reducing its numbers, reproduction, or distribution. As described in the NMFS policy for Integration of Endangered Species Act Section 7 with the Magnuson-Stevens Act Processes (PD 01-117), the Council plays an integral role in these consultations.

When a federal agency's action "may affect" an ESA-listed species, that agency is required to consult formally with NMFS (for marine species, some anadromous species, and their designated critical habitats) or the U.S. Fish and Wildlife Service (USFWS; for terrestrial and freshwater species or their designated critical habitat). The product of formal consultation is the agency's biological opinion (BiOp). Federal agencies are exempt from this formal consultation requirement if they have concluded that an action "may affect, but is not likely to adversely affect" ESA-listed species or their designated critical habitat, and NMFS or USFWS concur with that conclusion (see 50 CFR § 402.14(b)).

The ESA also prohibits the taking of listed species except under limited circumstances. Western Pacific regional fisheries are operated in accordance with terms of ESA consultations that consider the potential interactions of fisheries with listed species, the impacts of interactions on the survival and recovery of listed species, and the protection of any designated critical habitat.

As provided in 50 CFR § 402.16, NMFS is required to reinitiate formal consultation if:

- (1) the amount or extent of the incidental take is exceeded;
- (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in an opinion;
- (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in the opinion; or
- (4) a new species is listed or critical habitat designated that may be affected by the action.

Fisheries operating under this FEP have the potential to interact with a range of protected species. A current list of ESA listed species applicable to the Pacific Pelagics FEP is included in the Annual Pelagic Fishery Ecosystem Report (SAFE Report) and additional information regarding protected species interactions in this FEP is included in Section 3.2 (Other Considerations Important for Implementation – Protected Species Information).

1.2.5 Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) prohibits, with certain exceptions, the take of marine mammals in the U.S. EEZ and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the United States. The MMPA gives the Secretary authority and duties for the protection and conservation of all cetaceans (whales, dolphins, and porpoises) and pinnipeds (seals and sea lions, except walruses). The MMPA requires NMFS to prepare and periodically review marine mammal stock assessments (see 16 U.S.C. § 1361, *et seq*.).

Pursuant to the MMPA, NMFS has promulgated specific regulations that govern the incidental take of marine mammals during fishing operations (50 CFR 229). Under section 118 of the MMPA, NMFS must publish, at least annually, a List of Fisheries that classifies U.S. commercial fisheries into three categories, based on relative frequency of incidental mortality and serious injury to marine mammals in each fishery:

- Category I designates fisheries with frequent serious injuries and mortalities incidental to commercial fishing. Annual mortality and serious injury of a stock in a given fishery is by itself responsible for the annual removal of greater than or equal to 50 percent or more of any stock's potential biological removal (PBR) level.

- Category II designates fisheries with occasional serious injuries and mortalities incidental to commercial fishing. Annual mortality and serious injury of a stock in a given fishery is, collectively with other fisheries, responsible for the annual removal of greater than 10 percent of any stock's PBR level, and is by itself responsible for the annual removal of between 1 and less than 50 percent, exclusive, of any stock's PBR level.

- Category III designates fisheries with a remote likelihood or no known serious injuries or mortalities. A Category III fishery is, collectively with other fisheries, responsible for the annual removal of 10 percent or less of any stock's PBR level; or collectively with other fisheries, more than 10 percent of any stock's PBR level, but is by itself responsible for the annual removal of 1 percent or less of PBR level.

Owners of vessels or gear engaging in a Category I or II fishery are required under 50 CFR 229.4 to obtain a marine mammal authorization to lawfully incidentally take non-ESA listed marine mammals by registering with NMFS' marine mammal authorization program. Fishermen participating in Category I or II fisheries are also required to accommodate an observer onboard upon request by NMFS, and are required to comply with any applicable take reduction plans. Current List of Fisheries classifications for fisheries operating under the Pacific Pelagics FEP are included in the Annual Report.

Section 101 (a)(5)(E) of the MMPA requires the Secretary of Commerce to allow the incidental, but not intentional, taking of individuals from marine mammal stocks that are designated as depleted because of listing as threatened or endangered under the ESA in the course of commercial fishing operations if it is determined that three criteria are met:

1. Incidental mortality and serious injury will have a negligible impact on the affected species or stock;
2. A recovery plan has been developed or is being developed; and
3. Where required under section 118 of the MMPA, a monitoring program has been established, vessels engaged in such fisheries are registered in accordance with section 118 of the MMPA, and a take reduction plan (TRP) has been developed or is being developed for such species or stock.

1.3 Pacific Pelagics

1.3.1 Geography

The Pacific pelagics environment differs from the Council's archipelagic and Pacific Remote Island Areas (PRIA) in that it is primarily open ocean. For information on the island geographies of American Samoa, the Mariana Islands, the Hawaiian Islands, and the PRIA, please refer to the FEPs for those areas. For an inventory of the islands of the South Pacific, which includes notes on geology and structure of the different land masses in the region, please see Douglas (1969).

Information on the hydrographic characteristics of South Pacific marine environments has been summarized from various sources by Wauthy (1986). The waters that form the surface layer of the tropical west and central Pacific enter into the transpacific intertropical circulation from the eastern boundaries of two subtropical anticyclonic gyres, where the coastal upwelling of California and Peru provide nutrient rich subsurface waters. Brought to the surface by prevailing westerly winds the cooled and enriched waters form the westward-moving North and South Pacific equatorial currents that create zones of enhanced productivity in the equatorial region though to the central Pacific (Figure 2).

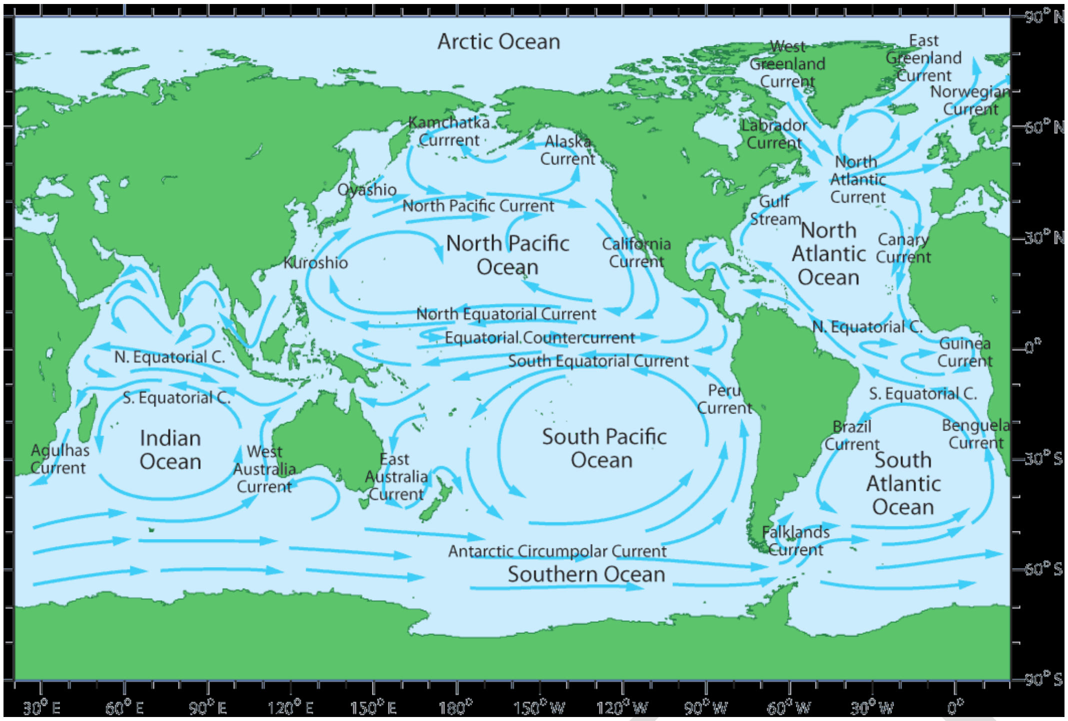

Figure 2. Map of global ocean circulation centered on the Pacific Ocean
Source: Science Education through Earth Observation for High Schools (SEOS) Project (http://www.seos-project.eu/home.html)

Countercurrents and undercurrents form peripheral to these main equatorial flows, and the whole system of currents, temperature fronts creates equatorial surface ocean habitat structure that is otherwise absent from the tropical Pacific except at the continental margins. To the north and south of these currents the anticyclonic gyres are warmed by solar radiation and tend to become a well-mixed stratum above a well-established thermocline and oxycline. Whereas temperate ocean surface layers are mixed by storms each winter, the tropical mixed surface layers are permanent. As the gyre and equatorial current waters move from east to west they grow warmer and more impoverished as nutrients are consumed by photosynthesis and particulate materials are sedimented out. The oxygen consuming decay of sinking organic detritus creates an oxygen minimum below the photosynthetic layer that is most extreme, and shallowest in the eastern and equatorial Pacific where it forms a habitat boundary for epipelagic species.

Limited primary production continues on the basis of partial re-mineralization within the stratified upper surface layer of the water column. Nutrient-depletion leads to very clear blue oceanic water in which suspended particles are depleted and living organisms are scarce. The term ‘oceanic desert’ has been used by Lisitzin (in Wauthy 1986) to describe these nutrient poor-waters. Primary productivity in the photic zone ranges on average from 20 to 50 $gCm^{-2}yr^{-1}$(FAO 1972). Upwelling is one mechanism by which impoverished tropical waters can be enriched with nutrients from the subsurface waters and this has been observed at the equator. Another mechanism whereby subsurface nutrient-rich waters reach the euphotic zone involves shallowing of the thermocline at 10°N and 10°S, at the edge of the equatorial counter currents. In the South Pacific, nutrient inputs from precipitation and runoff are of major significance only in the waters surrounding the large island archipelagos of Melanesia where highlands are extensive and rainfall is very heavy. Not surprisingly, the highest oceanic primary productivities (outside of the eastern boundary and equatorial current systems) in the region (90-180 $gCm^{-2}yr^{-1}$) are found on the shelf area of the Gulf of Papua which receives much of the drainage from PNG highlands region.

Combination of various physical factors results in the accumulation in the tropical Pacific of the thickest surface layer of warm water west of 180°. This accumulation forms one of the pre-conditions necessary for the generation of cyclones or hurricanes that are a common meteorological phenomenon in the North, Central and South Pacific. The second pre-condition is the existence of a cyclonic-like convergence in the lower layers of the atmosphere that can be found in the western tropical Pacific between the equatorial monsoon winds from the west and the easterly trade winds. In the northwest tropical Pacific, cyclones form most frequently between June and November, and are most frequent in August/September, with an average of 18 per year. South of the equator, cyclones occur from December to April and are less frequent than in the northwest, with an average of four per year (Wauthy 1986).

Large-scale oceanic events such as the El Niño Southern Oscillation (ENSO) also influence the coastal marine environment of the South Pacific islands. The Southern Oscillation Index is the difference in atmospheric pressure between Tahiti and Darwin, which is usually positive due to the low pressure area over Indonesia and Australia. During an ENSO episode, the pressure gradient reverses and becomes negative for a prolonged period with a consequent shift in climatic and oceanographic conditions. The easterly trade winds weaken and westerly winds are observed over parts of the equatorial western Pacific. The area of warm water usually associated with the western tropical Pacific is displaced eastward over the central and eastern Pacific region and the ocean waters of the western Pacific cool. Another aspect of the oscillation is anomaly in westerly winds blowing across the eastern Pacific continental margins that produce cold water upwelling and nutrification. When these winds weaken this results in anomalously warm ocean off the coasts of Peru, Ecuador, and California around the Christmas season and hence was named by Peruvian fishermen 'El Niño', the familiar diminutive Spanish term for the infant Christ.

This major climatic shift produces unseasonal droughts in the western Pacific and unseasonal rains in the central and eastern Pacific. Information from commercial tuna fisheries in the South Pacific and pelagic and demersal fisheries in South America suggests that ENSO events can, depending on species, have both negative and positive effects on catch ability and apparent abundance. In the western and tropical Pacific, the abundance of surface skipjack and yellowfin tuna stocks shifts eastwards during an ENSO episode. This can be inferred from the concentration of fishing effort by tuna purse-seine vessels, which during normal years concentrate to the West of 160°E line of longitude and to the east of this line during an ENSO event (Anon. 1995). Little is known at present about how ENSO events affect coastal fish and invertebrate stocks in the North and South Pacific due to the lack of any suitable time series of data. It is likely, however, that such a large scale anomaly will have an influence on productivity and recruitment, especially in those species with long oceanic pelagic larval stages.

There may be other long-term climatic cycles in the Pacific region that will influence the productivity and abundance of pelagic marine organisms. Polovina et al. (1994) describe such an event in the Northwestern Hawaiian Islands that began in the mid-1970s and ended in the late 1980s. Over a 10-year period, this climatic event promoted the movement of nutrient-rich deep ocean water into the euphotic zone during the first quarter of the year. This in turn resulted in higher survival of fish, crustaceans, seals and sea birds. The decline in the event was followed by declines in the recruitment and abundance of fish, crustaceans, birds and seals. During this event an important commercial lobster fishery in the Northwest Hawaiian Islands expanded rapidly in the mid-1980s then declined as recruitment to the population was markedly reduced, despite the efforts of fisheries managers to promote sustainable yields from the fishery.

1.3.2 People and Demographics

The following information is specific to participants in the pelagic fishing fleets covered by the P-FEP and is sourced from Pickering and Gist (2011). Unfortunately, much of the information is dated. For social and demographic information specific to American Samoa, the Commonwealth of the Northern Mariana Islands, Guam, and Hawaii, please refer to the Council's archipelagic fishery ecosystem plans and annual fishery ecosystem reports.

<u>Hawaii.</u>

Racial demographics of the Hawaii-based longline fleet were examined in 2000 by O'Malley and Pooley (2002). Korean-American (30% of the fleet) and Caucasian-American owners (27%) generally fished for tuna, while Vietnamese-American owners (43%) primarily targeted swordfish, but also fished for tuna. Allen and Gough (2006) examined Filipino crew members working in the Hawaii-based longline fleet and provide a thorough exploration of the perspectives and experiences of Filipino fishermen working as crew in the Hawaii longline industry in 2003.

Hospital et al. (2011) found that an overwhelming majority of fishermen in the Hawaii small boat pelagic fishery are male (97.8%). Respondents averaged 45 years in age and approximately 23.5 years of fishing experience. The largest ethnicity represented in the fishery was Asian (46.7%), followed by White (23.2%), and Native Hawaiian or Pacific Islander (8.9%) Approximately 21.2% identified were represented by more than one race.

In a study of troll and handline fisheries by Miller (1996), those interviewed ranged in age from 21-61, averaging 38 years. The primary occupation of 20 participants was charter fishing, four were full-time troll and handline fishermen, four were dive instructors, and the remaining 23 who answered this question held a wide array of occupations. The ratio of females to males was 1:53. Regarding the involvement of women in Hawaii's fisheries, this data may be misleading. As stated by Glazier (2007), "Women *do* participate [in Hawaii's fisheries] indirectly: transporting fish to the auction, purchasing ice, doing palapala (paper work), and so forth." Survey work found that captain's wives participated in 60% of secondary participation, and the captain's mothers and daughters participated in another 12% (Glazier, 2007).

Hamilton (1999) showed that pelagic troll fishermen in Hawaii could be classified statistically into 'Recreational', 'Expense', 'Part-Time Commercial' and 'Full-Time Commercial'. Significant differences were found between all groups for avidity, catch, catch rates, percent of catch sold, annual gross fishing revenue and percent of income from fishing profits.

The charter fishing community is generally considered to be boat owners, captains and crew members. According to O'Malley and Glazier (2001), the majority of the charter fishing community was between 31-50 years old, with 25% between the ages of 41-50. Crew members were typically younger than captains with average ages of 29 and 46 respectively. The charter community was nearly all male, with one survey reporting 98.8% of the charter fishing community as male (Walker, 1997). The majority of charter captains, boat owners and crew were not from Hawaii; 42% were born in California, 22% in Hawaii, and nearly all of the rest coming from other places on the U.S. Mainland (O'Malley and Glazier, 2001). O'Malley and Glazier (2001) found that 84% of surveyed charter fishing patrons were from the U.S. Mainland, while 3% were from Hawaii. Charter patrons interviewed were typically middle-class, with 24% reporting annual incomes over $150,000.

American Samoa

The role of fishing as a central and organizing force for communities in American Samoa has undergone dramatic changes over the past 50-75 years. The islands' population has more than tripled over that time period, with a steady shift from a largely subsistence-oriented economy to a cash-based economy. Fishing events such as the annual *atule* and *palolo* harvests continue to organize and mobilize many villages, but a smaller percent of American Samoans are taking part in these activities today, and the role of fishing as a central aspect of community within American Samoan life and culture has become less prominent over time. Fishing and marine resources are universally considered to be important aspects of *fa'a Samoa,* the Samoan way of life, but access to cash income and ready availability of food imports have made American Samoans less inclined to engage in fishing.

While change in nearshore fishing effort for subsistence purposes has not been consistently measured, a significant downward trend is evident since the 1980s. The catch rate for the outer islands, which have not experienced the same increase in population as the main island of Tutuila, is not decreasing in the same way that it is on Tutuila.

Traditionally, all work, including fishing, was organized at the village and family level. The village *fono* decided, according to season, what sort of community fishing should take place. The *tautai*, or master fisherman, of the village was a key decision maker who was awarded higher status than other *matai* (who might otherwise outrank him) when it came to matters of fishing. Fishing and canoe building were important skills that could improve village status and prestige. Customarily, and still today, the village controls rights of access to nearshore marine resources. A non-village member must gain permission from the mayor or village council to fish in an area adjacent to a village. Each village is also able to establish its own restrictions on fishing and access for the entire community. Community-specific restrictions on use of marine resources have been formalized in some cases through the government's Community-based Fisheries Management Program.

Commercial fishing activity has undergone several cycles over time. The Dory Project in the early 1970's initiated an era of modern fishing technology in American Samoa by providing easy credit and loans to fishermen to develop offshore fisheries. The project developed a boatbuilding facility that produced 23 vessels over a 3-year period. In the 1980s, dories were replaced by larger, more powerful vessels that could stay several days at sea. These *alia* catamarans, usually 28 to 32 ft long and powered by an outboard-engine, used primarily trolling and bottomfishing gear. In 1995, some *alia* captains began using horizontal longline gear, which quickly became the largest fishery in American Samoa based on total landed weight of the catch. In the early 2000s, bigger, monohulled longline vessels entered the fishery, resulting in greatly increased landings—over 15 million pounds in 2002, compared to under 2 million pounds in 2000. These vessels are typically crewed by (Western) Samoans with an American Captain (Nate Ilaoa, pers. comm.)

The tuna canneries based in American Samoa are another critical aspect of American Samoa as a fishing community. Canneries first began operating in American Samoa in 1954 and today, the canneries are the largest private-sector source of employment in the region. As the principal industry in the territory, the tuna canneries also shape other aspects of the American Samoan economy. For example, many private-sector jobs in the territory involve delivery of goods or services to tuna processors, and economic growth in the consumer retail and service sectors is tied to tuna industry expenditures and the buying patterns of cannery workers. StarKist Samoa, the largest tuna cannery in the world, produces more than 85% of American Samoa's canned tuna, while Samoa Tuna Packers produces the remaining 15% (V. Chan, NMFS PIRO International Division).

Commonwealth of the Northern Mariana Islands

The most recent detailed survey of small boat fishing in the CNMI was conducted by Hospital and Beavers (2014).

On average, vessels in the CNMI are approximately 18 ft. long with a 98 h.p. engine, were built in the early 1990s. All vessels in the survey were reported to be less than 25 ft. in length. Considerable evidence showed co-ownership and sharing of fishing vessels as, on average, nearly 70% of vessel owners reported that their vessel is used, at least part of the time, without the boat owner on board. On average, fishermen reported 3 people on board while fishing. About one third (31%) of the fleet reported to be a 2-person operation with a captain and one crew member, while another third (31%) typically fish with one captain and two crew members. A mere 2% of fishermen reported to always fish alone.

CNMI fishermen, on average, reported approximately 37 boat fishing trips in the 2011, with fishermen who sold fish reporting more fishing trips relative to those who do not sell fish. Boat fishermen in the CNMI use many gear types and target many species throughout the year. On average, fishermen reported the use of 3 different gear types/target species during the past 12 months, with pelagic trolling as the most popular gear type followed closely by deepwater bottomfish fishing, shallow-water bottomfish, and spear fishing.

Survey respondents indicated that their fishing trips in 2011 were evenly distributed within both local (< 3 nm from shore) and offshore waters (3–200 nm). The importance of Fish Aggregating Devices (FADs) was evident as 71% of fishermen reported to have fished at a FAD during the past 12 months, and on nearly 22% of their fishing trips. A high degree of seasonal fishing effort was found for all fishing activity across most subgroups of the fleet, although fishermen on Tinian and Rota were more likely to report fishing year round.

A majority of fishermen (74%) reported selling at least a portion of fish caught in the past 12 months and, on average, these fishermen reported selling fish after approximately 47% of their fishing trips in the past 12 months. On average, fishermen reported selling roughly 38% of their total catch.

For the majority of the fleet there is considerable heterogeneity in levels of market participation, utilization and access, although the majority consider the fish they sell to contribute *very little* to their personal income, as cost recovery is a major motivation for selling a portion of catch. However, there appear to be significant market limitations for CNMI fishermen as less than half (43%) of survey respondents indicated that they can always sell all the fish that they want to sell. During 2010 and 2011, the cost of a trolling trip averaged approximately $188 with a median cost of $179. As anticipated, fuel expenses accounted for a majority (78%) of total pelagic trip expenditures. Likewise, the average bottomfish trip cost was reported at $179 with a median of $138. Fishermen reported an average reef fish trip to cost approximately $108 (median of $94). Fuel accounted for a similar share of the cost structure across all fishing methods. In total, it is estimated that CNMI small boat fishermen responding to the Hospital and Beavers 2011 survey provided direct trip-related sales impacts ranging from approximately $0.60 million (using median trip costs) to $0.72 million (using mean trip costs) to the CNMI economy.

In addition to variable trip costs, fishing requires significant annual fixed-cost expenditures. Nearly every survey respondent (88%) reported to incur at least some non trip- related fishing expenditures during 2010. The most common expenditure categories were fishing gear (84%), oil and lube (67%), repair and maintenance (67%), safety equipment (58%), and fees (49%). As one would expect, the median annual fishing related expenditure in 2010 was significantly higher for boat owners ($3,075) relative to non-boat owners ($175). In aggregate CNMI small boat fishermen responding to our survey incurred total annual fishing expenditures of approximately $0.31 million. In considering the direct economic impact to the local island economy, fishermen reported, on average, that 64% of fishing expenditures were purchased directly on island. Therefore, direct sales impacts of fishermen responding to the survey from non-trip related expenditures equate to approximately $0.20 million.

The breakdown of catch disposition in the CNMI small boat fishery reflects the social and cultural motivations towards fishing and sheds light on the complexities of classifying catch in the small boat fisheries. Fishermen who responded to the survey reported that approximately 28% of fish catch was consumed at home, while 38% was given away, with approximately 29% of fish sold. The remaining catch is either released (2%) or exchanged for goods and services (3%). This diversity of catch disposition even extends to avid fishermen who regularly sell fish as they still retain approximately 22% of their catch for home consumption and participation in traditional fish-sharing networks and customary exchange. Additionally, fish are clearly an important source of food for fishing families: 86% consider the pelagic fish they catch to be an important source of food, with higher rates for bottomfish and reef fish at 91% and 93%, respectively. These findings validate the importance of fishing in terms of building and maintaining social and community networks, perpetuating fishing traditions, and providing fish to local communities as a source of food security.

Guam

The most recent examination of pelagic fishermen in Guam was conducted by Rubinstein in 2001. The investigators collected data from 340 separate fishing trips by 97 fishermen. The fishermen were residents of 16 villages, with a mean length of village residence of 17 years. All but two of the fishermen were men, and neither of the two women were Pacific Islanders. According to Rubinstein (2001), the gender distribution "reflects the strong cultural values in Micronesia that discourage women from involvement in pelagic fishing; significantly, neither of the two women in our sample are Pacific Islanders." Indigenous Chamorros accounted for the largest proportion (41%) of pelagic fishermen in Guam, which about corresponds to the proportion of the Guam population that claimed Chamorro ethnicity in the 1990 Guam census. Other Micronesians, mainly from Palau and the Federated States of Micronesia, formed 18% of the fishing population, while Filipino fishermen comprised 7% of the pelagic fishing population.

The fishermen in the Rubinstein sample had an estimated 4.1 members per household. Guam pelagic fishermen on average had a higher median household income than the islands overall median household income ($50,000 vs. $30,755). The distribution of this income is highly uneven, however, as the Micronesian fishermen from the Republic of Palau and the Federated States of Micronesia earn a median household income of only $20,000, with a mean household size of 6.9.

1.3.2.1 Socio-political boundaries

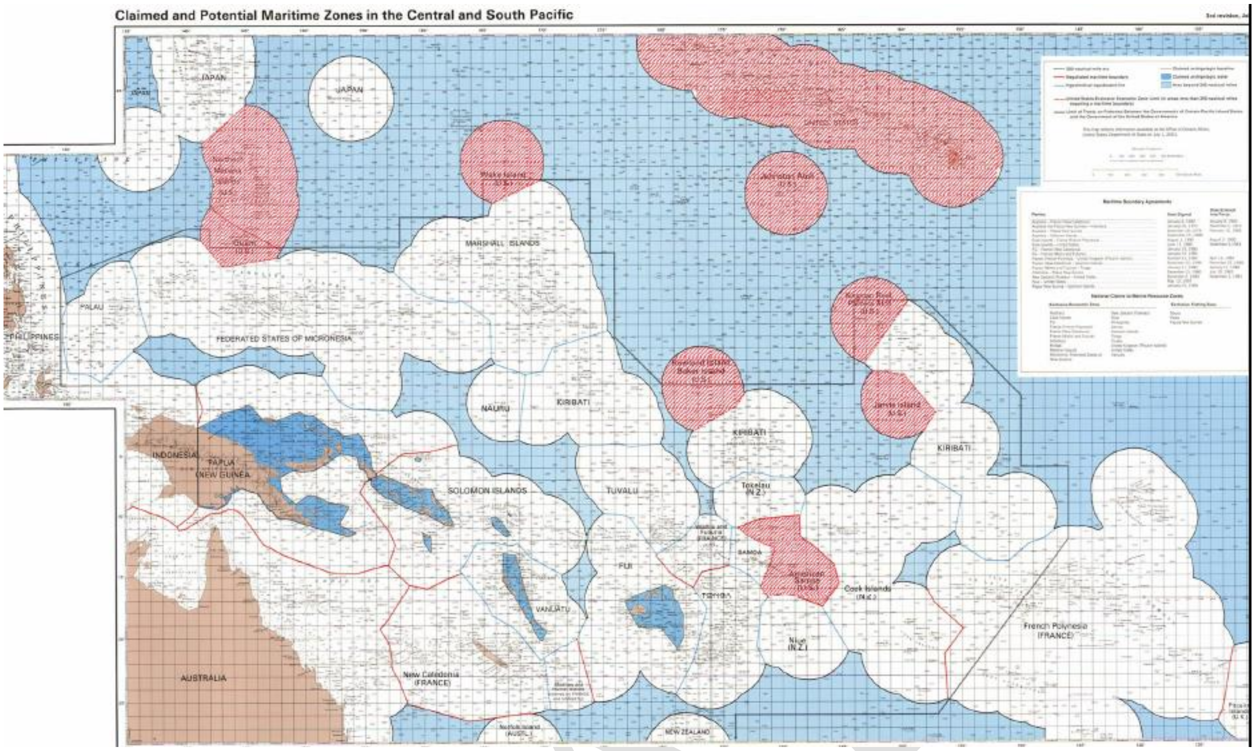

Figure 3. States and Territories in the Western and Central Pacific Ocean. US EEZs are shown in red.

International coordination is an important component of marine resource management within the island areas of the Western Pacific Region. For example, fish stocks and other marine resources are found within the US EEZs of the US Pacific Islands may be part of larger populations that occur on larger geographic scales (Figure 3). Also, the US EEZ around the islands areas within the Western Pacific Region are adjacent to the EEZs of foreign countries. Marine debris from foreign sources also wash ashore on US Pacific Islands. To support international coordination, the territories of American Samoa, Guam and CNMI, in addition to the US government, are members of the Secretariat of the Pacific Community and South Pacific Regional Environmental Program. The three territories are also recognized as Participating Territories within the Western and Central Pacific Fisheries Commission. The US and American Samoa also has formal observer status within the Pacific Islands Forum Fisheries Agency.

Several of the Council's major pelagic fisheries operate in a dynamic international fishery management arena, principally governed by two Regional Fishery Management Organizations (RFMOs) – the Western and Central Pacific Fisheries Commission (WCPFC) and the Intern-American Tropical Tuna Commission (IATTC). The line of demarcation is at 150° W longitude, with a dog leg at 130°W to incorporate all of French Polynesia. This division of jurisdiction makes the Western Pacific Council the most internationally-focused of the US fishery management councils.

The WCPFC, established in 2000 through the Honolulu Convention, includes Australia, China, Canada, Cook Islands, European Community, Federated States of Micronesia, Fiji, France, Japan, Kiribati, Korea, Republic of Marshall Islands, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Philippines, Samoa, Solomon Islands, Chinese Taipei, Tonga, Tuvalu, the United States of America, and Vanuatu. It was the first regional fishery management organization to be based on the principles of the United Nations Convention on the Law of the Sea.

The situation in the WCPFC is complicated by a number of issues, including the special requirement of developing states (Article 30 of the WCPFC Convention). This, among other reasons, requires the Commission to assess the disproportionate burden of management measures on developing states. In addition, a Northern Committee was established under the Convention to consider fishery management issues to the north of 20° N latitude. This Committee is concerned with species such as northern albacore, swordfish and North Pacific bluefin tuna, which are of little concern to most Pacific Island nations. However, there is overlap between the north and south over issues of mutual interest such as bigeye and blue marlin. The Northern Committee has also absorbed a forum, the International Scientific Committee for tuna and tuna-like species of the North Pacific Ocean (ISC), as its main source of scientific advice.

The IATTC was established in 1950 between the United States and Costa Rica. Its membership has expanded to also include Colombia, Nicaragua, Guatemala, Panama, Ecuador, Peru, El Salvador, Mexico and Venezuela. This membership is supplemented by participation by France, Spain, Vanuatu, Japan and Korea. The most notable absence from the IATTC is Chile, which forms a significant part of the western boundary of the Pacific. The initial 1950 convention was superseded by the Antigua Convention of 2004, which among other things broadened the area of application from 30° north and south to 50 ° north and south, thus including stocks such as swordfish, albacore and bluefin tuna.

Finally, the Pacific islands are all members of the Secretariat of the Pacific Community (SPC), which was first convened in 1947 and also includes the governments of New Zealand, Australia, the United States and France. The 14 independent island states (excludes US, French and UK territories), with the addition of New Zealand and Australia, are also members of the South Pacific Forum, which was established in 1971. The Conference and the Forum have secretariats housed in New Caledonia and Fiji, respectively. Both institutions support fisheries in the South Pacific: the Forum through the Solomon Island-based Pacific Islands Forum Fisheries Agency, which is concerned with managing access by distant water fishing nations to the region’s tuna stocks, and the SPC through its Oceanic Fisheries Program (OFP), which conducts fisheries research and development. The OFP is also the science advisor to the WCPFC and conducts stock assessments and other studies on WCPO pelagic stocks.

1.3.2.2 Fishing Communities

The MSA defines a fishing community as a community which is substantially dependent on or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community.

Island communities in the Western Pacific have depended upon the surrounding ocean and its resources have provided residents with a source of food and opportunities for maritime commerce and recreation for millennia. Because participants in various fisheries in the Western Pacific are not concentrated in a few specific locales but rather reside in many villages and small towns across the islands, and because fishing, seafood, and fishing-related businesses assume extensive social and economic importance throughout the region, the Council recommended in 1999 that the Secretary of Commerce designate American Samoa, Guam and the CNMI as fishing communities under the MSA. The NMFS Pacific Islands Fisheries Science Center has since developed general profiles of these fishing communities. In 2002, the Council recommended that the Secretary of Commerce designate each of the Main Hawaiian Islands as fishing communities under the MSA.

The social and economic interplay between island residents and the surrounding ocean environment is central to an understanding of community life in the archipelagos. Aside from some of the Main Hawaiian Islands, the islands are relatively small, and most towns and villages are located along the coastal zone. As such, the ocean is an ongoing visual presence in the lives of all residents. Because most island areas in the Council's jurisdiction are located some thousands of miles from the nearest continent and over 5,500 miles from North America, goods must be transshipped on or over thousands of miles of ocean. This has led to a relatively high cost of living and limited availability of certain goods and services. The tourism economy is closely related to recreation and leisure opportunities along the coastal zone, and it too is conditioned by distance of travel to the islands. Fishing activities are important across the region, and living marine resources are used for commercial sale, household consumption, and as a source of recreation. Various aspects of local and indigenous history, culture, and society are closely related to the surrounding ocean and use of its resources.

2 MANAGEMENT POLICY, GOALS, AND OBJECTIVES

2.1 Council Management Policy

The Council's management policy is to apply responsible and proactive management practices, based on sound scientific data and analysis and inclusive of fishing community members, to conserve and manage fisheries and their associated ecosystems.

2.2 Pacific Pelagic FEP Purpose and Need

The Pacific pelagic area contains various stocks and stock complexes that are found in federal waters and on the high seas and which provide important benefits to the Nation. Since these resources are in need of management, the Council is required under the MSA and international treaties to develop management plans to accomplish this. The Council's Pacific Pelagic FMP became effective on March 23, 1987 (52 FR 5987) to conserve and manage billfish, wahoo, mahimahi, and oceanic sharks. The FMP's first measures prohibited drift gillnet fishing within the region's waters of the Exclusive Economic Zone (EEZ) and prohibited foreign longline fishing within certain areas of the EEZ.

In addition, the habitats for these fish, as well as other elements of the marine ecosystem, such as sea turtles, cetaceans, and corals, are also locally and nationally important. Since all of these are interconnected, the Council opted in the mid-2000s to take an ecosystem-based approach to fisheries managed and spent the next several years revising the species/complex-based fishery Pacific Pelagic FMP into an ecosystem-based plan. Unlike the other Council FEPs, the Pelagic FEP is not archipelagic or place-based, since it manages migratory species with a basin-wide distribution, such as tuna and tuna-like species.

The Council's decision to transition to ecosystem-based fishery management (EBFM) followed Congressional direction in 1998 to the NMFS to establish an Ecosystem Principles Advisory Panel (Panel; EPAP). The Panel was tasked with assessing the extent to which ecosystem principles were being or could be used in fisheries management and recommending how to further ecosystem principle use to improve the status and management of marine resources. The Panel was composed of members of academia, fishery and conservation organizations, and fishery management agencies (see below).

2.3 Pacific Pelagics Fishery Ecosystem Plan Goals

The Pacific Pelagics FEP establishes a framework under which the Council can recommend management measures required by federal law and informed by best available scientific information. The National Oceanic and Atmospheric Administration (NOAA) defines an ecosystem approach as "management that is adaptive, specified geographically, takes account of ecosystem knowledge and uncertainties, considers multiple external influences, and strives to balance diverse social objectives" In addition, because of the wide-ranging nature of ecosystems, successful implementation of ecosystem approaches will need to be incremental and collaborative (NOAA 2004).

On international, national, and local levels, institutions and agencies tasked with managing marine resources are moving toward an ecosystem approach to fisheries management. One reason for this shift is a growing awareness that many of Earth's marine resources are stressed and the ecosystems that support them are degraded. In addition, increased concern regarding the potential impacts of fishing and non-fishing activities on the marine environment, and a greater understanding of the relationships between ecosystem changes and population dynamics, have all fostered support for a holistic approach to fisheries management that is science based and forward thinking (Pikitch et al. 2004).

In order to achieve EBFM, this plan:

1. Identifies the management objectives of the Pacific Pelagics FEP;
2. Delineates the boundaries of the Pacific Pelagics FEP;
3. Designates the management unit species included in the Pacific Pelagics FEP;
4. Details the federal fishery regulations applicable under the Pacific Pelagics Archipelago FEP;
5. Establishes appropriate Council structures and advisory bodies to provide scientific and management advice to the Council.

In addition, this plan provides the information and rationale for these measures; discusses the key components of the Pacific Pelagics ecosystem, including an overview of the region's pelagic fisheries; and explains how the measures contained within are consistent with the MSA and other applicable laws.

This FEP has four goals:

Goal 1. Conserve and manage target and non-target stocks;
Goal 2. Protect species and habitats of special concern;
Goal 3. Understand and account for important ecosystem parameters and their linkages, and;
Goal 4. Meet the needs of fishermen, their families, and communities.

2.4 Pacific Pelagics FEP Objectives

To achieve the policy and goals of the Pacific Pelagics FEP, the Council has adopted the following objectives:

OBJECTIVE 1. Support Fishing Communities

a. Identify the various social and economic groups within the region's fishing communities and their interconnections.
b. Ensure that regulations designed to meet conservation objectives are written to be as minimally-constraining as possible.
c. Select alternatives that minimize adverse economic impacts to fishing communities when possible.
d. Eliminate regulations that are no longer necessary (i.e., eliminate access barriers).
e. Increase communication between fishery sectors.
f. Support fishery development, training and processing opportunities.
g. Support projects, programs and policies that increase sustainable fishing opportunities.

OBJECTIVE 2: Prevent Overfishing on Council-managed Stocks

a. Develop status determination criteria for all stocks and stock complexes in the fisheries.
b. Monitor fisheries to understand when overfishing may be close to occurring
c. Rebuild overfished stocks

OBJECTIVE 3. Improve Fishery Monitoring and Data Collection

a. Increase the number of fishery ecosystem elements being monitored.
b. Improve the timeliness of data availability.
c. Improve the quantity and quality of relevant fishery data.
d. Encourage research to improve precision of data regarding protected species populations and distributions.
e. Increase research coordination between the Council, the state, and federal agencies.
f. Increase the quality and quantity of monitoring and enforcement data through improved technology.

OBJECTIVE 4. Promote Compliance

a. Understand factors that may result in non-compliance.
b. Consider ways to develop or increase buy-in from affected parties.
c. Ensure that regulations are written and implemented so as to be easy to follow and enforce.
d. Develop codes of conduct specific to individual fisheries.

OBJECTIVE 5. Reduce Bycatch and Minimize Interactions and Impacts to Protected Species to the Extent Practicable

a. Maintain minimal impacts to protected species and other bycatch species while maintaining the viability of fisheries.
b. Promote viable methods and technologies that may reduce interactions with seabirds, marine mammals, sea turtles and other protected species.
c. Encourage non-regulatory approaches to reducing protected species and bycatch impacts where necessary and appropriate
d. Increase fishermen’s knowledge about protected species issues and regulations and ways to minimize interactions.
e. Continue to work with federal and state agencies to protect relevant threatened and endangered species.
f. Improve assessment of protected species and bycatch species impacts through improvements in data collection, research and monitoring.
g. Encourage research that examines whether and to what extent bycatch is an issue in the fisheries covered by this management plan.

OBJECTIVE 6. Refine and Minimize Impacts to Essential Fish Habitat

a. Review and update EFH and HAPC designations on regular schedule (5-years) based on the best available scientific information of a higher EFH level than was used for the original designation.
b. Identify and prioritize research to: assess adverse impacts to EFH and HAPC from

fishing and non-fishing activities, including, but not limited to, activities that introduce land-based pollution into the marine environment.

OBJECTIVE 7. Increase Traditional and Local Knowledge in Decision-making

a. Identify relevant indigenous and local practices and knowledge that may improve scientific inquiry regarding Council-managed fisheries.
b. Utilize cultural practitioners, concepts, and bodies in the analysis of management alternatives.
c. Utilize fishermen knowledge in the analysis of management alternatives.

OBJECTIVE 8. Consider the Implications of Spatial Management Arrangements in Council Decision-making

a. Identify and prioritize research that examines the positive and negative consequences of current no-take fishing areas to fisheries, fishery ecosystems, and fishermen, such as military installations, Monuments, and Marine Conservation Areas.
b. Consider whether the goals of any spatial-based fishing restrictions proposed in federal waters appear to be achievable.
c. Establish effective spatially-based fishing zones.
d. Remove spatial-based fishing restrictions that are no longer necessary.

OBJECTIVE 9. Consider the Implications of Climate Change in Council Decision-making

a. Identify and prioritize research that examines the effects of climate change on Council-managed fisheries and fishing communities.
b. Ensure climate change considerations are incorporated into the analysis of management alternatives.
c. Monitor climate-change related variables via the Council's Annual Reports.
d. Engage in climate change outreach with US Pacific islands communities.

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3 MANAGEMENT REGIME AND FISHERY INFORMATION

3.1 Management Regime and Specific Fisheries

3.1.1 Pacific Pelagic FEP Management Unit Species

Management unit species (MUS) are those species that are managed under an FMP or FEP. In fisheries management, MUS typically include those species that are caught in quantities sufficient to warrant management or monitoring by NMFS and the Council. The primary impact of inclusion of species in an MUS list is that the associated fishery can be directly managed. National Standard 3 of the MSA requires that to the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination. For stock assessment purposes the PMUS (see Table 1) are divided into different units based on geography, management, and biology. However, those stocks which have a basin-scale distribution across the Pacific, either on both sides of the equator or in the North and South Pacific, are managed under the FEP as single stocks.

Those species for which maximum sustainable yields (MSY) have been estimated are indicated with an asterisk and their MSY values can be found in Section 3.1.1.1.10 and Table 2. Some of the species included as MUS are not subject to significant fishing pressure and there are no estimates of MSY or minimum stock size threshold (MSST, the level of biomass beneath which a stock or stock complex is considered overfished) or maximum fishing mortality threshold (MFMT, the level of fishing mortality, on an annual basis, above which overfishing in occurring) available for these species at this time.

However, these species are important components of the ecosystem and including these species as MUS in the FEP is also consistent with MSA National Standard 3. For that reason, they are included in this FEP. This section further provides that "A management unit may contain, in addition to regulated species, stocks of fish for which there is not enough information available to specify MSY and optimum yield (OY) or to establish management measures, so that data on these species may be collected under the FMP". Under the adaptive approach that utilizes the best available scientific information, the Council, in coordination with NMFS, will continue to develop and refine estimates or proxies of MSY for these species when sufficient data are available. The establishment of MSY proxies is consistent with 50 CFR 600.310 text regarding MSA National Standard 1 which states that "When data are insufficient to estimate MSY directly, Councils should adopt other measures of productive capacity that can serve as reasonable proxies of MSY to the extent possible." Future management measures that would directly affect the harvest of any MUS contained in this FEP will be subject to the requirements of the MSA and other applicable laws.

Table 1. Pacific Pelagic Management Unit Species (PMUS).

Scientific Name	English/Local Common Name	Scientific Name	English/Local Common Name
TUNAS		**BILLFISHES**	
*Thunnus alalunga**	albacore	*Tetrapturus audax**	striped marlin
*T. obesus**	bigeye tuna	*T. angustirostris*	shortbill spearfish
*T. albacares**	yellowfin tuna	*Xiphias gladius**	swordfish
T. thynnus	northern bluefin tuna	*Istiophorus platypterus*	sailfish
*Katsuwonus pelamis**	skipjack tuna	*Makaira mazara**	blue marlin
Euthynnus affinis	kawakawa	*M. indica*	black marlin
Auxis spp. *Scomber* spp. *Allothunus* spp.	other tuna relatives		
SHARKS		**OTHER PELAGICS**	
Alopias pelagicus	pelagic thresher shark	*Coryphaena* spp.	mahimahi (dolphinfish)
A. superciliousus	bigeye thresher shark	*Lampris* spp.	moonfish
A. vulpinus	common thresher shark	*Acanthocybium solandri*	wahoo
Carcharhinus falciformis	silky shark	*Gempylidae*	oilfish family
C. longimanus	oceanic whitetip shark	*Bramidae*	pomfret family
*Prionace glauca**	blue shark	*Ommastrephes bartamii*	neon flying squid
Isurus oxyrinchus	shortfin mako shark	*Thysanoteuthis rhombus*	diamondback squid
I. paucus	longfin mako shark	*Sthenoteuthis oualaniensis*	purple flying squid
Lamna ditropis	salmon shark		

3.1.1.1 Hawaii Longline Fishery

3.1.1.1.1 Description

Longline fishing in Hawaii dates from 1917 using wooden style sampans off the Waianae coast of Oahu. Changes in fishing methods and greater amounts of fishing gear characterized the expansion of the longline fleet over the ensuing decades. Boggs and Ito (1993) give a comprehensive account of the history of the Hawaii longline fishery up to the early 1990s, and readers should see that document for information on the history of the fishery.

All Hawaii longline vessels fish for bigeye tuna, with some vessels still opting to seasonally fish for swordfish out of Hawaii. Vessels now deploy continuous nylon monofilament main lines stored on spools with snap-on monofilament branch lines. The fleet size ranged between 120 and

130 vessels during the 1990s, but more recently has been between 135 and 140 vessels, and the number of hooks deployed has increased 50%-70% since the mid-2000s. In the mid-1980s, longliners began exploring fishing grounds up to 800 n.mi. from the Main Hawaiian Islands, and distant-water fishing gradually became more common in the 1990s.

Conflicts with other fisheries and interactions with protected species led to the exclusion of the longline fishery from the nearshore waters of the Hawaii Archipelago in 1990 and 1991. Longline fishing was prohibited within a radius of 50 n.mi. off the Northwestern Hawaiian Islands (NWHI) to prevent interactions with Hawaiian monk seals. In mid-1991, the Council established a buffer zone prohibiting longline fishing within a radius of 75 n.mi. of the Kauai and Oahu and 50 n.mi of the coasts of Maui, Molokai Lanai, Kahoolawe and Hawaii.

3.1.1.1.2 Type and Quantity of Fishing Gear

In this fishery, longline gear is comprised of monofilament mainline stored on a hydraulically-operated drum. Typically, between 30-50 n.mi of mainline are deployed in a “set.” This line is suspended by surface floats to form a series of catenary curves in the water column to which the branch lines are attached and suspended.

When targeting bigeye tuna, fishermen deploy 15-30 hooks between the line floats, with enough sag to reach as deep as 400 m. A line thrower is required to put emplace this sag. In targeting swordfish, only a few hooks are deployed between floats and the line is kept relatively taut so that it stays in the upper 30-90 m of water. Night fishing employs luminescent "light sticks" which attract broadbill swordfish or their prey. Imported squid were first used for bait, but fishermen switched to fish bait in 2004 in response to management measures to reduce sea turtle interactions (WPRFMC 2004).

3.1.1.1.3 Catch in Numbers and Weight

The catch by numbers by the Hawaii longline fleet between 2004-2014 is shown in Figure 4. During that time, the total catch increased from about 400,000 fish to about 500,000 fish per year, driven primarily by the expansion of the deep-set tuna fishery. The shallow set swordfish fishery has remained relatively static since 2005, landing on average between 35,000 to 40,000 fish.

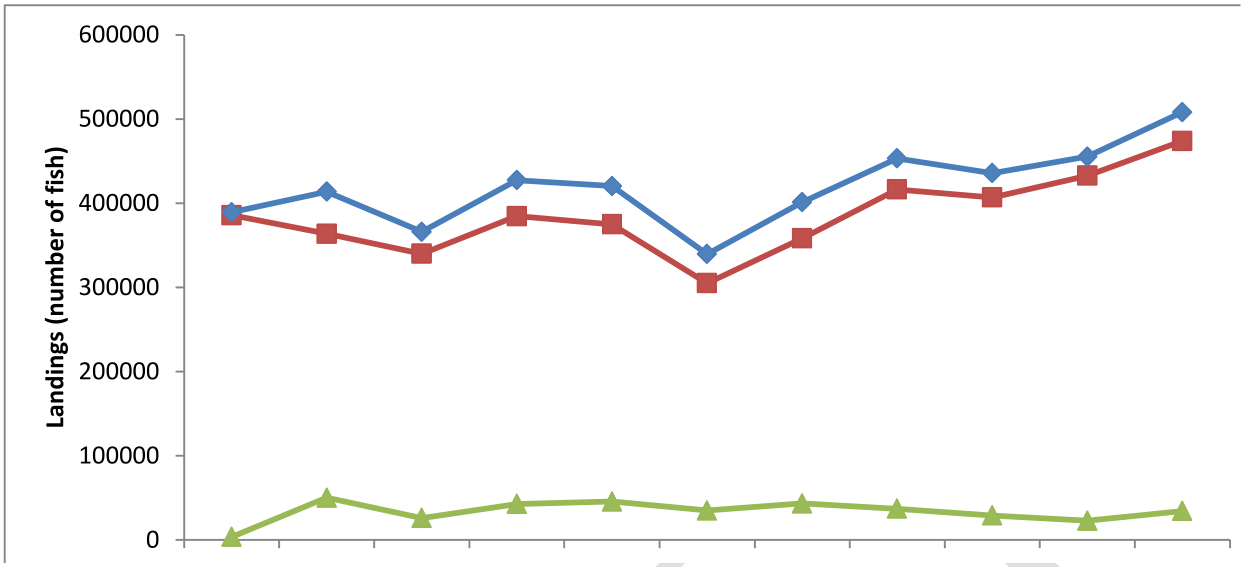


Figure 4. Landings in number of fish by the deep set and shallow set longline fisheries in Hawaii.
Source: WPRFMC 2015 and unpublished NMFS-PIFSC data.

The deep set fishery landed 25.1 million lbs. in 2013, worth $86.5 million and 26.8 million lbs. in 2014 worth $79.1 million. The shallow set longline fishery landed 2.3 million lbs. in 2013, worth $3.2 million and 3.3 million lbs. in 2014, worth $4.0 million. For current information regarding Hawaii longline catch and revenues refer to the most current WPFMC Pelagic Annual Fishery Ecosystem Report (SAFE Report).

The species composition of the deep set and shallow set sectors of the Hawaii longline fishery are shown in (Figure 5 and Figure 6).

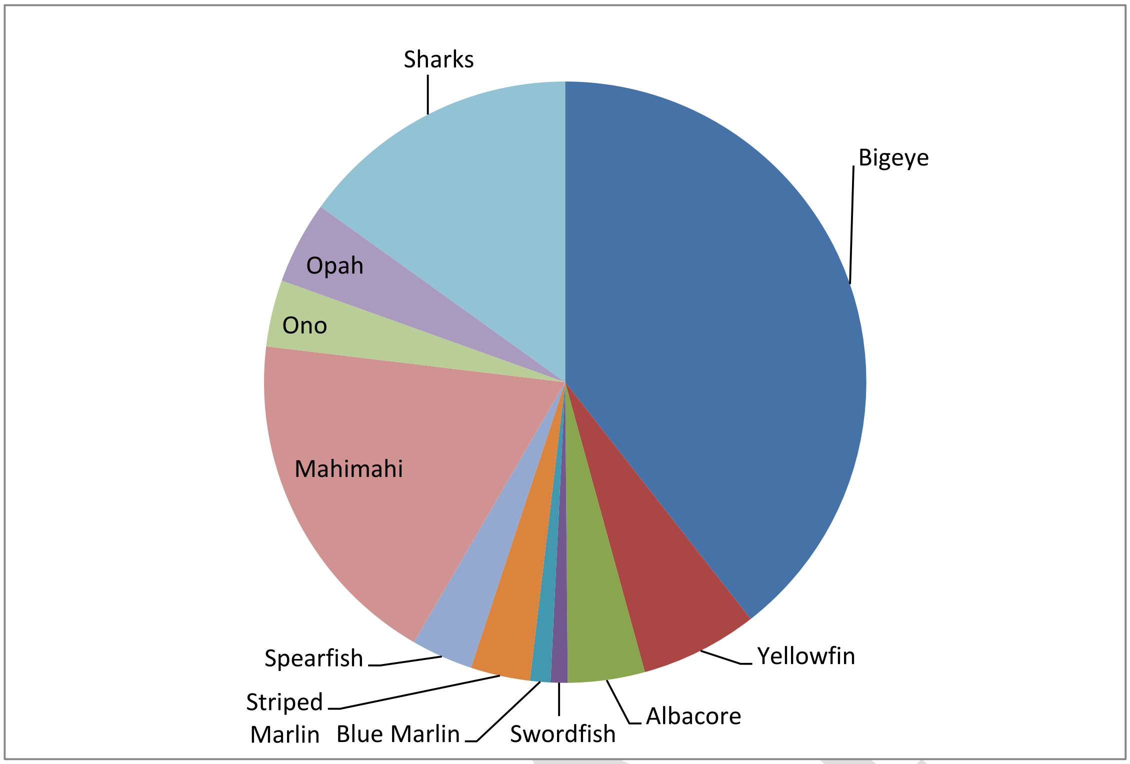


Figure 5. Species composition of total catch (kept and discarded) in the deep set sector of the Hawaii longline fishery, 2014.
and unpublished NMFS-PIFSC data.

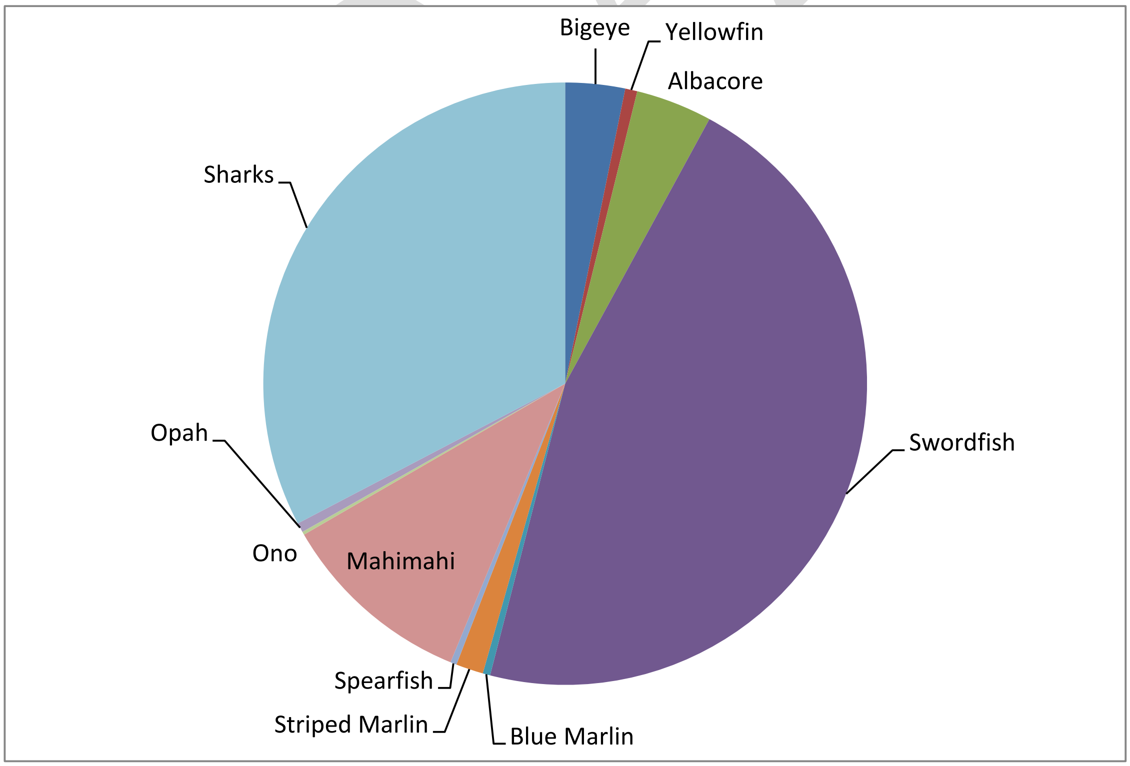


Figure 6. Species composition of total catch (kept and discarded) in the shallow set sector of the Hawaii longline fishery, 2014.
Source: WPRFMC and unpublished NMFS-PIFSC data.

3.1.1.1.4 Fishing Areas

The deep-set fishery operates north and south of the Hawaii Archipelago, and on occasion may fish as far south as equatorial latitudes around Palmyra Atoll. The deep-set fishery may also operate in the same northern latitudes as the shallow set fishery and may range nearly as far to the east (6). The shallow set swordfish fishery operates predominantly to the north and east of the Hawaii Archipelago. In 2014, the fishery operated to the EEZs off the US West Coast and Mexico (7).

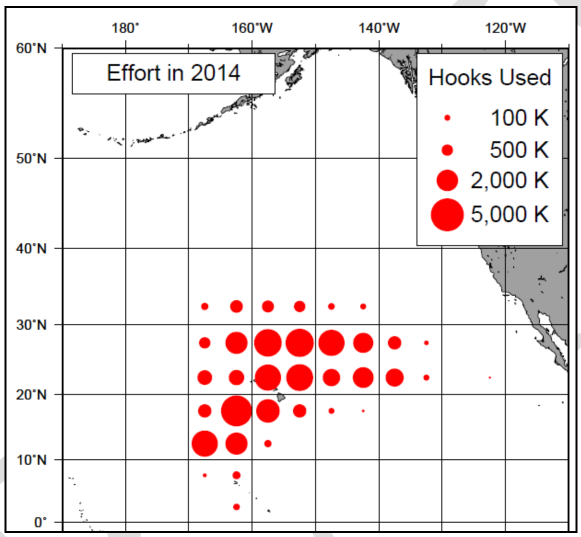


Figure 7. Distribution of deep-set longline fishing effort in 2014

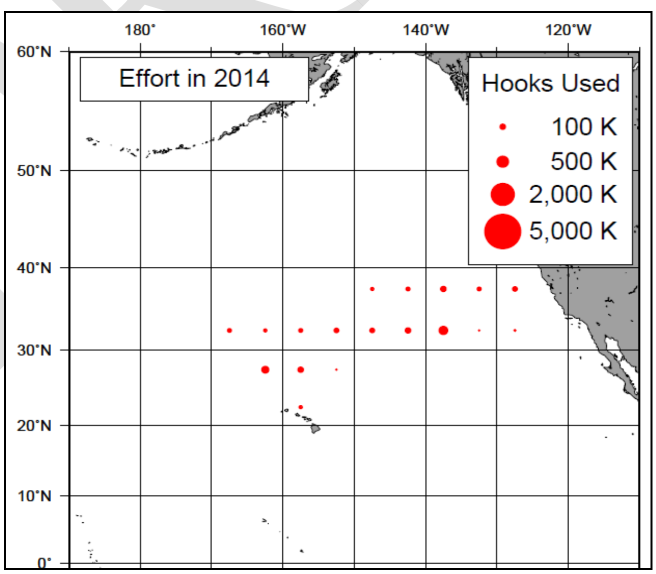


Figure 8. Distribution of deep-set longline fishing effort in 2014

3.1.1.1.5 Time of Fishing

Fishermen shallow-setting for swordfish are required by regulations to set an hour after local dusk and to have completed the haul an hour before local dawn. Such time constraints for deep-set tuna longlining are not proscribed in regulation, but fishing usually starts at dawn, with the set retrieved by the late afternoon. Hauling may continue to midnight or so.

3.1.1.1.6 Number of Sets

The number of sets is shown in Figure 9. The number of shallow sets since 2004 has ranged between 850 and 1,833 sets with an average of about 1,400 sets. In the deep set fishery, the trend in the number of sets rose between 2001 to 2007, where it levels off at around 17,000-18,000 sets.

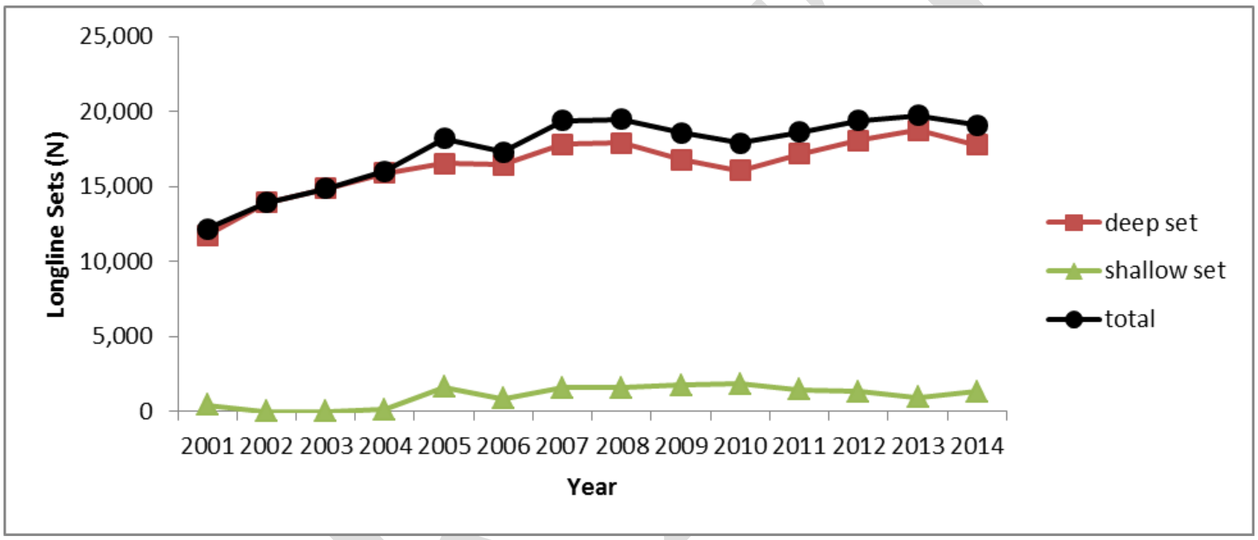


Figure 9. Trends in deep, shallow and total sets by the Hawaii longline fishery, 2001 - 2014

Source: WPRFMC (2015) and unpublished NMFS-PIFSC data.

3.1.1.1.7 Economics

The most valuable tuna per pound is Pacific bluefin, though landings of this species are negligible in our fisheries. Bigeye tuna accounts for about 60% of the deep-set fishery landings and over 70% of the landed value. Swordfish comprise about 90% of the shallow-set longline fishery and between 70-80% of the landed value. The average direct revenue from the longline fishery (deep-set and shallow-set) between 2002 and 2012 was $68,603,000, with a high of $92,334,000 (2012) and a low of $50,849,000 (2002). For current information regarding revenue of the fishery, price per pound, total direct employment, and fisheries-dependent services or industries, please refer to the most current WPFMC Pelagic Annual Fishery Ecosystem Report (SAFE Report).

3.1.1.1.8 Estimated and Actual Processing Capacity Utilized by U.S. Processors

Most of the Hawaii longline catch is utilized by US processors, either locally in Hawaii or on the mainland. Almost all the tuna landed by the longline fishery is retained in Hawaii, while most of the swordfish is exported to markets in the US East Coast. The value of the bigeye caught by the deep-set longline fishery in 2013 amounted to about $62.7 million, while the swordfish value in the shallow-set fishery in 2013 amounted to about $2.7 million (WPRFMC 2015).

3.1.1.1.9 Present and Probable Future Condition of the Fishery

The present condition of the fishery is likely to remain largely unchanged unless bigeye catch assigned to the US Pacific islands territories is no longer allowed to be transferred to Hawaii. The other potentially-constraining factor for the future of the fishery is how much further the US government wants to restrict fishing by longline vessels (and other gear types) in the WCPO. For example, the declaration and subsequent expansion of the Pacific Remote Islands Marine National Monument has reserved from fishing a total of 2,030,000 km^2 of ocean area.

3.1.1.1.10 Maximum Sustainable Yield

Stock assessments have been conducted for a number of major pelagic species in the Pacific (Table 2) and
Figure 10 shows the status of these stocks relative to MSY following the Council approved MSY control rule (see Appendix E), based on the latest stock assessments.

For the most recent MSY for the fishery, refer to the current Pelagic Annual Fishery Ecosystem Report (SAFE Report).

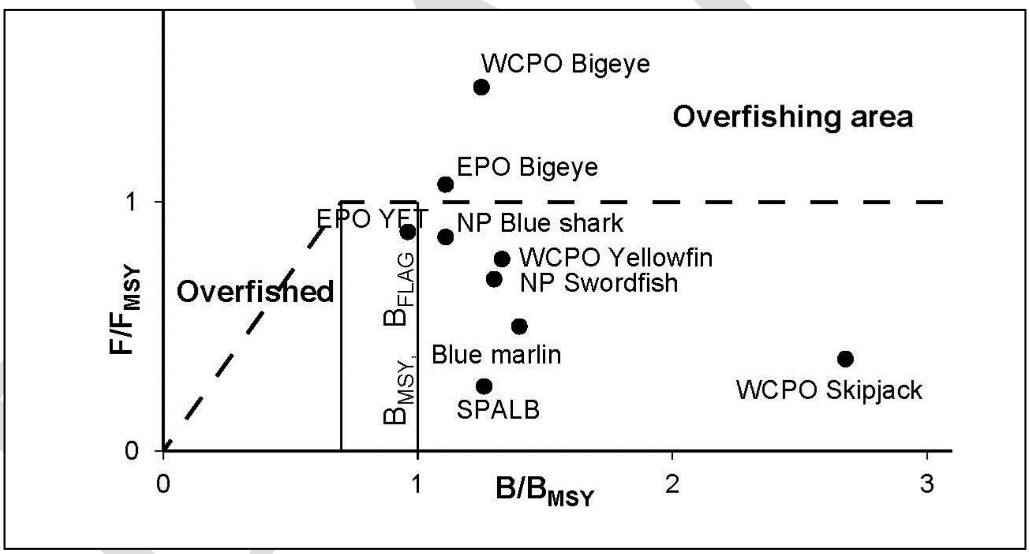


Figure 10. Specification of fishing mortality and biomass reference points in the WPRFMC Pelagics FMP and current stock status in the western-central (WCPO) and eastern Pacific Ocean (EPO). Source: WPRFMC (2013).

Table 2. Summary of the most recent stock assessments and status of PMUS in the WCPO and EPO
Source: WPRFMC unpublished information

Stock	Overfishing reference point	Is overfishing occurring?	Approaching Overfishing (2 yr)	Overfished reference point	Is the stock overfished?	Approaching Overfished (2 yr)	Assessment results	Natural mortality[1]	MSST
Skipjack Tuna (WCPO)	F/FMSY=0.62	No	No	SB_{2011}/SB_{MSY}=1.81, $SB_{2011}/SB_{F=0}$=0.48	No	No	Harley et al. 2014	>0.5 yr^{-1}	0.5 B_{MSY}
				B_{2011}/B_{MSY}=1.75					
Yellowfin Tuna (WCPO)	F/FMSY=0.72	No	No	SB_{2012}/SB_{MSY}=1.24, $SB_{2012}/SB_{F=0}$=0.42	No	No	Davies et al. 2014	0.8-1.6 yr^{-1}	0.5 B_{MSY}
				B_{2011}/B_{MSY}=1.25					
Albacore Tuna (S. Pacific)	F/FMSY=0.21	No	No	$SB_{2007-2010}/SB_{MSY}$=2.56, $SB_{2007-2010}/SB_{F=0}$=0.63	No	No	Hoyle et al. 2012	0.4 yr^{-1}	0.7 SB_{MSY}
Albacore Tuna (N. Pacific)	72% of F_{ATHL}	No	No		No	No	ISC 2011	0.4 yr^{-1}	0.6 B_{MSY}
Bigeye Tuna (WCPO)	F/FMSY=1.57	Yes	Not applicable	SB_{2012}/SB_{MSY}=0.77, $SB_{2012}/SB_{F=0}$=0.16	No	No	Rice et al. 2014	0.4 yr^{-1}	0.6 B_{MSY}
				B_{2011}/B_{MSY}=0.96					
Pacific Bluefin Tuna	F/FMSY=	Yes	Not applicable		Yes	Not applicable	ISC 2014	0.25-1.6 yr^{-1}	~0.72 B_{MSY}
Blue Marlin (Pacific)	F/FMSY=0.81	No	Unknown	SB/SB_{MSY}=1.28	No	Unknown	ISC 2013	0.22-0.42 yr^{-1}	~0.7 B_{MSY}
Swordfish (WC N. Pacific)	F/FMSY=0.58	No	Unknown	SB/SB_{MSY}=1.20	No	Unknown	ISC 2014	0.3 yr^{-1}	0.7 B_{MSY}
Striped Marlin WC (N. Pacific)	F/FMSY=1.37	Yes	Not applicable	SB/SB_{MSY}=0.35	Yes	Not applicable	ISC 2012	0.4 yr^{-1}	0.6 SB_{MSY}
Blue Shark (N. Pacific)[2]	F/FMSY=0.34	No	Unknown	SB_{2011}/SB_{MSY}=1.62	No	Unknown	Rice et al. 2014	0.2 yr^{-1}	0.8 B_{MSY}
Oceanic white-tip shark (WCPO)	F/FMSY=6.69	Yes	Not applicable	SB/SB_{MSY}=0.15	Yes	Not applicable	Rice and Harley 2012	0.18 yr^{-1}	0.82 B_{MSY}
Silky shark (WCPO)	F/FMSY=4.32	Yes	Not applicable	SB/SB_{MSY}=0.72	Yes	Not applicable	Rice and Harley 2013	0.18 yr^{-1}	0.82 B_{MSY}
Other Billfishes		Unknown		Unknown				Unknown	
Other Pelagic Sharks		Unknown		Unknown				Unknown	
Other PMUS		Unknown		Unknown				Unknown	

3.1.1.1.10.1 Optimum Yield

Optimum yield (OY) for PMUS is defined as the amount of each management unit species or species complex that can be harvested by domestic and foreign fishing vessels in the EEZ and adjacent waters to the extent regulated by the FEP without causing local overfishing or economic overfishing within the EEZ of each island area, and without causing or significantly contributing to growth overfishing or recruitment overfishing on a stock-wide basis.

This definition of OY makes clear that the Council is concerned with localized overfishing and economic overfishing. This is because there may be times when local fishermen are concerned about the availability of the MUS in their area even though that those species are not experiencing recruitment overfishing on an ocean-wide basis. The Council intends to manage Pacific pelagic MUS so that the economic viability of commercial fisheries, the social benefits associated with healthy recreational fisheries, and traditional fishing practices (e.g., for non-market personal consumption) are maintained. The FEP promotes, within the limits of managing at OY, domestic harvest of the management unit species in the EEZ and domestic fishery values for these species by enhancing the opportunities for satisfying recreational opportunities and profitable commercial fishing operations. Any expansion of existing fisheries, or the development of new fisheries, would be managed in this context.

The non-numeric definition of OY for the Pelagic FEP makes it difficult to quantify the domestic capacity to harvest OY or that portion of OY that can be made available for foreign fishing and to date no total allowable level of foreign fishing (TALFF) has been specified for this fishery. With the exception of the American Samoa longline fishery which freezes catches, harvests by pelagic fisheries of the Western Pacific Region supply fresh fish markets, with little to no processing beyond heading and gutting of swordfish, and gilling and gutting of tunas and mahimahi > 20 lb. in the Hawaii longline fishery. Thus, domestic processors appear fully capable of processing 100% of domestic pelagic fish harvests in the Hawaii segment of the Western Pacific Region.

3.1.1.1.10.2 Extent to Which Fishing Vessels will Harvest OY

The definition of OY ensures that fishing vessels will harvest it. The Hawaii longline fishery is a multispecies fishery ranging over a wide are of ocean, well beyond the confines of the EEZ. Catches of the commercially valuable species have tended to increase with increasing fishing effort. Bigeye catch has increased with increasing number of sets and hooks deployed by the deep set fishery, as have moonfish and pomfret. Other species such as wahoo and mahimahi have remained relatively static, and catches of kept sharks have declined markedly.

Skillman et al (1993) have suggested that pelagic catches in the EEZ around Hawaii would tend towards an asymptote with increasing fishing pressure, however the longline fishery now fishes predominantly on the high seas. Moreover, unlike at lower latitudes, where fishing pressure has caused significant depletion of bigeye (Harley et al 2014b), catches of bigeye at high latitudes do not appear to be depleting the stock.

3.1.1.1.10.3 Extent to Which U.S. Fish Processors will Process OY

Almost all of the catch landed by the Hawaii longline fleet is sold through the local auction (United Fishing Agency) or directly to local seafood processors. Most of the swordfish is exported to the US mainland, primarily to East Coast markets, while the tuna and other species remain in Hawaii to satisfy local demand. A few Hawaii permitted longline vessels are based out of West Coast ports and sell their fish to markets in California.

3.1.1.1.11 Annual Catch Limit

PMUS managed under the Pelagics FEP qualify for the 'international exception' under National Standard 1 of the MSA, as they are managed through conservation and management measures and resolutions from the WCPFC and IATTC respectively (more information provided in next section).

3.1.1.1.11.1 Limit

The PMUS caught by the Hawaii longline fleet are not subject to ACLs, as they qualify for international exception status under National Standard 1. This exception can be obtained for stocks or stock complexes subject to management under an international agreement, which is defined as any bilateral or multilateral treaty, convention, or agreement that relates to fishing and to which the United States is a party. Excepted stocks still must have status determination (SDC) and maximum sustainable yield (MSY) specified.

The Hawaii longline fleet is subject to WCPFC Conservation and Management Measures (CMMs) and Resolutions of the IATTC. The US engages in domestic rulemaking for the Hawaii longline fleet based on Commission measures.

The principal measures enacted by these two commissions that have the greatest impact on the Hawaii longline fleet are for bigeye tuna. In 2008, the Hawaii longline fleet was forced to reduce its catch to 90% of its 2004 level (4,181 mt) for the years 2009-2011 under WCPFC CMM 2008-

01. This catch limit was maintained until the passage of CMM 2013-01, which required additional cuts of 5% in 2015 (3,554 mt) and 2017 (3,345 mt). Currently, the IATTC Resolution C-13-01, which limits vessels (US) vessels > 24 m to a catch of 500 mt of bigeye tuna.

Under CMM 2008-01 and its successors, the three US territories have no limits on their bigeye catch. However, the Council and NMFS have capped the territories' bigeye limit at 2,000 mt per year and in 2015, as directed by Congress, allowed them transfer up to 1,000 mt of that bigeye limit to a US fishing entity, namely the Hawaii longline fishery. Prior to this arrangement, Congress, through a 2011 appropriations bill, provided the authority for NMFS to transfer catch to a US fishing entity.

3.1.1.1.11.2 Accountability Measures

If the Hawaii longline fishery nears its specified bigeye limit in the WCPO or EPO, NMFS prohibits the fishery from retaining bigeye for the remainder of the year. For the EPO, this prohibition only applies to vessels > 24 m.

3.1.1.1.12 Criteria for Determining Overfishing

Where stock assessments are conducted, *overfishing* is defined as Ft/Fmsy > 1.0 and *overfished* is defined as Bt/Bmsy < Bmsst. In the absence of stock assessments, other proxies are used – such as the annual variation in catch per unit of effort (CPUE), changes in size frequency and average size and spawning potential ratio.

3.1.1.1.13 MSA Conservation and Management Measures

The Council has been proactive in protecting pelagic marine ecosystems and managing US pelagic fisheries since 1987, with implementation of the Pelagics FMP, which among other things banned drift gillnets in the US EEZ of the Western Pacific.

In the 1990s, area closures were established by the Council in the Northwestern Hawaiian Islands to protect monk seals and turtles, and around the Main Hawaiian Island to prevent competition between small boats and longline vessels (Figure 11). In the same period, under the PFMP, logbooks, observers and VMS were required by the Council on the Hawaii longline fishery, and the Council also established a limited entry program for the Hawaii fishery with a cap of 164 permits.

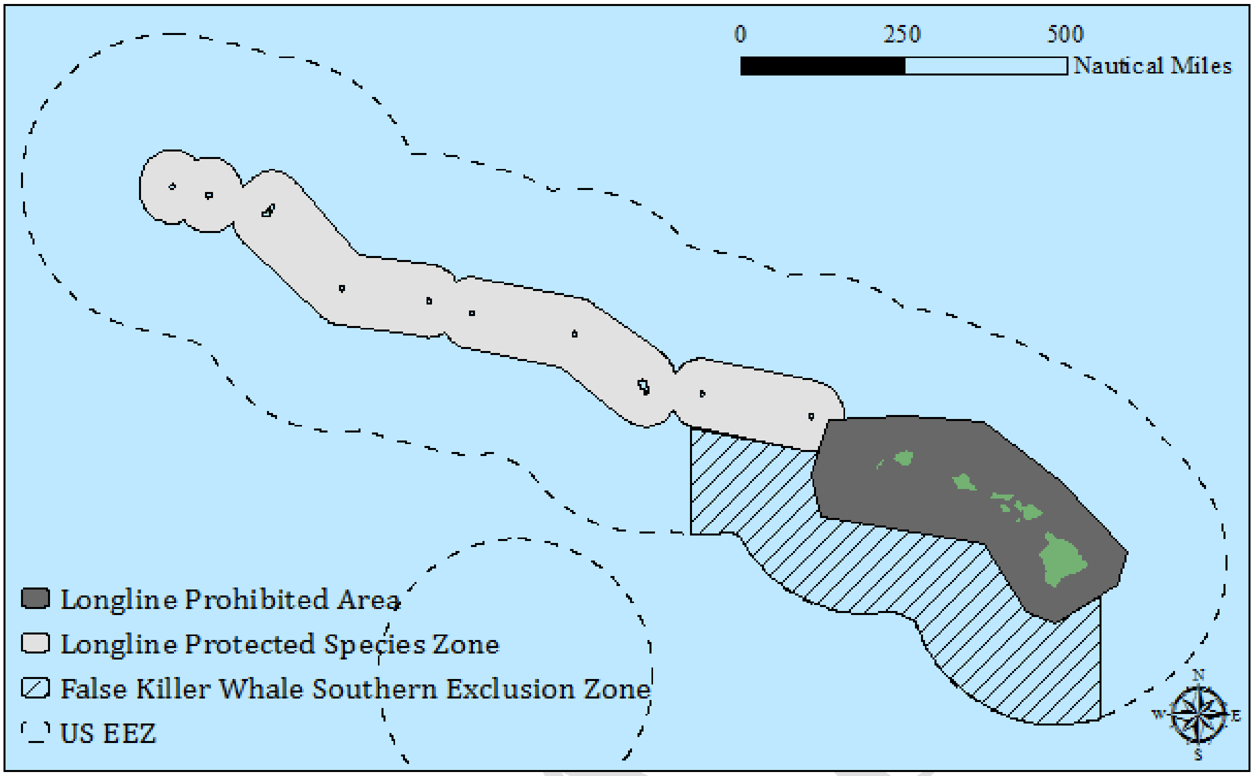


Figure 11. Map of the longline management zones around the Hawaiian Archipelago

Currently, observer coverage is 20% for the deep set bigeye targeting sector of the fishery and 100% on the shallow-set swordfish targeting vessels.

In the late 1990s and early 2000s, the longline fishery was required by the Council to adopt fishing gear and operational changes which resulted in a 90-95% decline of seabird and sea turtle interactions. The seabird and turtle mitigation measures were developed and tested in large part by the fishing industry, while the industry, Council and e-NGOs developed the turtle management regime.

The Hawaii longline fishery continues to operate under hard caps for loggerhead and leatherback sea turtle interactions which close the fishery for the reminder of the year. Currently, the caps are 34 loggerheads and 26 leatherbacks, which were established from the incidental take statement of a 2012 biological opinion issued by NMFS (NMFS 2012). The fishery also operates under a take reduction plan (TRP) for false killer whales (NMFS 2010) which was implemented in 2012 and 2013 (FR Vol. 77 No. 230, November 2012, 71260-71286. Among the measures in the TRP is the closure of the US EEZ to the south of the Main Hawaiian Islands which is triggered after two observed false killer whale takes in the EEZ, evaluated to cause a mortality or serious injury (Figure 10).

Longline owners and skippers are required to be annually certified in the safe handling and release of incidentally caught seabirds and turtles, and longline vessels are mandated to carry specific equipment to facilitate bird, turtle and cetacean release.

3.1.1.1.14 Regulations implementing International Recommendations and other Applicable Laws

As described previously, the Hawaii longline fleet is subject to WCPFC CMMs and Resolutions of the IATTC. The US engages in domestic rulemaking for the Hawaii longline fleet based on these measures.

The principal measures enacted by these two commissions that have the greatest impact on the Hawaii longline fleet are for bigeye tuna. In 2008, the Hawaii longline fleet was forced to reduce its catch to 90% of its 2004 level (4,181 mt) for the years 2009-2011 under WCPFC CMM 2008-01. This catch limit was maintained until the passage of CMM 2013-01, which required additional cuts of 5% in 2015 (3,554 mt) and 2017 (3,345 mt). Currently, the IATTC Resolution C-13-01, which limits vessels (US) vessels > 24 m to a catch of 500 mt of bigeye tuna.

CMM 2011-04 and CMM 2013-08 prohibit the retention of oceanic white tips and silky sharks respectively, by pelagic fishing vessels operating in the WCPO. The IATTC's Resolution C-11-10 prohibits longline retention of silky sharks in the EPO.

The False Killer Whale Take Reduction Plan (NMFS 2010) requires Hawaii longline fishery to fish with 'weak hooks,' to no longer fish within the winter reduction of the MHI area closure, and established a southern MHI closure zone in the event of two mortality and serious injury hookings of false killer whales per year.

3.1.1.1.15 Bycatch Amount and Type

Bycatch is monitored by the Hawaii longline logbooks and by the observer program on the Hawaii longline vessels. The logbook record of discards is concerned primarily with the commercially important species, although it does document shark species which have little commercial value in Hawaii. Observers record each species caught by the longliners and this is expanded through a series of algorithms to the total fleet wide bycatch. More information is provided about bycatch reporting in section 3.2.4.

For current information regarding Hawaii longline bycatch refer to the most current WPFMC Pelagic Annual Fishery Ecosystem Report (SAFE Report) and the National Bycatch Report from NMFS.

3.1.1.2 American Samoa Longline Fishery

Longlining was introduced to American Samoa in 1995 by fishermen from Western or Independent Samoa (Samoa). Initially, *alia* catamarans – Samoan-built, twin aluminum-hulled boats with fiberglass or wood superstructures generally 24 to 38 ft. in length and powered by small (40 hp) gasoline outboard engines (Kaneko and Bartram, 2004) – were the vessels most frequently used for longline fishing. This vessel type was dominant during the 1980s and 1990s in American Samoa. Navigation on these vessels was visual, using landmarks. The gear was stored on deck on a hand-crank reel which held between 2-10 miles of monofilament mainline.

Gear for longlining on alias was set by spooling the mainline off the reel and retrieved by hand-pulling the line back to the boat. The reel was used to take up and store the mainline as it was pulled. Trips were one day long (about 8 hours). Setting the equipment generally began in the early morning and hauling was generally in the midday to mid-afternoon. The catch was stored in boxes built into the hull of the boat or in portable coolers or freezer chests.

The predominant catch in the fishery is South Pacific albacore, which is sold to the tuna canneries in Pago Pago. By 1997, 33 alia vessels received general longline permits from NMFS to fish in federal waters around American Samoa, although only 21 were actively fishing at that time. The number of small longline vessels participating in longline fishing in American Samoa has dropped substantially and since 2008: only one alia vessel has been actively longline fishing in recent years and NMFS cannot report its landings due to data confidentiality rules.

In 2000, the fishery began to expand rapidly with the influx of large (≥50 ft) conventional monohull vessels similar to the type used in the Hawaii-based longline fishery, including some vessels from Hawaii. These vessels are larger, have a greater range, and are able to set 30-40 nautical miles of mainline and more hooks per trip than the average alia vessel. The number of permitted and active longline vessels in this sector increased from three in 1997 to 31 in 2003. Of these 31 vessels, 10 permits were believed to be held by indigenous American Samoans as of March 21, 2002 (P. Bartram, Akala Products, Inc., pers. comm. to Council Staff, March 2002). Economic barriers, such as the capital needed to purchase, operate and maintain a large fishing vessel, may have prevented more substantial indigenous participation in the large-scale sector of the longline fishery. Over time, most of the small longline vessels became inactive and in 2013, there was one small (Class A) vessel, and 23 active Class C and D (large) vessels in the fishery (Figure 20).

3.1.1.2.1 Type and Quantity of Fishing Gear

Longline gear is comprised of monofilament longline mainline stored on a drum. As mentioned, alia vessels use manually-powered mainline drums that hold between 2-10 miles of monofilament line. These smaller longline vessels make single day trips with a crew of three. A single set of around 300 – 350 hooks per set is made on a trip and catch is kept on ice – in boxes built into the hull of the boat or in portable coolers or freezer chests.

Longline vessels longer than 50 feet are typically steel-hulled vessels of around 60–80 ft. long with hydraulically-driven mainline reels holding 30–50 nautical miles of monofilament. They set about 3,000 hooks per day and have crews of 5–6 people. They are also likely to be well equipped with marine electronics and have refrigeration systems to freeze catch onboard for extended trips of up to 60 days. Therefore, the larger vessels can range to the outer portions of the EEZ and, in the past, some have negotiated fishing access with neighboring states. The large monohull vessels are, in some cases, the same vessels that have engaged in the Hawaii longline fisheries. All are presently being operated to freeze albacore onboard, rather than to land chilled fish.

Based on logbook data from 2004-2014 , the annual number of hooks per set used by the longline fleet steadily increased from 12 million hooks to 18 million hooks in 2007, after which it has declined steadily to 7.7 million hooks in 2014 (Figure 12).

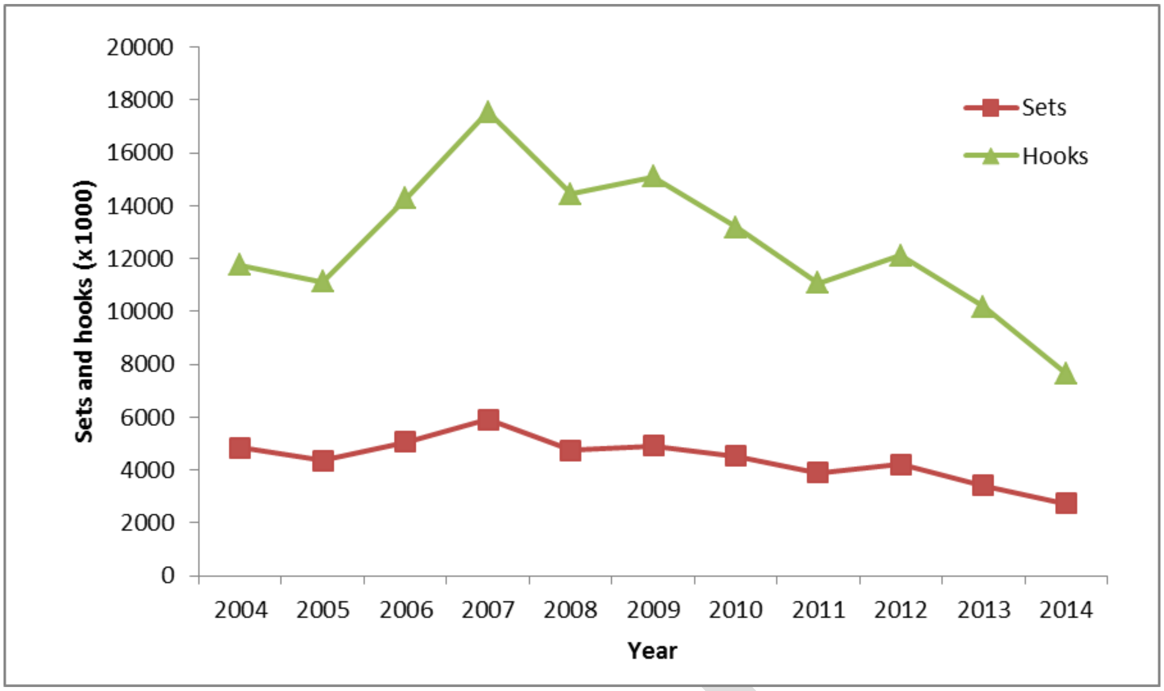


Figure 12. The annual number of sets and hooks made by the American Samoa longline fishery, 2004-2014.
Source: WPRFMC 2015 and unpublished PIFSC data.

Fishing power is clearly distinct between the different size classes of vessel, and separate catch statistics are compiled by the American Samoa Department of Marine and Wildlife Resources.

Fishing effort has occurred predominantly in EEZ waters surrounding American Samoa (excluding any relevant prohibited areas) but also in some limited effort in foreign EEZ waters surrounding American Samoa where vessels have fishing access agreements, including the Cook Islands, Samoa, Tokelau, and others, as well as high seas areas giving an operational area roughly 155° W to 180°, and from 3° to 32° S from 2000 through 2009 (NMFS 2010a). Fishing effort in these countries has ranged from a couple thousand hooks per year to over 2.7 million hooks set in the Cook Islands in 2006.

The number of hooks set by the American Samoa-based longline fleet has varied over time, and in recent years, shows a general decline. Data for 2013 indicates 10.1 million hooks were set by the American Samoa longline fishery, down from 15 million hooks set in 2009, and 38 percent less than a high of 17.5 million set in 2007 (WPRFMC 2015). Table 3 shows landing and effort statistics for the longline fishery.

Table 3. American Samoa Longline Fishery Landings and Other Statistics, 2003-2013.

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Active Vessels	49	41	36	30	29	28	26	26	24	22	22
Hooks Set (millions)	14.2	11.7	11.1	14.3	17.5	14.4	15.0	13.2	10.8	11.7	10.1
Trips	650/ 282*	430/193*	223/179*	331	377	287	177	264	274	275	96
Sets Made	6,220	4,850	4,359	5,069	5,919	4,754	4,910	4,534	3,776	4,068	3393
Total Pelagics Landings (mt)	5,173	4,079	3,999	5,401	6,586	4,347	4,787	4,673	3,250	4,022	2.717
Albacore Tuna Landings (mt)	3,931	2,488	2,919	4,104	5,329	3,456	3,910	3,938	2,292	3,092	2,051
Yellowfin Tuna (mt)	517	890	516	493	620	336	155	445	536	385	414
Bigeye Tuna (mt)	253	226	132	199	199	124	146	178	170	167	85
Skipjack Tuna (mt)	120	235	141	213	165	163	156	111	109	250	64
Wahoo (mt)	195	215	221	287	198	136	139	131	125	83	88
Total Ex-vessel Value (adjusted) ($ millions)	$10.7	$9.1	$8.0	$11.5	$13.7	$9.4	$10.4	$ 10.4	$7.2	$7.2	$6.5

Source: WPRFMC (2015).

*The first number is trips by alia and the second is by larger monohull vessels. From 2006, three or fewer alia vessels were active and those data are confidential.

Note: all other species (e.g. mahimahi, swordfish, etc.) landed are less than 1 percent of total landings.

3.1.1.2.2 Catch in Numbers or Weight

About 5.9 million lb. (94%) of total landings in 2013 was comprised of tuna species, while the non-tuna landings were roughly 353,000 lbs. Albacore dominated tuna species landings at 78% and comprised 74% of all pelagic species landings (Figure 13); while yellowfin (15%), bigeye (3%), skipjack (2%), and unknown tunas make up the rest of the tuna landings. Wahoo species dominated the “Non-Tuna and Others” total landings; they make up 55 % of non-tuna landings and 3 % of all pelagic landings (WPRFMC 2015). Class D (>70 feet) longline vessels make the majority of the American Samoa total pelagic landings and commercial landings. For current information regarding the American Samoa longline fishery, refer to the most current WPFMC Annual Pelagic Fishery Ecosystem Report (SAFE Report).

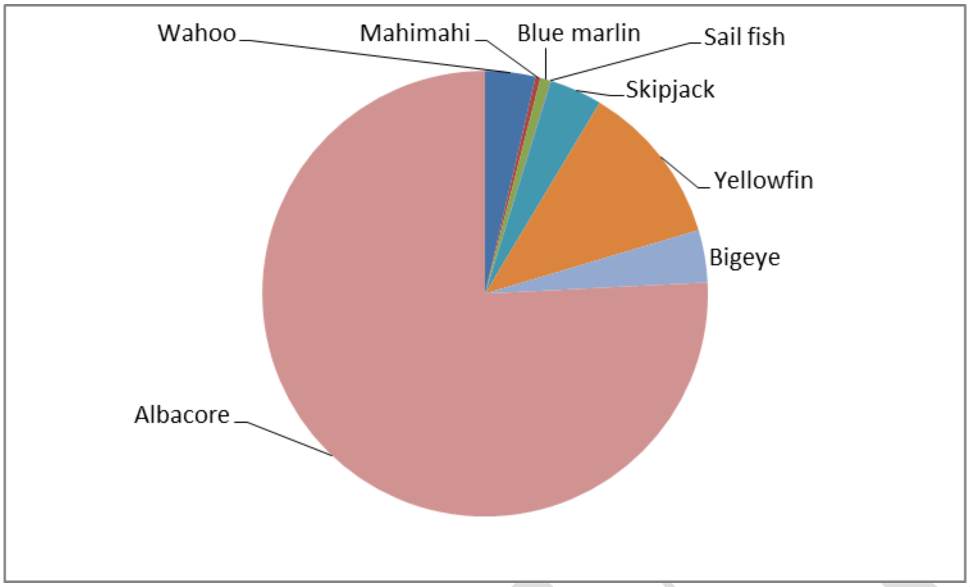


Figure 13. Catch composition of the American Samoa longline fishery, 2004-2014.
Source: WPRFMC (2015) and unpublished PIFSC data.

3.1.1.2.3 Fishing Areas

American Samoa longline vessels fish predominantly in the US EEZ around American Samoa (Figure 14) but can fish farther afield through fishery access agreements with neighboring countries or on the high seas.

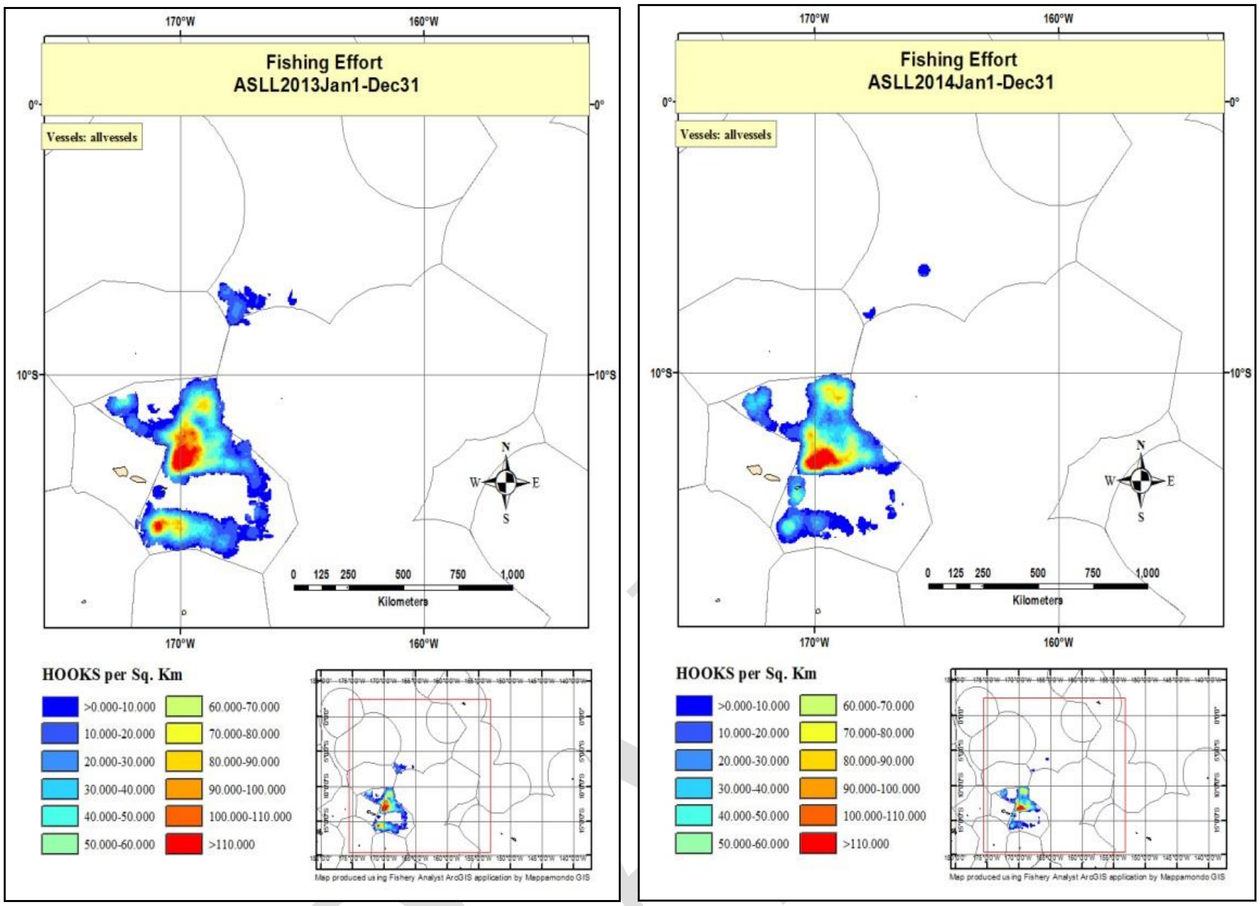


Figure 14. Distribution of fishing effort for the American Samoa longline fishery in 2012 and 2013.

3.1.1.2.4 Time of Fishing

The American Samoa longline fishery, in common with the Hawaii deep set longline fishery, is a daytime fishery, setting at dawn and retrieving the line usually in the late afternoon.

3.1.1.2.5 Number of Sets

The number of sets in the American Samoa longline fishery between 2004 and 2014 ranged from 2,745 sets (2014) to 5,920 sets (2007), with a mean of 4,426 sets.

3.1.1.2.6 Economics

Revenue data for American Samoa's pelagic fisheries is not broken out by fishery. However, the vast majority of pelagic catch that is landed is via the longline fishery. Between 2002-2012, the average adjusted direct revenue from American Samoa pelagic catch was $13,719,139, of which 96% was tuna and 4% was non-tuna. During this period, the high year was 2002 ($22,186,361) and the low year was 2012 ($9,709,160).

3.1.1.2.7 Estimated and Actual Processing Capacity Utilized by U.S. Processors

Most of the catch of the American Samoa longline fishery is sold to the canneries in Pago Pago.

There is no other major fish processing facility in the territory. Any residual catch from the longline fishery is sold locally.

3.1.1.2.8 Present and Probable Future Condition of the Fishery

The American Samoa longline fishery has experienced a strong economic downturn in recent years leading to a contraction of the fleet from 66 vessels in 2001 to 21 vessels in 2014. Most of the vessels that left the fishery were the small scale alia catamarans of which only one vessel continues to fish. The future condition of the fishery is highly dependent on the fishing conditions for albacore in the US EEZ around American Samoa, and the continued operations of the Pago Pago-based canneries.

3.1.1.2.9 Maximum Sustainable Yield

For the most recent MSY for the fishery, refer to the current Pelagic Annual Fishery Ecosystem Report (SAFE Report).

3.1.1.2.10 Optimum Yield

Optimum yield (OY) for PMUS is defined as the amount of each management unit species or species complex that can be harvested by domestic and foreign fishing vessels in the EEZ and adjacent waters to the extent regulated by the FEP without causing local overfishing or economic overfishing within the EEZ of each island area, and without causing or significantly contributing to growth overfishing or recruitment overfishing on a stock-wide basis.

This definition of OY makes clear that the Council is concerned with localized overfishing and economic overfishing. This is because there may be times when local fishermen are concerned about the availability of the MUS in their area even though that/those species are not experiencing recruitment overfishing on an ocean-wide basis. The Council intends to manage Pacific pelagic MUS so that the economic viability of commercial fisheries, the social benefits associated with healthy recreational fisheries, and traditional fishing practices (e.g., for non-market personal consumption) are maintained. The FEP promotes, within the limits of managing at OY, domestic harvest of the management unit species in the EEZ and domestic fishery values for these species by enhancing the opportunities for satisfying recreational opportunities and profitable commercial fishing operations. Any expansion of existing fisheries, or the development of new fisheries, would be managed in this context.

The non-numeric definition of OY for the Pelagics FEP makes it difficult to quantify the domestic capacity to harvest OY or that portion of OY that can be made available for foreign fishing and to date no total allowable level of foreign fishing (TALFF) has been specified for this fishery.

The majority of harvests by the American Samoa longline fishery are sold to the two American tuna canneries located on Tutuila. The remaining portion of this fishery's harvests is sold in American Samoa as fresh fish. Thus domestic processors appear fully capable of processing 100 percent of domestic pelagic fish harvests in the American Samoa segment of the Western Pacific Region.

3.1.1.2.10.1 Extent to Which Fishing Vessels will Harvest OY

Since OY for PMUS is defined as the amount of each management unit species or species complex that can be harvested by domestic and foreign fishing vessels in the EEZ and adjacent waters, fishing vessels will harvest 100% of OY as currently defined.

3.1.1.2.10.2 Extent to U.S. Fish Processors will Process OY

All of the albacore and some of the other catches by the American Samoa longline fishery, such as yellowfin, skipjack and wahoo, are sold to the canneries in American Samoa. The volume of fish caught by the American Samoa longline fisheries is insufficient to satisfy the total demand for fish from the canneries, thus the canneries have the capacity to process the entire OY from the American Samoa longline fishery.

3.1.1.2.11 Regulations Implementing International Recommendations and other Applicable Laws

Various conservation and management measures (CMMs) of the WCPFC apply to American Samoa, primarily those concerned with monitoring, control and surveillance (MCS), including VMS, observers, vessel marking, vessel permitting and boarding and inspection. CMMs that are concerned with conservation include those for non-retention of oceanic white-tip and silky sharks, and requirements for seabird interaction mitigation south of 30 degrees south.

3.1.1.2.12 Bycatch Amount and Type

Bycatch is monitored by federal logbooks and by the Observer Program on the American Samoa vessels. The logbook record of discards is concerned primarily with the commercially important species, although it does document shark species which have little commercial value in American Samoa. Observers record each species caught by the longliners and this is expanded through a series of algorithms to the total fleet wide bycatch. (See the National Bycatch Report produced by NMFS). For recent bycatch figures, refer to the most current WPFMC Annual Pelagic Fishery Ecosystem Report (SAFE Report).

3.1.1.2.13 Criteria for Determining Overfishing

Where stock assessments are conducted, overfishing is defined as Ft/Fmsy > 1.0, overfished is defined as Bt/Bmsy < Bmsst. In the absence of stock assessments other proxies are used such as the annual variation in catch per unit of effort (CPUE), changes in size frequency and average size and spawning potential ratio.

3.1.1.2.14 MSA Conservation and Management Measures

Framework Measure 1 became effective March 1, 2002 (67 FR 4369) and prohibited fishing for pelagic species by vessels greater than 50 ft in length overall within EEZ waters 0-50 nm around the islands of American Samoa. An exception was made for vessels that landed PMUS in American Samoa under a Federal longline general permit prior to November 13, 1997. This measure was intended to prevent localized depletion of nearshore stocks by large fishing vessels, as well as to prevent gear interactions between large and small fishing vessels in nearshore waters. The area closure came to be designated as the Large Vessel Prohibited Area or LVPA.

Amendment 11 became effective August 1, 2005 and established a limited access system for pelagic longlining in EEZ waters around American Samoa. Initial entry criteria were based on historical participation in the fishery and limited vessel upgrades were allowed. Longline vessel operators were required to obtain federal permits, to complete federal logbooks, to carry and use vessel monitoring systems installed, owned and operated by NFMS on vessels greater than 40 ft in length, to carry federal observers if requested by NMFS, and to follow sea turtle handling and resuscitation requirements (70 FR 29646). The objectives of this amendment were to stabilize the fishery and to allow the opportunity for substantial fishery participation by residents of American Samoa.

In 2011, the Pelagic FEP was amended to require specific gear configuration for pelagic longline fishing in the South Pacific (WPRFMC 2011). The requirements apply to U.S. vessels longer than 40 ft (12.2 m) while fishing south of the equator, and include minimum float line and branch line lengths, number of hooks between floats, and distance between floats and adjacent hooks. The action is intended to ensure that longline hooks fish deeper than 100 meters (m) to reduce interactions with Pacific green sea turtles. The rule also limits the number of swordfish taken and makes administrative clarifications to the names of several tunas and marlins.

In 2009, Presidential Proclamation 8337 created the Rose Atoll Marine National Monument (74 FR 1577, January 12, 2009). The monument includes Rose Atoll and surrounding waters to a distance approximately 50 nm around the atoll. The Proclamation prohibits commercial fishing in monument waters. The monument and the LVPA around Tutuila, the Manua Islands, and Rose Atoll overlap, but the boundaries did not align. The FEP was amended to align the boundaries (Figure 15).

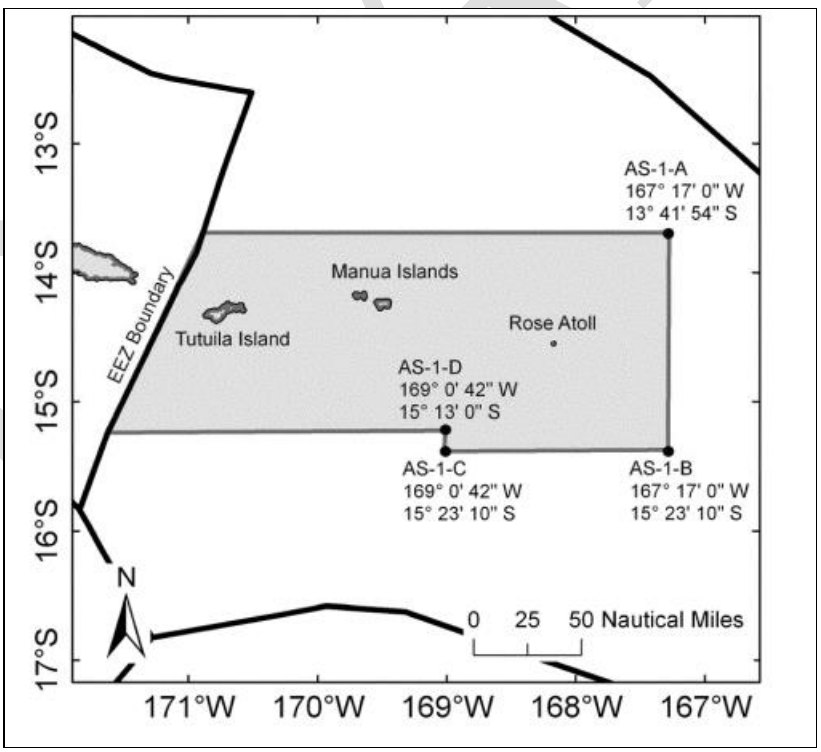


Figure 15. Revised boundaries of the Large Vessel Prohibited Area for pelagic fishing vessels > 50 ft around Tutuila, Manua Islands and Rose Atoll

3.1.1.3 Hawaii Troll Fishery

3.1.1.3.1 Description

Troll fishing, in which lures are towed behind a vessel, is practiced by commercial, charter and recreational fishermen in Hawaii. Lures may be artificial, dead, or live fish. Lures are generally towed near the surface, but weights and para-vanes can be used to catch fish below surface depths.

Trolling is the most popular pelagic fishing method in Hawaii. Thousands of boaters participate in this fishery, including full and part-time commercial fishermen, charter boats, and recreational fishermen. The troll fishery targets blue marlin, striped marlin, yellowfin tuna, mahimahi, ono and skipjack tuna and also lands incidental species such as spearfish, kawakawa and rainbow runner.

Up to six lines rigged with lures may be trolled when outrigger poles are used to keep the lines from tangling. Trolling gear usually consists of short, stout fiberglass rods and lever-drag hand-cranked reels. Trollers frequent anchored fish aggregation devices (FADs), drifting logs or flotsam, and areas where the bottom drops off sharply that may aggregate fish. One popular guide to fishing in Hawaii list almost 100 different trolling techniques for pelagic species and reef fish such as jacks (Reference Fishing Hawaii Style)

Commercial troll fishermen may use the 'green stick' method of fishing, named after the green fiberglass mast that serves as a strong vertical outrigger. The mast is the towing post for a specially designed device known as a 'bird' because of its wings. An array of plastic squid lures are attached to the towing line at carefully measured intervals, so that they skip across the surface of the water and tease yellowfin to the surface. It is thought that the passage of the bird behind the lures attracts tuna through curiosity, and the tuna try to outrace the bird in order to compete for the food it appears to be chasing.

3.1.1.3.2 Type and Quantity of Fishing Gear

Between 1,100 and 1,200 fishermen use trolling as their principal method of fishing. As noted above troll fishing methods are diverse and may employ troll lines singly or use multiple line deployments. About 13,000 small vessels are registered as pleasure craft, which may be used as fishing platforms. Recreational fishermen in Hawaii make on average about 297,000 trips per year.

3.1.1.3.3 Catch in Numbers or Weight

The Hawaii troll fishery catch is remarkably stable, averaging about 3 million pounds annually. Revenues are more variable, ranging from about $6 million pounds to $9 million with an average of about $7 million. Commercial troll catches are dominated by yellowfin and mahi mahi, followed by wahoo, skipjack and blue marlin (Table 11). For current information regarding the Hawaii troll fishery catch, refer to the most current WPFMC Pelagic Annual Fishery Ecosystem Report (SAFE Report).

3.1.1.3.4 Fishing Areas

The troll and handline vessels in Hawaii fish predominantly around the eight Main Hawaiian

Islands, often no more than 20 miles from shore (Figure 16). The offshore catches shown in Figure 17 are made by the specialized mixed gear fishery that operates on the Cross Seamount and NOAA weather-buoys.

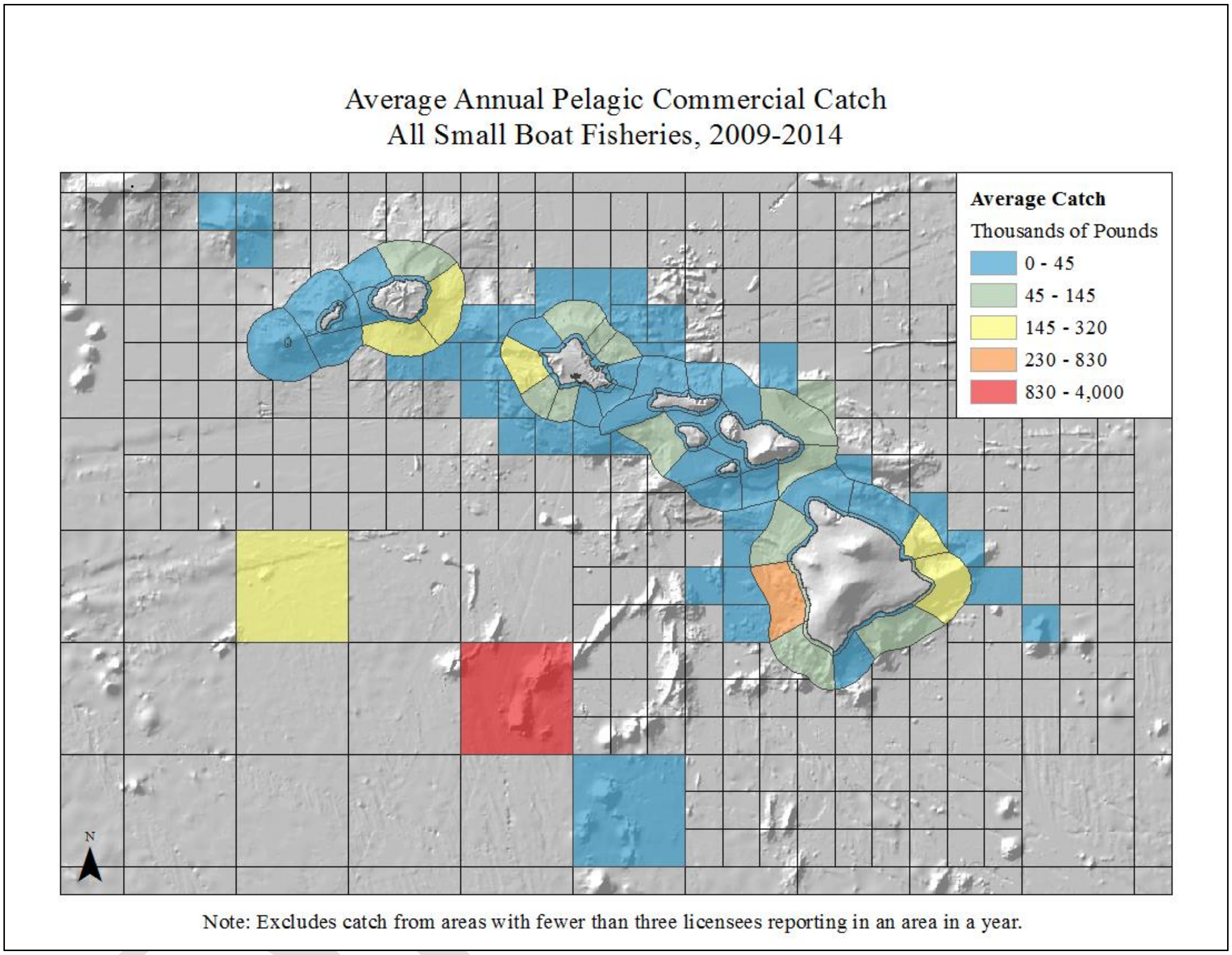


Figure 16. Spatial distribution of small boat catches (troll and handline vessels) in the Main Hawaiian Islands.
Source: HDAR Commercial Marine License Data

3.1.1.3.5 Time of Fishing

Almost all trolling activity is conducted during daylight hours

3.1.1.3.6 Number of Fishing Days

Troll fishing effort in Hawaii is measured in fishermen-days. Fishermen days ranged between 2004 and 2014 from 26,500 to 30,000 fishermen-days, with an average of 29,000 fishermen days.

3.1.1.3.7 Economics

The direct revenue from the Hawaii troll fishery averaged $6,542,000 between 2002-2013, with a high of $8,907,000 (2004) and a low of $5,456,000 (2009) (WPRFMC 2015). Yellowfin is the one of the more valuable component of the catch ranging from $1,728,869 to $3,231,460, with an average of $2,567,830. For current information regarding revenue of the fishery, price per pound, total direct employment, and fisheries-dependent services or industries, refer to the most current WPFMC Pelagic Annual Fishery Ecosystem Report (SAFE Report).

3.1.1.3.8 Estimated and Actual Processing Capacity Utilized by U.S. Processors

All troll catches are landed locally and processed by Hawaii seafood processors.

3.1.1.3.9 Present and Probably Future Condition of the Fishery

Over time the number of trollers fishing commercially in Hawaii has declined from around 1,500 in the late 1990s to about 1,100 in 2014. The fishery has been stable for the past several years amd it is unlikely that there will be a major expansion or contraction of the troll fishery in the future.

3.1.1.3.9.1 Maximum Sustainable Yield

Stock assessments have been conducted for a number of major pelagic species in the Pacific (Table 2). Figure 3 shows the status of these stocks relative to MSY, based on the latest stock assessments.

3.1.1.3.9.2 Optimum Yield

Optimum yield (OY) for PMUS is defined as the amount of each management unit species or species complex that can be harvested by domestic and foreign fishing vessels in the EEZ and adjacent waters to the extent regulated by the FEP without causing local overfishing or economic overfishing within the EEZ of each island area, and without causing or significantly contributing to growth overfishing or recruitment overfishing on a stock-wide basis.

This definition of OY makes clear that the Council is concerned with localized overfishing and economic overfishing. This is because there may be times when local fishermen are concerned about the availability of the MUS in their area even though that/those species are not experiencing recruitment overfishing on an ocean-wide basis. The Council intends to manage Pacific pelagic MUS so that the economic viability of commercial fisheries, the social benefits associated with healthy recreational fisheries, and traditional fishing practices (e.g., for non-market personal consumption) are maintained. The FEP promotes, within the limits of managing at OY, domestic harvest of the management unit species in the EEZ and domestic fishery values for these species by enhancing the opportunities for satisfying recreational opportunities and profitable commercial fishing operations. Any expansion of existing fisheries, or the development of new fisheries, would be managed in this context.

The non-numeric definition of OY for the Pelagics FEP makes it difficult to quantify the domestic capacity to harvest OY or that portion of OY that can be made available for foreign fishing and to date no total allowable level of foreign fishing (TALFF) has been specified for this fishery. With the exception of the American Samoa longline fishery which freezes catches, harvests by pelagic fisheries of the Western Pacific Region supply fresh fish markets, with little to no processing beyond heading and gutting of swordfish, and gilling and gutting of tunas and mahimahi > 20 lb.

3.1.1.3.9.3 Extent to Which Fishing Vessels will Harvest OY

Since OY for PMUS is defined as the amount of each management unit species or species complex that can be harvested by domestic and foreign fishing vessels in the EEZ and adjacent waters, fishing vessels will harvest 100% of OY as currently defined.

3.1.1.3.9.4 Extent to Which U.S. Fish Processors will Process OY

Almost all pelagic species caught by pelagic fishing vessels, including trollers, is processed in Hawaii. Therefore, that fraction of the OY caught by troll vessels will be processed by US fish processors.

3.1.1.3.10 Criteria for Determining Overfishing

Where stock assessments are conducted, overfishing is defined as Ft/Fmsy > 1.0, *overfished* is defined as Bt/Bmsy < Bmsst. In the absence of stock assessments other proxies are used such as the annual variation in catch per unit of effort (CPUE), changes in size frequency and average size and spawning potential ratio.

3.1.1.3.11 MSA Conservation and Management Measures

The Council has monitored this fishery for decades but has mostly chosen not to develop regulations, as small boat fishermen are regulated by the State of Hawaii, which requires all fishermen wishing to sell any portion of their catch to obtain a Commercial Marine License, with the obligation that all catches are reported each month to the Division of Aquatic Resources.

A control date of July 2, 2005 was established for all non-longline pelagic fisheries which states that participants in these pelagic fisheries, including troll fishing, are not guaranteed future participation in the fishery if the Council recommends, and NMFS approves, limiting entry or effort (FR vol. 70, No. 156, August 15, 2005, 47781-47782).

All non-longline pelagic fishermen must also abide by the sea turtle handling requirements for hooked or entangled turtles found at 50 CFR 665.812 (FR vol. 70, No. 219, August 15, 2005, 69282-69285). These requirements are as follows:

- Sea turtles that cannot be brought aboard.
    - Disentangle and remove the gear, or cut the line as close as possible to the hook or entanglement
- Sea turtles that can be brought aboard.
    - Disentangle and remove the gear, or cut the line as close as possible to the hook or entanglement, to remove the maximum amount of the gear from the sea turtle.
- Sea turtle resuscitation (if animal appears dead or comatose)
    - Place the sea turtle on its belly so that the sea turtle is right side up and its hindquarters elevated at least 6 inches for a period of no less than 4 hours and no more than 24 hours. Greater elevations are needed for larger sea turtles.
    - Administer a reflex test at least once every 3 hours. The test is to be performed by gently touching the eye and pinching the tail of a sea turtle to determine if the sea turtle is responsive
    - Keep the sea turtle shaded and damp or moist (but under no circumstances place the sea turtle into a container holding water). A water-soaked towel placed over

the eyes, carapace and flippers is the most effective method of keeping a sea turtle moist; and

- Return to the sea any sea turtle that revives and becomes active.
- Sea turtles that fail to revive within the 24-hour period must also be returned to the sea, unless NMFS requests the retention of a dead sea turtle for research. In releasing a sea turtle the vessel owner or operator must:
  - Place the vessel engine in neutral gear so that the propeller is disengaged and the vessel is stopped, and release the sea turtle away from deployed gear and observe that the turtle is safely away from the vessel before engaging the propeller and continuing operations.

Finally, a control date of March 16, 2007 was established for Hawaii charter troll fishery which states that participants in this fishery are not guaranteed future participation in the fishery if the Council recommends, and NMFS approves limiting entry or effort (FR vol 72, No. 91, May 11, 2007, 26771).

3.1.1.3.12 Regulations implementing International Recommendations and other Applicable Laws

WCPFC CMM 2010-01 requires that all pelagic fisheries maintain commercial catches of striped marlin below 458 mt. This includes the Hawaii troll fishery.

3.1.1.3.13 Bycatch Amount and Type

Historically, most fish that is landed by fishermen is kept regardless of size and species. Bycatch for the Hawaii troll fishery comprises sharks, shark-bitten pelagics, small pelagics, or other pelagic species.

3.1.1.4 Charter Vessel Sport Fishery

In some ways, the Charter Vessel Sport Fishery can be considered a subset of the Troll Fishery. Tables 4-8 present summaries of the charter vessel sportsfishing in the Western Pacific. Charter fishing in Hawaii is more focused on catching blue marlin, which in 2004 formed about 50% of the total annual charter vessel catch by weight, but in 2013 only formed about a fifth of the charter vessel catch and was superseded by yellowfin and mahimahi. Although commercial troll vessels take blue marlin, this species only forms about a seven percent of their catch, with the majority of the target species being yellowfin, mahimahi, and wahoo (). Unlike other parts of the US, there is little recreational fishery interest in catching sharks in Hawaii.

Guam has a charter fishing sector, which unlike Hawaii caters for both pelagic and bottomfish fishing. Until recently the troll charter fishery was expanding, but, over the past few years the number of vessels involved, and level of fishing, has decreased in response to lower tourist volume from Japan due to the ongoing economic recession. Compromising about 5% of Guam's commercial troll fleet, the Guam troll charter industry accounts for 6.2% of the troll catch and 47% and 19% of the Guam blue marlin and mahimahi catch respectively.

Charter fishing in NMI is limited, with about ten boats operating on Saipan, and a few vessels on Tinian conducting occasional fishing charters. No data was collected on charter vessel fishing in the NMI during 2013. Tourism is not a significant component of the American Samoa economy, and hence there is little charter fishing activity. As noted previously, there are few vessels suitable for charter-type operations (Tulafono 2001).

Table 4. Estimated catches by pelagic charter fishing vessels in Guam and Hawaii in 2013
Source: WPRFMC (2015)

Location	Catch (lb)	Effort (trips)	CPUE (lb/trip	Principal species
Guam	49,106	920	53.4	Mahimahi, Blue marlin, Skipjack
Hawaii	474,542	5,328	89.1	Yellowfin, Mahimahi, Blue marlin

Charter vessel fishing in the Western Pacific Region has elements of both recreational and commercial fishing. The primary motivation for charter patrons is recreational fishing, with the possibility of catching large game fish such as blue marlin. The charter vessel skipper and crew receive compensation in the form of the patron's fee, but are also able to dispose of fish on local markets, as is the case in Hawaii. The catch composition of charter vessel catch versus conventional commercial trolling in Hawaii reflects the different targeting in the two fisheries. Blue marlins are among the dominant feature of charter vessels in Hawaii (), along with yellowfin and mahimahi. In Guam blue marlin are also dominant in charter catches, though the single largest catch is mahimahi ().

Table 5. Comparison of species composition of landings made by Hawaii pelagic charter vessels versus commercial troll vessels, 2013.
Source: WPRFMC (2015).

	Charter		Commercial troll	
Species	**Landings (lb)**	**Percent**	**Landings (lb)**	**Percent**
Yellowfin tuna	159,540	33.68%	872,534	36.85%
Mahimahi	114,987	24.27%	446,167	18.85%
Blue marlin	97,953	20.68%	175,246	7.40%
Ono	38,322	8.09%	348,274	14.71%
Aku	37,513	7.92%	254,652	10.76%
Spearfish	12,023	2.54%	11,635	0.49%
Striped marlin	6,352	1.34%	10,812	0.46%
Bigeye tuna	3,882	0.82%	213,354	9.01%
Black marlin	1,481	0.31%	5,376	0.23%
Kawakawa	1,215	0.26%	6,158	0.26%
Uku	489	0.10%	11,135	0.47%
White ulua			3,196	0.13%
Tombo			2,976	0.13%
Others	696	0.15%	6,009	0.25%
Total	473,756	100.00%	2,367,523	100.00%

Table 6. Comparison of species composition of landings made by Guam pelagic charter vessels versus commercial troll vessels, 2013.
Source: WPRFMC (2015).

	Charter		Commercial	
Species	**Landings (lb)**	**Percent**	**Landings (lb)**	**Percent**
Mahimahi	31,616	64.38%	133,418	18.05%
Blue Marlin	7,550	15.37%	8,625	1.17%
Skipjack Tuna	7,167	14.59%	493,838	66.80%
Wahoo	2,773	5.65%	48,479	6.56%
Yellowfin Tuna	0	0.00%	52,745	7.13%
Others	0	0.00%	2,220	0.30%
Total	49,106	100.00%	739,325	100.00%

In Hawaii there is considerable variation in charter vessel catches between the various islands (), with the largest charter vessel fisheries based on the island of Hawaii and Oahu, in terms of catch. The Hawaii catch may be biased downwards due to the widespread practice of catch and release of billfish. Charter trips on Hawaii are form nearly 40% of the total charter activity in the State of Hawaii.

Table 7 Charter vessel catches in Hawaii by island, 2013.
Source: WPRFMC (2015).

Island	Catch (lb)	Percent	Trips	Percent	CPUE (lb/trip)
Hawaii	157,895	33.28%	1,981	37.18%	79.70
Kauai	73,452	15.48%	807	15.15%	91.02
Maui County*	82,003	17.28%	1,055	19.80%	77.73
Oahu	161,102	33.96%	1,485	27.87%	108.49
Total	474,452	100.00%	5,328	100.00%	89.05

* DAR confidentiality protocols prevent reporting 2007 charter vessel activity for Molokai and Lanai separately, and these are aggregated with data for Maui, reported collectively as Maui County

Most charter vessel fishing on the island of Hawaii is conducted from Kona's small boat harbor at Honokohau, and about 38% of the charter vessel catch comprises blue marlin (). Blue marlin used to amount to about two-thirds of the catch, but this number has fallen considerably with the spread of a stronger catch and release ethic for billfish by charter vessel operators at Honokohau. Elsewhere, yellowfin, mahimahi and wahoo tend to dominate charter vessel landings.

Table 8. Composition of charter vessel catches in the Main Hawaiian Islands, 2013.

Source: WPRFMC (2015)

Hawaii	Landings (lb)	Percent	Kauai	Landings (lb)	Percent
Yellowfin tuna	59,751	37.84%	Yellowfin tuna	30,685	41.78%
Blue marlin	45,930	29.09%	Aku	20,440	27.83%
Mahimahi	17,678	11.20%	Mahimahi	8,611	11.72%
Ono	15,145	9.59%	Blue marlin	6,654	9.06%
Spearfish	8,630	5.47%	Ono	6,433	8.76%

Aku	3,994	2.53%	Spearfish	465	0.63%
Striped marlin	2,910	1.84%	Kawakawa	164	0.22%
Bigeye tuna	2,249	1.42%			
Black marlin	1,481	0.94%			
Uku	89	0.06%			
Kamanu	40	0.03%			
Kaku	0	0.00%			
Total	157,895	100.00%		73,452	100.00%

Maui	**Landings (lb)**	**Percent**	**Oahu**	**Landings (lb)**	**Percent**
Mahimahi	38,294	46.70%	Mahimahi	50,404	31.29%
Yellowfin tuna	18,913	23.06%	Yellowfin tuna	50,191	31.15%
Blue marlin	11,015	13.43%	Blue marlin	34,354	21.32%
Ono	8,785	10.71%	Aku	11,720	7.27%
Bigeye tuna	1,633	1.99%	Ono	7,960	4.94%
Aku	1,360	1.66%	Striped marlin	3,150	1.96%
S.N. spearfish	1,023	1.25%	S.N. spearfish	1,905	1.18%
Uku	400	0.49%	Kawakawa	981	0.61%
Striped marlin	292	0.36%	Sailfish	321	0.20%
Kamanu	167	0.20%	Kaku	116	0.07%
Kawakawa	70	0.09%			0.00%
Kaku	52	0.06%			0.00%
Total	82,003	100.00%		161,102	100.00%

provides summaries of the recreational boat and shoreline fish catch between 2003 and 2013 for pelagic fish.

Table 9. Recreational pelagic fish catches in Hawaii between 2003 and 2012. Source: HDAR HMFRS and NMFS PIFSC.

Source: WPRFMC (2015)

Year	**Shore catch (lb)**	**Vessel catch (lb)**	**Total (lb)**
2003	422,439	14,906,148	15,328,587
2004	120,779	12,210,682	12,331,461
2005	229,059	11,564,698	11,793,758
2006	258,802	11,830,852	12,089,654
2007	114,832	13,956,644	14,071,475
2008	56,937	21,802,388	21,859,325
2009	66,635	17,071,414	17,138,049
2010	14,469	11,754,054	11,768,523
2011	14,216	10,574,696	10,588,912
2012	NA	12,330,638	12,330,638

Year	Shore catch (lb)	Vessel catch (lb)	Total (lb)
2013	0	14,245,945	14,245,945

Figures 17 summarizes aspects of the boat-based recreational fishery landings for six major pelagic fish species in Hawaii (blue marlin, striped marlin, mahimahi, skipjack, yellowfin and wahoo) between 2003 and 2013. Source: WPRFMC (2015)

Figures 15 to 19 shows the bimonthly distribution of boat-based fishing effort over the same time period. Skipjack tuna are the most commonly recreationally caught pelagic fish followed by yellowfin tuna, mahimahi and wahoo. In terms of weight, however, yellowfin tuna dominates recreational pelagic fish catches

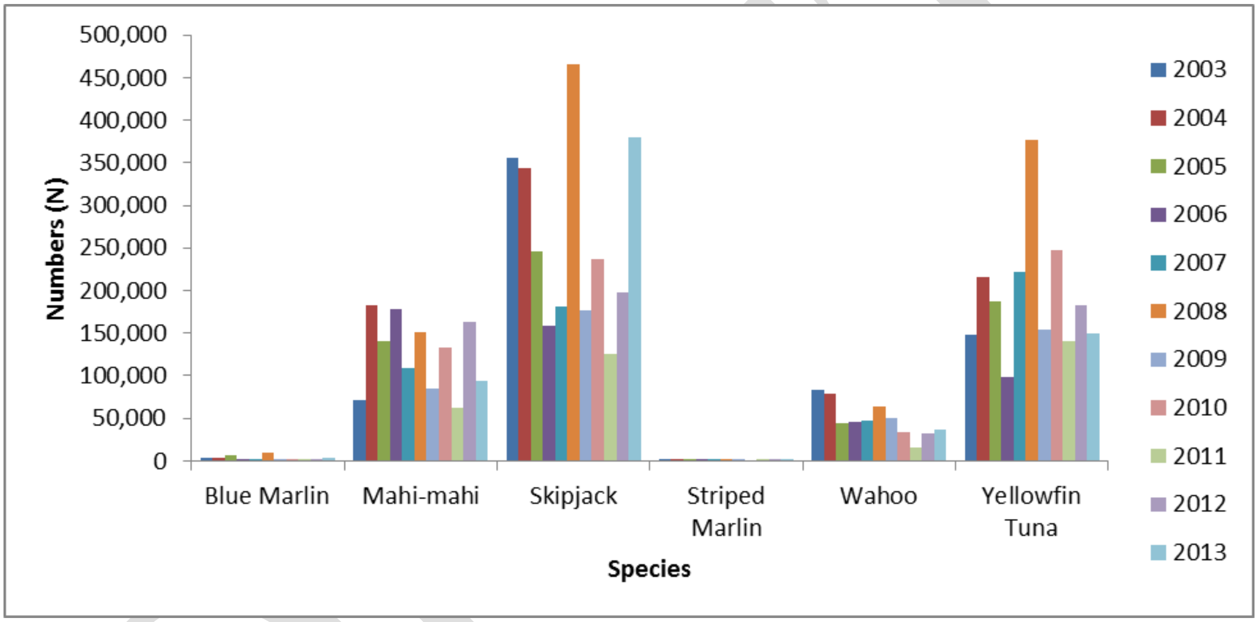


Figure 17. Annual recreational fishery landings by number for six major pelagic species between 2003-2013.
Source: WPRFMC (2015).

Figure 19. Annual recreational fishery landings by number for six major pelagic species between 2003-20.
Source: WPRFMC (2015).

Although blue marlin numbers in the catch are small compared to other species, the much greater average weight means that it can comprise a significant fraction of the recreational catch by weight. Average weights for most species tended to be relatively similar between years for mahimahi, skipjack and wahoo, but may vary considerable between years for blue marlin, striped marlin and yellowfin tuna. This is also reflected in the nominal catch rate (lbs/trip) where yellowfin catch rate was high in 2003, declined in 2004 and 2005, and then increased with peaks in 2009, 2011 and 2013. The distribution of fishing recreational fishing effort shows that boat based activity is highest in the summer and fall when the weather is at its most calm in Hawaii.

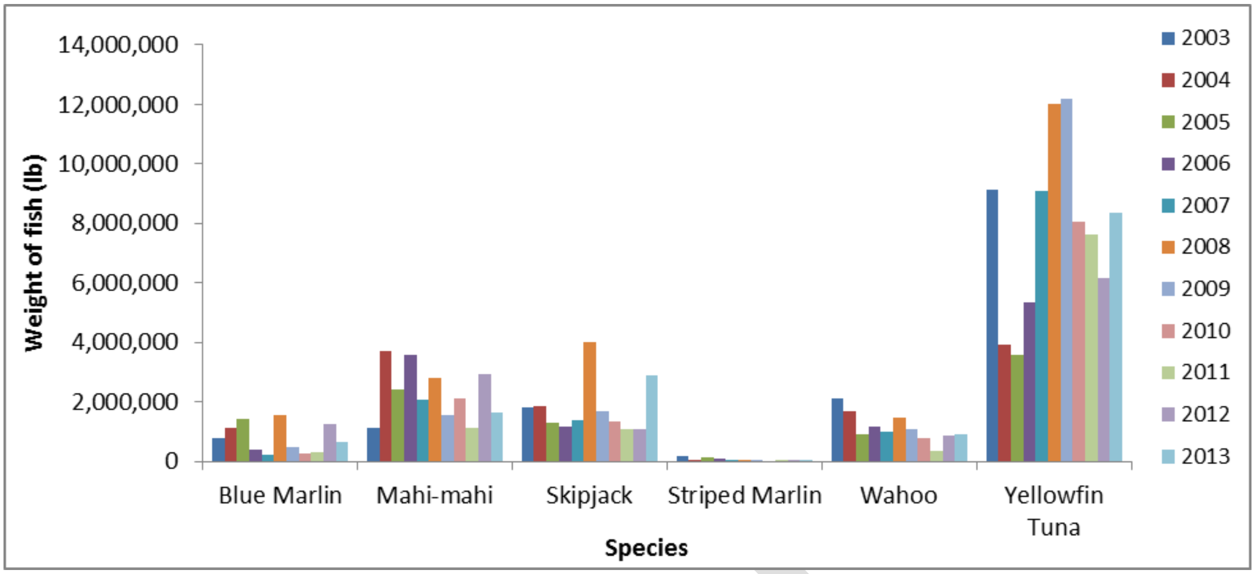


Figure 20. Annual recreational fishery landings by weight of six major pelagic fish species in Hawaii between 2003 and 2013.
Source: WPRFMC (2015)

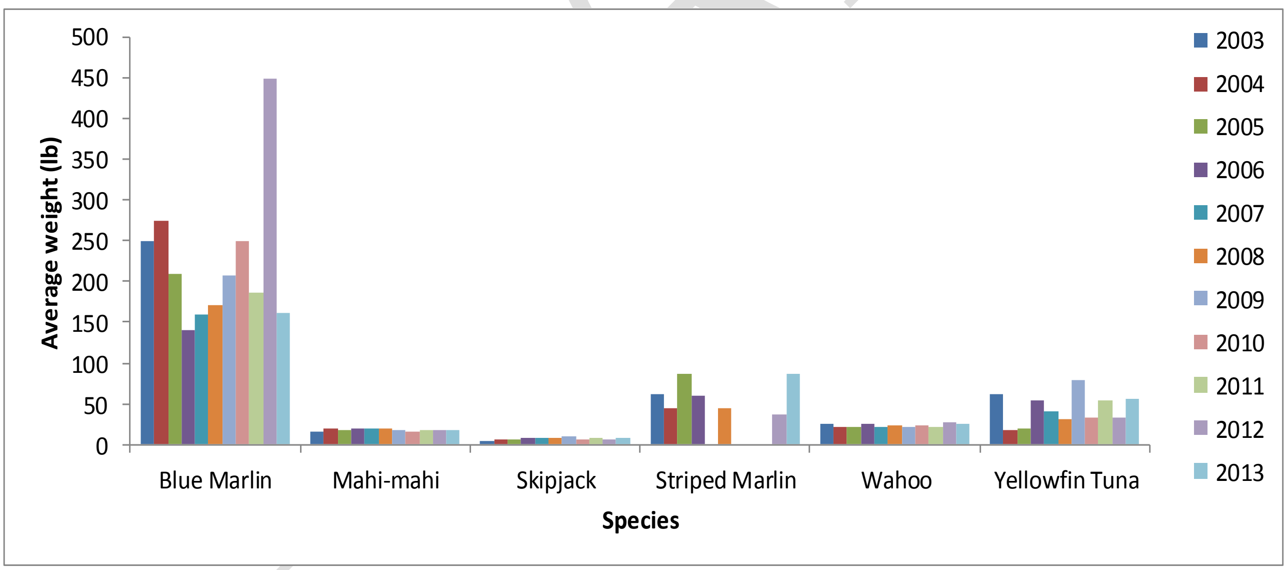


Figure 18. Average weight of six major pelagic fish species caught by recreational fishing in Hawaii between 2003 and 2013.
Source: WPRFMC (2015).

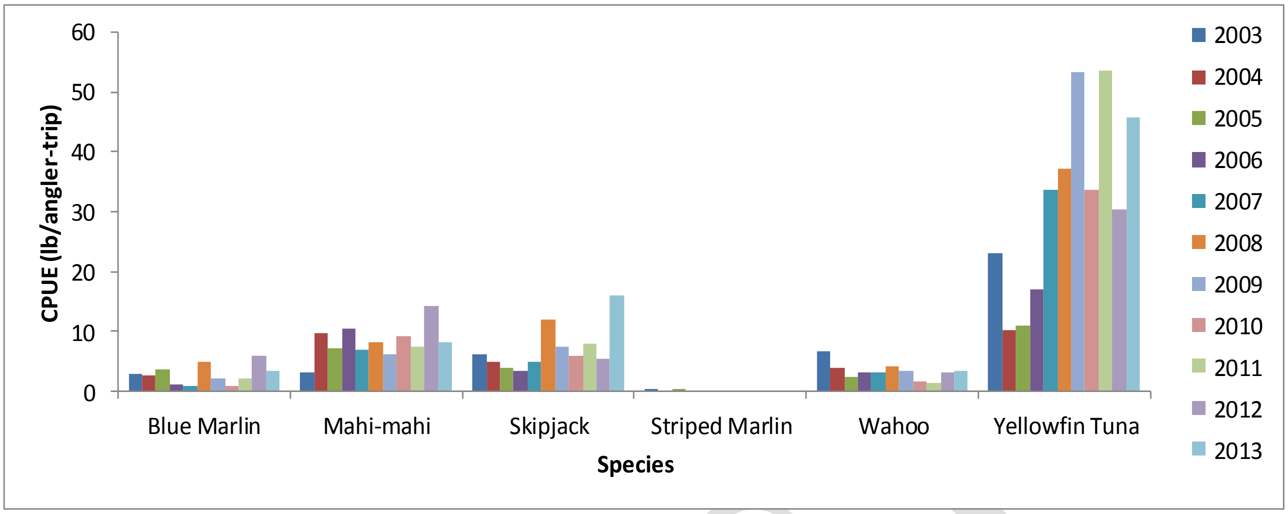


Figure 19 Annual recreational catch per unit effort (lbs. per trip) for six major pelagic species in Hawaii between 2003 and 2013.
Source: WPRFMC (2015)

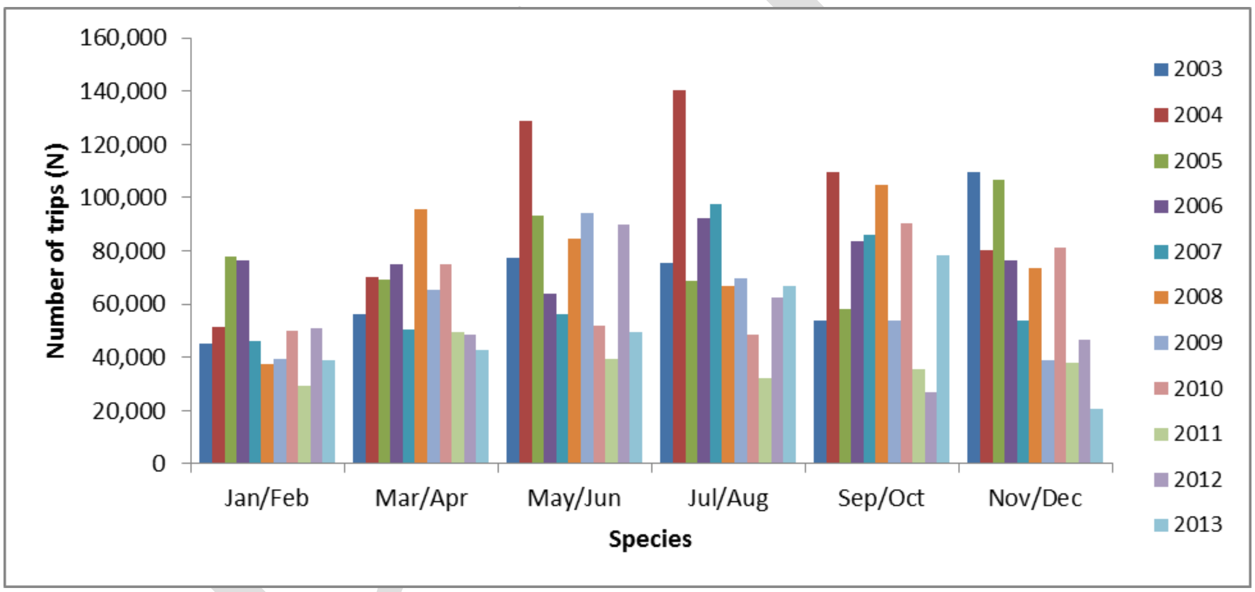


Figure 20. Boat fishing trip estimates (number of angler trips, 2003-2013.
Source: WPRFMC (2015).

3.1.1.5 Main Hawaiian Islands Handline Fishery

3.1.1.5.1 Description (commercial, charter, recreational)

There are several named methods or styles of fishing in this fishery.

Ika-shibi is a nighttime small-boat tuna fishery that was developed in the nearshore waters of Hawaiʻi Island during in the 1920s. *Ika* is the Japanese word for squid and *shibi* is the Japanese word for tuna. Crew deploy a parachute-type sea anchor to keep the vessel in a relatively stable and slow drift, usually above or near favored drop-offs, such as the 600 and 1,000 fathom curves, and around koʻa (known fish congregation sites), fish aggregating devices (FADs), thermoclines, or other features.

The summer months have been particularly productive for the ika-shibi fishery in years past, though some years involve a winter bite as well, often involving bigeye. Production and use of chum lines by cooperative captains is common. For many fishermen, lunar phase is an important determinant for timing the trip. Underwater 25-50 watt lamps and sometimes 25 watt above water lamps running from a 12 volt power source attract baitfish and squid to the vessels. Fresh squid are the preferred bait, but ʻōpelu (mackerel scad) or frozen squid are used on occasion and may initiate a night's fishing until fresh squid are caught (Rodgers 1987). Some shibi fishermen interact with ʻōpelu net fishermen to acquire fish for use as palu (chum; in this fishery anchovies or sardines are often used). The palu is intermittently dispersed as an attractant in the water column during the course of the operation.

Three or four long braided polypropylene or nylon lines are equipped with 300 to 400 lb. test leaders, baited 14/0 to 16/0 (size 32 to 56) circle hooks, and lead-filled tubular weights. These are cleated at staggered depths for fishing between about 10 to 15 fathoms and sometimes deeper, depending on the targeted feature. A breakaway line, often made of cotton cord, alerts the fishermen by making a pinging sound on the rails of the vessel as it breaks just prior to hook up.

Once the hook is set, the fish is hauled to the boat by hand on the main line. Skill is needed to gauge the strength of the fish (or multiple fish) and to play them properly to avoid loss of fish (and/or line and leader). Strikes often occur in clusters, making for sporadic periods of intense activity on board. Fish are stunned with a bat, and terminated – usually with a stiff wire run through spine/brain cavity. Large fish are bled, gilled, and gutted; some operators head the fish. These actions and consistent use of ice and icy brine have reduced burn problems characteristic of historic ika-shibi operations. Much effort is now exerted to chill the fish adequately to meet market demands for high-quality fish, which is often used for sashimi.

Palu ʻahi (also called "bust bag" or "drop stone" in local vernacular) is a tuna fishing method that was developed in the Pacific Islands over the millennia. In the Hawaiian language, "palu" refers to chopped and/or mashed bait. Historically, the bait material was wrapped around a smooth stone, covered with a leaf or placed in a cloth package and lowered to depth over a specific target, usually reef formations where ʻahi were known to congregate (ʻahi koʻa). In some cases, palu has been used to "train" pelagic and/or neritic-pelagic species to feed at such features in advance of their capture. The type of palu and its preparation were and remain critical in the traditional context. Although the palu ʻahi method is most common around the Big Island, it is also used elsewhere in the Hawaiian Islands. Some captains use parachutes to enable their vessels to drift slowly over the targeted feature; others do not.

In the case of the "drop stone technique, a hook baited with ʻōpelu is wrapped with leader and chopped ʻōpelu or other palu around a flat-sided beach cobble or similar stone. When the bait is lowered in a cloth or canvas bag to the proper depth, the mainline is jerked, releasing the double curl slipknot that secures the package. The contents spill out, ideally incurring a feeding reaction by the tuna. The stone falls off onto the bottom as the palu is dispersed and the leader and hook uncoil. While this gear is fished in as little as 10 fathoms at nearshore koʻa and as deep as 80 fathoms farther offshore, depth of use can vary extensively, depending on the nature of the targeted feature. Appropriate depth of use may be determined by experimentation or by identifying the depth of large fish on a depth recorder. Some fishermen use palu to draw large fish close to the surface where gear such as bamboo poles or danglers may be used.

Make dog is similar to drop stone, and probably a natural evolution of the technique in that it allows the fisherman to retain the weight. It may have evolved in Japan or among Japanese immigrant fishermen in Hawai‘i, as the phrase “make doggu” is also sometimes used, which in Japanese means “wrapped device.” The method involves use of a flat, ovoid lead weight – the convex side of which is shaped to accommodate the ‘ōpelu bait. The weight and bait are wrapped in a piece of cloth and lowered in a manner similar to drop stone. But in this case, the lead weight is tethered to the mainline and can thus be retrieved. Size 13/0 to 16/0 circle hooks are used in both drop stone and make dog techniques; constant and movement-sensitive upward pressure on the mainline is essential during retrieval.

Privately established FADs include any privately-owned device that functions to attract biomass and hence pelagic predators in the upper levels of the water column. Anchor and chain of sufficient capacity are used to retain an appropriate length and thickness of mooring line that, in turn, is shackled to a float system. Mooring lines are often as long as 2.5 miles, which creates a broad swing-circle around the pivot point. The surface buoy or other source of flotation, and associated streamers, attract bait and pelagic fish. PFADs are, in effect, a highly efficient form of fishing gear. They tend to be used in secret and therefore represent a difficult problem for assessment and application of potential management measures.

The technology is straightforward, but mooring and float systems can vary extensively and tend to reflect a balance between cost and effectiveness. Although some are constructed more cheaply, well-constructed PFADs used by small-boat operators around the Hawaiian Islands reportedly can range from about $5,000 to $10,000 per device. The lifespan of PFADs can be quite short in the highly dynamic ocean environment. Nelson (2003) reports that the size of floats and streamers, or “the fish house,” is correlated with aggregating efficiency. Chapman et al. (2005) contains discussion about effective FAD planning and construction in the Pacific.

Interview data indicate that PFADs were first deployed along the Kona side of the Big Island not long after the establishment of the State of Hawai‘i FAD program in 1980. The privately established devices, however, were not widely used in the region until around the mid-1990s.

Bigeye and yellowfin tuna are most typically targeted at PFADs. While many captains focus on bigeye in winter, the devices effectively aggregate ‘ahi and other pelagic fish throughout the year. Many operators use multiple devices in close proximity. The full range of handline methods are used at PFADs. Captains also commonly troll en route and while in the vicinity of PFADs. Some PFADs are positioned below the surface to avoid detection and potential entanglement with passing vessels. Geographic Positioning System (GPS) technology is used to mark the general position of the devices.

3.1.1.5.2 Type and Quantity of Fishing Gear

Fishing gear is described immediately above. On average nearly 500 fishermen used some form of handline gear in the main Hawaiian Islands between 2004 and 2014, with a range of 374 in 2006 to 565 in 2012 (WPRFMC 2014).

3.1.1.5.3 Catch in Number or Weight

The MHI handline fishery landed on average 1.1 million pounds of fish between 2004 and 2014, ranging from 0.7 million pounds to 1.6 million pounds. The majority of the catch is formed by yellowfin and albacore (Figure 2). For current information regarding the Main Hawaiian Islands handline fishery, please refer to the most current WPFMC Pelagic Annual Fishery Ecosystem Report (SAFE Report).

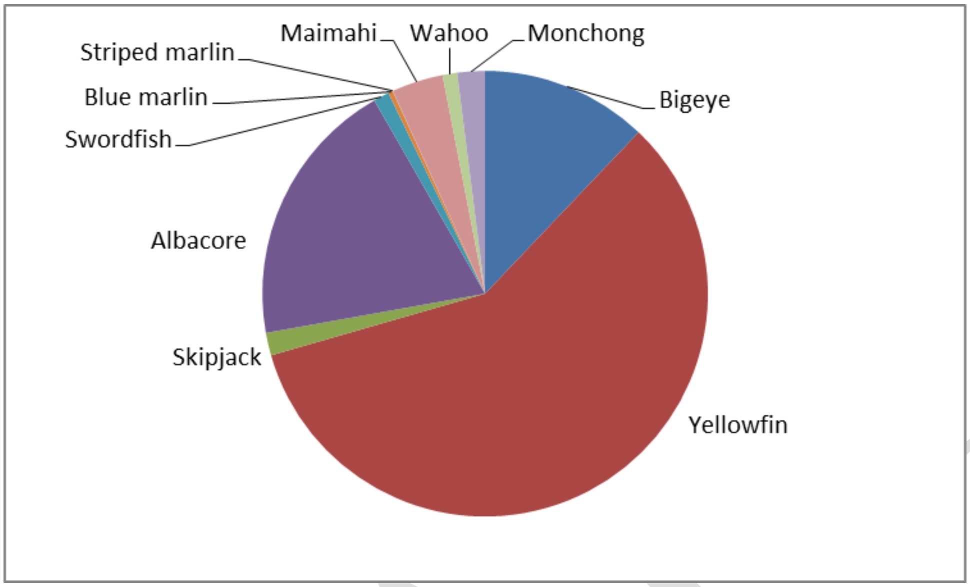


Figure 24. Species composition of the Main Hawaiian Islands Handline fishery landings, 2004-2014.
Source: WPRFMC (2015) and unpublished data

3.1.1.5.4 Time of Fishing

Ika shibi handline fishing occurs principally during the night, while *palu-ahi* style fishing is a daytime activity.

3.1.1.5.5 Number of Days Fished

The number of fishermen-days in the MHI handline fishery ranged between 2004 and 2014 from 3,400 to 6,400 fishermen days with an average of 4,700 fishermen days.

3.1.1.5.6 Fishing Areas

The MHI handline fishery overlaps with the troll fishery around the eight main Hawaiian Islands, with fishing rarely beyond 20 miles from shore (see Figure 17).

3.1.1.5.7 Economics

The direct revenue from the Main Hawaiian Islands handline fishery averaged $2,478,000 between 2002-2012, with a high of $4,027,000 (2002) and a low of $1,542,000 (2008). For current information regarding revenue of the fishery, price per pound, total direct employment, and fisheries-dependent services or industries, refer to the most current WPFMC Annual Pelagic Fishery Ecosystem Report (SAFE Report).

3.1.1.5.7.1 Maximum Sustainable Yield

For the most recent MSY for the fishery, refer to the current Pelagic Annual Fishery Ecosystem Report (SAFE Report).

3.1.1.5.7.2 Optimum Yield

Optimum yield (OY) for PMUS is defined as the amount of each management unit species or species complex that can be harvested by domestic and foreign fishing vessels in the EEZ and adjacent waters to the extent regulated by the FEP without causing local overfishing or economic overfishing within the EEZ of each island area, and without causing or significantly contributing to growth overfishing or recruitment overfishing on a stock-wide basis.

This definition of OY makes clear that the Council is concerned with localized overfishing and economic overfishing. This is because there may be times when local fishermen are concerned about the availability of the MUS in their area even though that/those species are not experiencing recruitment overfishing on an ocean-wide basis. The Council intends to manage Pacific pelagic MUS so that the economic viability of commercial fisheries, the social benefits associated with healthy recreational fisheries, and traditional fishing practices (e.g., for non-market personal consumption) are maintained. The FEP promotes, within the limits of managing at OY, domestic harvest of the management unit species in the EEZ and domestic fishery values for these species by enhancing the opportunities for satisfying recreational opportunities and profitable commercial fishing operations. Any expansion of existing fisheries, or the development of new fisheries, would be managed in this context.

The non-numeric definition of OY for the Pelagics FEP makes it difficult to quantify the domestic capacity to harvest OY or that portion of OY that can be made available for foreign fishing and to date no total allowable level of foreign fishing (TALFF) has been specified for this fishery. With the exception of the American Samoa longline fishery which freezes catches, harvests by pelagic fisheries of the Western Pacific Region supply fresh fish markets, with little to no processing beyond heading and gutting of swordfish, and gilling and gutting of tunas and mahimahi > 20 lb.

3.1.1.5.7.3 Extent to Which Fishing Vessels will Harvest OY

Since OY for PMUS is defined as the amount of each management unit species or species complex that can be harvested by domestic and foreign fishing vessels in the EEZ and adjacent waters, fishing vessels will harvest 100% of OY as currently defined.

3.1.1.5.7.4 Extent to Which U.S. Processors will Process OY

Landings by trollers and handline vessels are subject to little on-board processing other than gilling and gutting for tuna and mahimahi that are > 20 lbs. Almost all pelagic species caught by pelagic fishing vessels, including Main Hawaiian Islands handline fishery is processed in Hawaii. Therefore, that fraction of the OY caught by handline vessels is processed by US fish processors.

3.1.1.5.7.5 Accountability Measures

There are presently no accountability measures for the Main Hawaiian Islands handline fishery. The fishery catches a small volume of striped marlin but no domestic rule making has been made to require non-retention of striped marlin should the limit of 458 mt be reached. The fishery is, however, still subject to the authority of the Council.

3.1.1.5.8 Criteria for Determining Overfishing

Where stock assessments are conducted, overfishing is defined as Ft/Fmsy > 1.0, overfished is defined as Bt/Bmsy < Bmsst. In the absence of stock assessments other proxies are used such as the annual variation in catch per unit of effort (CPUE), changes in size frequency and average size and spawning potential ratio.

3.1.1.5.9 MSA Conservation and Management Measures

The Council has monitored this fishery for decades but has mostly chosen not to develop regulations, as small boat fishermen are regulated by the State of Hawaii, which requires all fishermen wishing to sell any portion of their catch to obtain a Commercial Marine License, with the obligation that all catches are reported each month to the Division of Aquatic Resources.

A control date of July 2, 2005 was established for all non-longline pelagic fisheries which states that participants in these pelagic fisheries, including troll fishing, are not guaranteed future participation in the fishery if the Council recommends, and NMFS approves, limiting entry or effort (FR vol. 70, No. 156, August 15, 2005, 47781-47782).

All non-longline pelagic fishermen must also abide by the sea turtle handling requirements for hooked or entangled turtles found at 50 CFR 665.812 (FR vol. 70, No. 219, August 15, 2005, 69282-69285). These requirements are as follows:

- Sea turtles that cannot be brought aboard.
    - Disentangle and remove the gear, or cut the line as close as possible to the hook or entanglement
- Sea turtles that can be brought aboard.
    - Disentangle and remove the gear, or cut the line as close as possible to the hook or entanglement, to remove the maximum amount of the gear from the sea turtle.
- Sea turtle resuscitation (if animal appears dead or comatose)
    - Place the sea turtle on its belly so that the sea turtle is right side up and its hindquarters elevated at least 6 inches for a period of no less than 4 hours and no more than 24 hours. Greater elevations are needed for larger sea turtles.
    - Administer a reflex test at least once every 3 hours. The test is to be performed by gently touching the eye and pinching the tail of a sea turtle to determine if the sea turtle is responsive
    - Keep the sea turtle shaded and damp or moist (but under no circumstances place the sea turtle into a container holding water). A water-soaked towel placed over the eyes, carapace and flippers is the most effective method of keeping a sea turtle moist; and
    - Return to the sea any sea turtle that revives and becomes active.
    - Sea turtles that fail to revive within the 24-hour period must also be returned to the sea, unless NMFS requests the retention of a dead sea turtle for research. In releasing a sea turtle the vessel owner or operator must:
        - Place the vessel engine in neutral gear so that the propeller is disengaged and the vessel is stopped, and release the sea turtle away from deployed gear and observe that the turtle is safely away from the vessel before engaging the propeller and continuing operations.

Finally, a control date of March 16, 2007 was established for Hawaii charter troll fishery which states that participants in this fishery are not guaranteed future participation in the fishery if the Council recommends, and NMFS approves limiting entry or effort (FR vol 72, No. 91, May 11, 2007, 26771.

3.1.1.5.10 Bycatch

Historically, most fish that is landed by fishermen is kept regardless of size and species. Bycatch for the Main Hawaiian Islands handline fishery comprises sharks, shark-bitten pelagics, small pelagics, or other pelagic species.

3.1.1.6 Hawaii Offshore Handline Fishery

3.1.1.6.1 Description

Another distinct pelagic handline fishery was developed in the early 1970s, when enterprising fishermen began to take advantage of tuna aggregations at Cross Seamount, approximately 150 miles southwest of Hawaiʻi Island. Fishing also gradually occurred at the offshore weather buoys after these were established in the early to mid-1980s. The "far offshore" fishery was highly profitable for some operators. Participation and production peaked in the late 1980s and early 1990s. Given rising fuel costs and other challenges, relatively few operators now frequent these areas.

Handlines are particularly useful in that they can be deployed at specific depths in areas known to be favorable for tuna fishing. For instance, if a school is located above a koʻa at 30 fathoms, then the palu and baited hooks can be released at precisely that depth. Once a fish is hooked, its capture is largely a matter of maintaining steady pressure on the line, avoiding any action that might lead it to dive.

While experimenting with new types of gear at Cross Seamount during the 1990s, a small group of handliners discovered that by fishing at depths closer to the summit of the seamount, they could catch bigeye that were larger than those normally captured closer to the surface. At one point, a kind of vertically-set longline was used (cf. Preston et al. 1998). This resembles the normal longline configuration (with many baited hooks clipped to a long mainline), but it is much shorter and set vertically, from a buoy on the surface to a weight on the bottom, in this case, along the slopes of the seamount. This configuration subsequently influenced development of deep-set horizontal gear, also known as shortline gear. As illustrated below (

Figure 21) and as described in detail by Itano (2005), this configuration allowed fishermen to suspend and drift numerous baited hooks at specific depths around the summit of the seamount. Deep-set horizontal gear is thought to hold promise for reducing the capture of juvenile bigeye, and it has also been used to catch various pomfret species (Bramidae), just above the peak of the seamount.

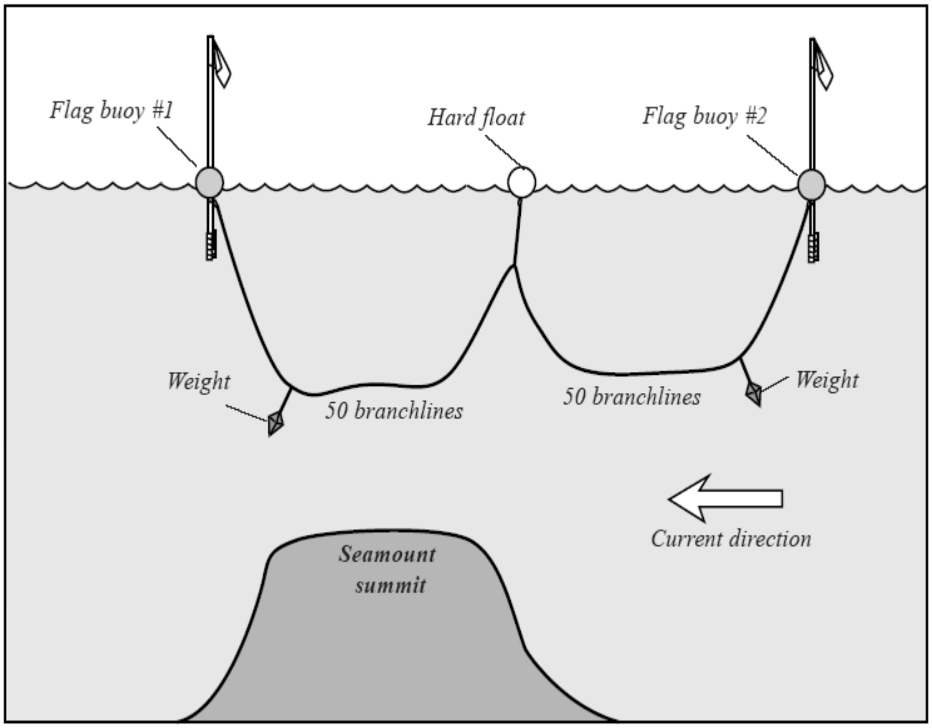


Figure 21. Deployment of shortline gear on a seamount

3.1.1.6.2 Type and Quantity of Fishing Gear

A small fleet of between 9 to 15 vessels operated in the offshore handline fishery with an annual average of about 12 vessels. Gear includes pole and line, handlines, surface droppers and shortlines.

3.1.1.6.3 Catch in Numbers or Weight

The offshore handline fishery caught 298,000 to 831,000 lbs between 2004 and 2014, with an average of 514,000 lbs. The principal volume of the catch (86%) was bigeye tuna, followed by yellowfin (12%) and mahimahi (2%) (Figure 22). For current information regarding the offshore handline fishery, refer to the most current WPFMC Pelagic Annual Fishery Ecosystem Report (SAFE Report).

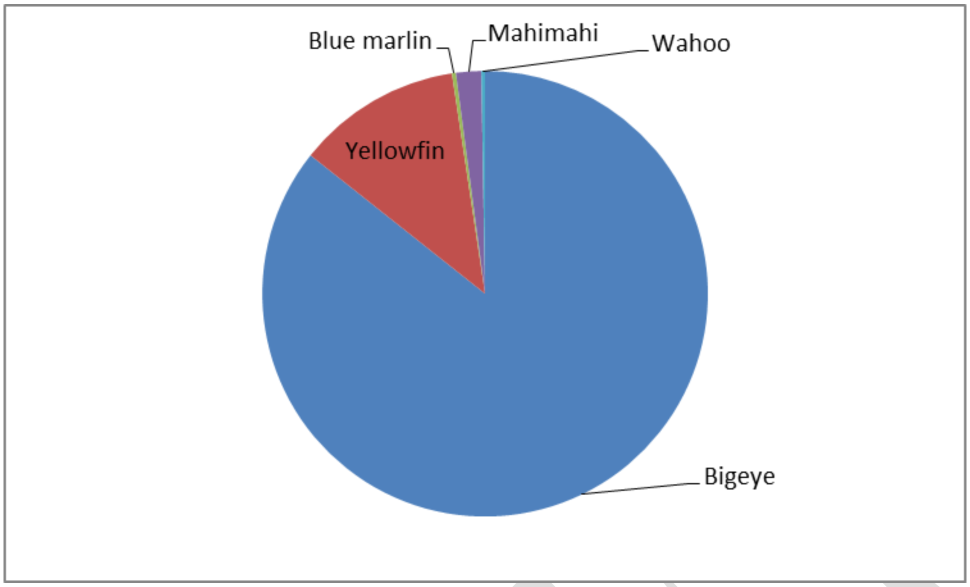


Figure 22. Catch composition of the offshore handline fishery operating on the Cross Seamount/NOAA Weather-buoys between 2004 and 2014.
Source: WPRFMC (2015) and unpublished data.

3.1.1.6.4 Fishing Areas

The offshore handline fishery operates primarily on the Cross Seamount, which lies 150 nm to the southwest of the Big Island. Other fishing areas include NOAA weather buoys deployed in the US EEZ around Hawaii.

3.1.1.6.5 Time of Fishing

The offshore handline fishery relies on the crepuscular feeding response of target species, primarily bigeye, and therefore fishing is most often conducted at dawn and dusk. Fish are lured to the surface with chum and caught on handlines and pole and lines.

3.1.1.6.6 Number of Fishing Days

The number of fisherman-days in the offshore handline fishery ranged between 2004 and 2014 from 160 to 540 fishermen days, with a mean of 280 fishermen-days.

3.1.1.6.7 Economics

The direct revenue from the Hawaii offshore handline fishery averaged $957,700 between 2002-2012, with a high of $2,278,000 (2002) and a low of $426,000 (2009). For current information regarding revenue of the fishery, price per pound, total direct employment, and fisheries-dependent services or industries, refer to the most current WPFMC Pelagic Annual Fishery Ecosystem Report (SAFE Report).

3.1.1.6.8 Estimated and Actual Processing Capacity Utilized by U.S. Processors

All of the offshore handline fishery catch is processed by US processors in Hawaii. Tuna and mahimahi > 20 lbs. are gilled and gutted onboard the vessel before offloading in Honolulu.

3.1.1.6.9 Present and Probable Future Condition of the Fishery

The offshore handline fishery is generally unstable, with participants regularly entering and leaving the fishery. The fishery will likely continue and benefit from biologically productive years such as 2015, when the Hawaii longline fishery reached its WCPFC bigeye limit prematurely in early August.

3.1.1.6.9.1 Maximum Sustainable Yield

For the most recent MSY for the fishery, refer to the current Pelagic Annual Fishery Ecosystem Report (SAFE Report).

3.1.1.6.9.2 Optimum Yield

Optimum yield (OY) for PMUS is defined as the amount of each management unit species or species complex that can be harvested by domestic and foreign fishing vessels in the EEZ and adjacent waters to the extent regulated by the FEP without causing local overfishing or economic overfishing within the EEZ of each island area, and without causing or significantly contributing to growth overfishing or recruitment overfishing on a stock-wide basis.

This definition of OY makes clear that the Council is concerned with localized overfishing and economic overfishing. This is because there may be times when local fishermen are concerned about the availability of the MUS in their area even though that/those species are not experiencing recruitment overfishing on an ocean-wide basis. The Council intends to manage Pacific pelagic MUS so that the economic viability of commercial fisheries, the social benefits associated with healthy recreational fisheries, and traditional fishing practices (e.g., for non-market personal consumption) are maintained. The FEP promotes, within the limits of managing at OY, domestic harvest of the management unit species in the EEZ and domestic fishery values for these species by enhancing the opportunities for satisfying recreational opportunities and profitable commercial fishing operations. Any expansion of existing fisheries, or the development of new fisheries, would be managed in this context.

The non-numeric definition of OY for the Pelagics FEP makes it difficult to quantify the domestic capacity to harvest OY or that portion of OY that can be made available for foreign fishing and to date no total allowable level of foreign fishing (TALFF) has been specified for this fishery. With the exception of the American Samoa longline fishery which freezes catches, harvests by pelagic fisheries of the Western Pacific Region supply fresh fish markets, with little to no processing beyond heading and gutting of swordfish, and gilling and gutting of tunas and mahimahi > 20 lb.

3.1.1.6.9.3 Extent to Which Fishing Vessels will Harvest OY

Since OY for PMUS is defined as the amount of each management unit species or species complex that can be harvested by domestic and foreign fishing vessels in the EEZ and adjacent waters, fishing vessels will harvest 100% of OY as currently defined.

3.1.1.6.9.4 Extent to Which U.S. Fish Processors will Process OY

Almost all pelagic species caught by pelagic fishing vessels, including in the offshore handline fishery, is processed in Hawaii. Therefore, that fraction of the OY caught by handline vessels will be processed by US Fish Processors.

3.1.1.6.10 Accountability Measures

There are presently no accountability measures for the offshore handline fishery.

3.1.1.6.11 Criteria for Determining Overfishing

Where stock assessments are conducted, overfishing is defined as Ft/Fmsy > 1.0, overfished is defined as Bt/Bmsy < Bmsst. In the absence of stock assessments other proxies are used such as the annual variation in catch per unit of effort (CPUE), changes in size frequency and average size and spawning potential ratio.

3.1.1.6.12 MSA Conservation and Management Measures

There are no MSA Conservation and Management Measures for the offshore handline fishery. However, a control date of February 15 2001 was established for this fishery which states that participants in these fishery are not guaranteed future participation in the fishery if the Council recommends, and NMFS approves limiting entry or effort (FR Vol 66, No. 97, May 18, 2001, 27623-27624.

3.1.1.6.13 Regulations Implementing International Recommendations and other Applicable Laws

There are no international recommendations applicable to the offshore handline fishery.

3.1.1.6.14 Bycatch Amount and Type

Historically, most fish that is landed by fishermen is kept regardless of size and species. Bycatch for the Hawaii troll fishery comprises sharks, shark-bitten pelagics, small pelagics, or other pelagic species.

American Samoa Troll Fishery

3.1.1.6.15 Description (commercial, charter, recreational)

Levine and Allen (2009) provide some background on troll fishing in American Samoa. Until 1995, boat-based fishing in Tutuila and Manu'a was primarily trolling and bottomfish handlining. In 1996, the majority of trolling fishermen converted their alias to longline fishing, although some of them continued to troll fish occasionally. Consequently, the fishery has experienced a decline in its catch and effort, especially since larger commercial trollers were most often the ones that converted to longlining. In 1996, 7 of the 35 trolling vessels were 25-40 ft long pleasure boats whose captains fished for recreation on weekends, holidays or competed in fishing tournaments, with the catch rarely sold.

3.1.1.6.16 Type and Quantity of Fishing Gear

Troll fishing experienced a long period of decline in American Samoa especially with the advent of the American Samoa longline fishery in 1994 (Figure 2). On average about 14 vessels annually engage in troll fishing. Lures may be artificial, dead, or live fish. Lures are generally towed near the surface, but weights and para-vanes can be used to catch fish below surface depths.

Up to six lines rigged with lures may be trolled when outrigger poles are used to keep the lines from tangling. Trolling gear usually consists of short, stout fiberglass rods and lever-drag hand-cranked reels. Trollers frequent anchored fish aggregation devices (FADs), drifting logs or flotsam.

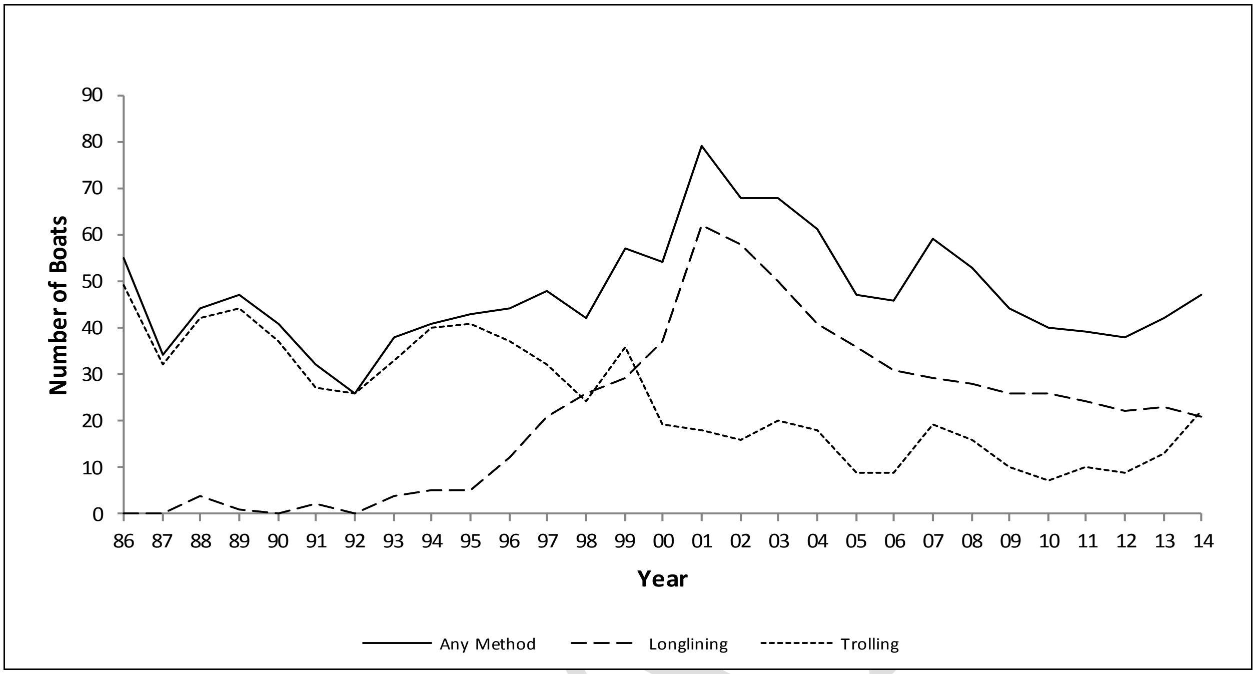


Figure 27. Number of vessels landing pelagic species in American Samoa, 1986-2014.
Source: WPRFMC (2015) and unpublished PIFSC data.

3.1.1.6.17 Catch in Numbers or Weight

Yellowfin and skipjack tuna have comprised most of the trolling landings (Figure 2). In 1986, when trolling was the only pelagic fishing method, 53 trolling boats landed 137,100 pounds of skipjack tuna and 54,622 pounds of yellowfin tuna. In 1996, when longlining was just getting started, these two species comprised 75% of the trolling landings with 35 boats landing 56,562 pounds of skipjack and 36,551 pounds of yellowfin tuna. Mahimahi, blue marlin and wahoo made up a significant proportion of the other 25% of the catch. By 2001, when longlining became the dominant fishing method in American Samoa, the number of trolling boats and their total catch dropped dramatically. More recent catches in the troll fishery continue to be dominated by skipjack and yellowfin (Figure 23).

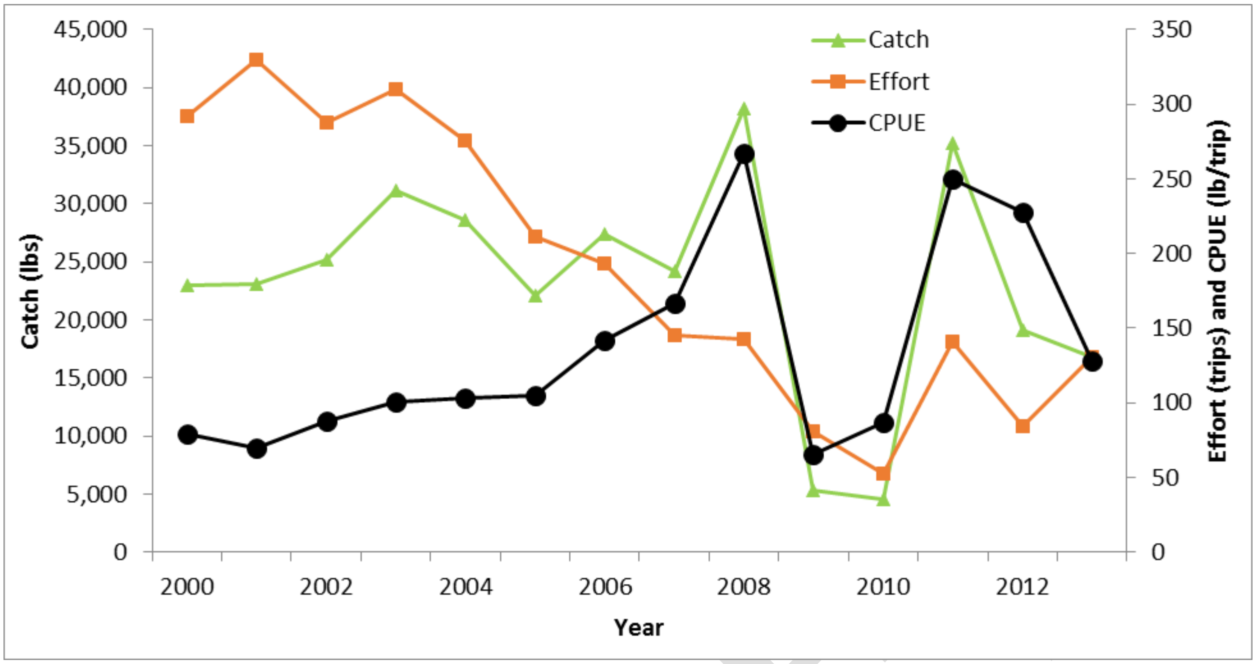


Figure 28. Catch, fishing effort and CPUE for troll fishing vessels in American Samoa, 2000-2013.
Source: WPRFMC 2015 and unpublished data.

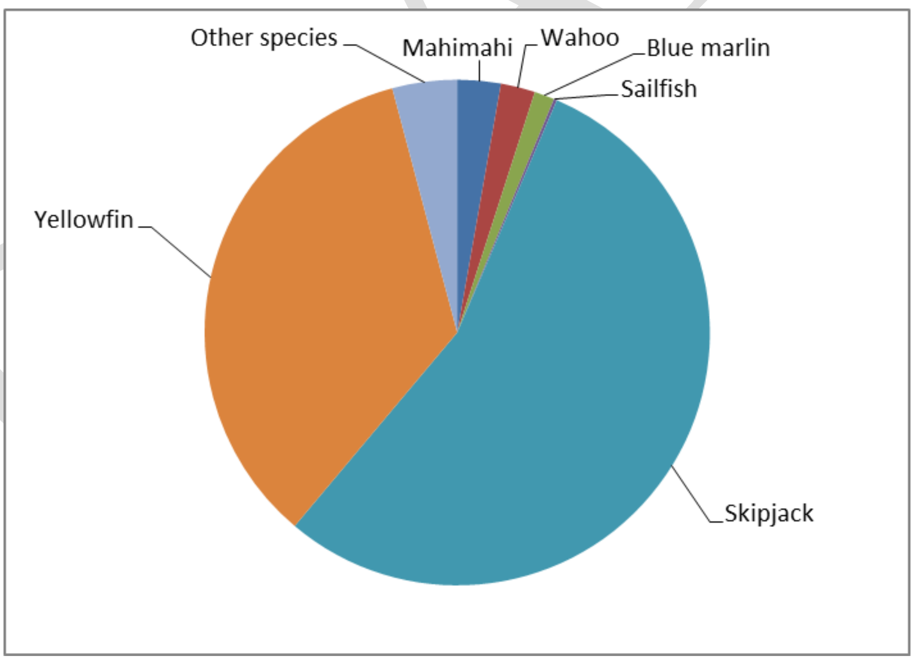


Figure 23. Species composition of the American Samoa troll fishery landings, 2000-2014.
Source: WPRFMC (2015) and unpublished data.

Fishing effort in the troll fishery has declined since 2000, though with a partial recovery after 2010 (Figure 2). On average there were about 14 troll vessels fishing each year making about

190 fishing trips each year, although fleet size ranged from 9-20 vessels, making 53-330 fishing trips. Despite declining troll effort, troll catches were relatively stable between 2000 and 2008, and then declined sharply during 2009 and 2010, and then recovering to former levels in 2011 (Figure 2).

The CPUE in the troll fishery showed and increasing trend, as effort declined, between 2000 and 2008 (Figure 2). Like the catch, there was a major decline in the CPUE between 2009 and 2010, which likely accounted for the catch decline. Following 2010, CPUEs, though still variable returned to former levels. For current information regarding the American Samoa troll fishery, refer to the most current WPFMC Pelagic Annual Fishery Ecosystem Report (SAFE Report).

3.1.1.6.18 Fishing Areas

Data from WPacFIN surveys indicates that about 40% of the troll pelagic catch comes from fishing on the banks, and about a fifth of this catch is generated from fishing around East Bank. Details on the structure and depths of the banks is given in Table 10.

Table 10. Details on the American Samoa seamounts and banks.

Source (Ralston & Goolsby 1986)

Bank	Extent (nm)	Depth (m)
South Bank	4.5	40
East Bank	20	200-500
Southeast Bank	Not available, comprises several small pinnacles	200
Northeast Bank	Flat topped guyot with top of 3 nm^2	100
Manua Bank	Not available, comprises several small pinnacles	100-600

3.1.1.6.19 Time of Fishing

Troll fishing in American Samoa is conducted during the day time.

3.1.1.7.6 Number of Fishing Trips

Fishing effort in the American Samoa troll fishery is measured in the number of trips per year. Between 2000 and 2014, the number of troll fishing trips ranged from 50 to 300 trips per year, with an average of 190 trips per year.

3.1.1.6.20 Economics

Between 2003-2013, the average adjusted direct revenue from the Guam pelagic fishery was $62,485. During this period, the high year was 2003 ($111,290) and the low year was 2008 ($18,179). (WPRFMC, 2015). For current information regarding revenue of the fishery, price per pound, total direct employment, and fisheries-dependent services or industries, refer to the most current WPFMC Pelagic Annual Fishery Ecosystem Report (SAFE Report).

3.1.1.6.21 Estimated and Actual Processing Capacity Utilized by U.S. Processors

All troll catch is processed and sold in American Samoa.

3.1.1.6.22 Present and Probable Future Condition of the Fishery

The present condition of the American Samoa troll fishery will continue to be a mix of commercial alia vessels and recreational boats belonging to the Pago Pago Gamefishing Club. The future condition of the troll fishery is to some extent contingent on the American Samoa longline fishery, which is the principal pelagic fishery in the Territory. The contraction of the troll fishery was not driven by resource issues but by troll fishermen choosing to participate in the longline fishery.

3.1.1.6.22.1 Maximum Sustainable Yield

For the most recent MSY for the fishery, refer to the current Pelagic Annual Fishery Ecosystem Report (SAFE Report).

3.1.1.6.22.2 Optimum Yield

Optimum yield (OY) for PMUS is defined as the amount of each management unit species or species complex that can be harvested by domestic and foreign fishing vessels in the EEZ and adjacent waters to the extent regulated by the FEP without causing local overfishing or economic overfishing within the EEZ of each island area, and without causing or significantly contributing to growth overfishing or recruitment overfishing on a stock-wide basis.

This definition of OY makes clear that the Council is concerned with localized overfishing and economic overfishing. This is because there may be times when local fishermen are concerned about the availability of the MUS in their area even though that/those species are not experiencing recruitment overfishing on an ocean-wide basis. The Council intends to manage Pacific pelagic MUS so that the economic viability of commercial fisheries, the social benefits associated with healthy recreational fisheries, and traditional fishing practices (e.g., for non-market personal consumption) are maintained. The FEP promotes, within the limits of managing at OY, domestic harvest of the management unit species in the EEZ and domestic fishery values for these species by enhancing the opportunities for satisfying recreational opportunities and profitable commercial fishing operations. Any expansion of existing fisheries, or the development of new fisheries, would be managed in this context.

The non-numeric definition of OY for the Pelagics FEP makes it difficult to quantify the domestic capacity to harvest OY or that portion of OY that can be made available for foreign fishing and to date no total allowable level of foreign fishing (TALFF) has been specified for this fishery. With the exception of the American Samoa longline fishery which freezes catches, harvests by pelagic fisheries of the Western Pacific Region supply fresh fish markets, with little to no processing beyond heading and gutting of swordfish, and gilling and gutting of tunas and mahimahi > 20 lb.

3.1.1.6.22.3 Extent to Which Fishing Vessels will Harvest OY

American Samoa troll vessels will harvest that fraction of the OY comprising surface caught pelagic species

3.1.1.6.22.4 Extent to Which U.S. Fish Processors will Process OY

Little to no processing of troll catches in American Samoa occurs other than gilling and gutting larger fish. All American Samoa troll caught fish is sold and processed in American Samoa

3.1.1.6.23 Criteria for Determining Overfishing

Where stock assessments are conducted, overfishing is defined as Ft/Fmsy > 1.0, overfished is defined as Bt/Bmsy < Bmsst. In the absence of stock assessments other proxies are used such as the annual variation in catch per unit of effort (CPUE), changes in size frequency and average size and spawning potential ratio.

3.1.1.6.24 MSA Conservation and Management Measures

Local fishery regulations ban landings of any shark species, regulates the use of gillnets and deployment of and tampering with FADs.

Additionally, all non-longline pelagic fishermen must also abide by the sea turtle handling requirements for hooked or entangled turtles found at 50 CFR 665.812 (FR vol. 70, No. 219, August 15, 2005, 69282-69285). These requirements are as follows:

- Sea turtles that cannot be brought aboard.
  - Disentangle and remove the gear, or cut the line as close as possible to the hook or entanglement
- Sea turtles that can be brought aboard.
  - Disentangle and remove the gear, or cut the line as close as possible to the hook or entanglement, to remove the maximum amount of the gear from the sea turtle.
- Sea turtle resuscitation (if animal appears dead or comatose)
  - Place the sea turtle on its belly so that the sea turtle is right side up and its hindquarters elevated at least 6 inches for a period of no less than 4 hours and no more than 24 hours. Greater elevations are needed for larger sea turtles.
  - Administer a reflex test at least once every 3 hours. The test is to be performed by gently touching the eye and pinching the tail of a sea turtle to determine if the sea turtle is responsive
  - Keep the sea turtle shaded and damp or moist (but under no circumstances place the sea turtle into a container holding water). A water-soaked towel placed over the eyes, carapace and flippers is the most effective method of keeping a sea turtle moist; and
  - Return to the sea any sea turtle that revives and becomes active.
  - Sea turtles that fail to revive within the 24-hour period must also be returned to the sea, unless NMFS requests the retention of a dead sea turtle for research. In releasing a sea turtle the vessel owner or operator must:
    - Place the vessel engine in neutral gear so that the propeller is disengaged and the vessel is stopped, and release the sea turtle away from deployed gear and observe that the turtle is safely away from the vessel before engaging the propeller and continuing operations.

3.1.1.6.25 Regulations Implementing International Recommendations and other Applicable Laws

There are no international recommendations that apply to the American Samoa troll fishery.

3.1.1.6.26 Bycatch

Bycatch in the American Samoa troll fishery is minimal – zero bycatch has been reported for most years.

3.1.1.7 Guam Troll Fishery

3.1.1.7.1 Description

Aside from the pelagic troll fishery discussed below, there are distant-water purse seiners and longliners (foreign and domestic) that fish outside Guam's economic exclusive zone (EEZ) and transship through the island and small, primarily recreational, trolling boats that are either towed to boat launch sites or marina-berthed charter boats and fish only within local waters, either within Guam's EEZ or on some occasions in the adjacent EEZ of the Northern Mariana Islands. Most fishermen sell a portion of their catch at one time or another and it is difficult to make a distinction between recreational, subsistence, and commercial fishers. There are currently 15 civilian charter vessels on Guam and one charter operation run by the U.S. military from Sumay Cove (John Calvo, personal communication.) A summary of the catches by the Guam charter fleet is given in WPRFMC (2015). A feature of the Guam charter industry is that catches are often served as sashimi to the patrons, most of whom are Japanese.

Landings consist primarily of five major species: mahimahi, wahoo, bonita or skipjack tuna, yellowfin tuna, and Pacific blue marlin. Other minor species caught include rainbow runner, kawakawa, dogtooth tuna, double-lined mackerel, and oilfish.

High value is placed on sharing of one's fish catch with relatives and friends. The social obligation to share one's fish catch extends to part-time and full-time commercial fishermen (Amesbury and Hunter-Anderson, 1989). In a study conducted by Rubinstein (2001), nearly all fishermen (96 percent) reported that they share fish regularly, giving fish to family (36 percent), friends (13 percent) or both (47 percent). A majority (53 percent) said they did not give fish to people other than family and close friends; of those who did occasionally, the main recipients were church fiestas (32 percent) and other church events or organizations (20 percent). A 2005 survey of Guam households found that out of the fish consumed by households, a little more than half (51 percent) was purchased at a store or restaurant and 9 percent was purchased at a flea market or from a roadside stand. Nearly one-quarter (24 percent) of the fish consumed was caught by the respondent or an immediate family member, and an additional 14 percent was caught by a friend or extended family member (Beukering et al., 2007 in Allen and Bartram 2008).

3.1.1.7.2 Type and Quantity of Fishing Gear

Like Hawaii, there are a large variety of trolling techniques in Guam. The number of boats involved in Guam's pelagic or open ocean fishery has remained fairly constant between 2000 and 2014 at about 400 (Figure 24). A majority of the fishing boats are less than 10 meters (33 feet) in length and are usually owner-operated by fishermen who earn a living outside of fishing. Most fishermen sell a portion of their catch at one time or another and it is difficult to make a distinction between recreational, subsistence, and commercial fishers. A small, but significant, segment of the pelagic group is made up of marina-berthed charter boats that are operated primarily by full-time captains and crews.

Lures may be artificial, dead, or live fish. Lures are generally towed near the surface, but weights and para-vanes can be used to catch fish below surface depths. Up to six lines rigged with lures may be trolled when outrigger poles are used to keep the lines from tangling. Trolling gear usually consists of short, stout fiberglass rods and lever-drag hand-cranked reels. Trollers frequent anchored fish aggregation devices (FADs), drifting logs or flotsam, and areas where the bottom drops off sharply that may aggregate fish. Commercial troll fishermen may use the ‘green stick’ method of fishing, named after the green fiberglass mast that serves as a strong vertical outrigger. The mast is the towing post for a specially designed device known as a ‘bird’ because of its wings. An array of plastic squid lures are attached to the towing line at carefully measured intervals, so that they skip across the surface of the water and tease yellowfin to the surface. It is thought that the passage of the bird behind the lures attracts tuna through curiosity, and the tuna try to outrace the bird in order to compete for the food it appears to be chasing.

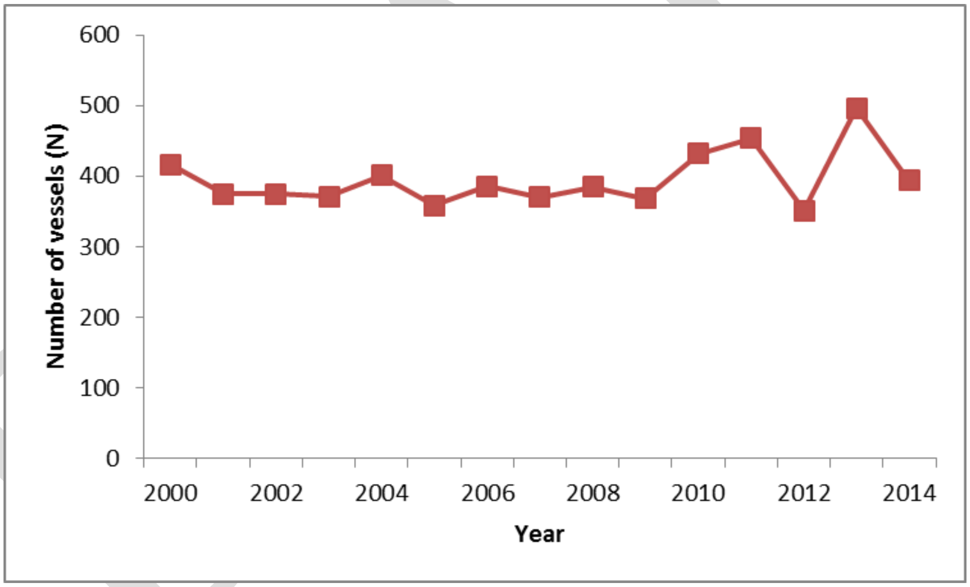


Figure 24. Annual number of fishing vessels in the Guam troll fishery
Source: WPRFMC (2015) and unpublished data.

3.1.1.7.3 Catch in Numbers or Weight

The estimated annual pelagic landings have varied widely between 2000 and 2014, ranging between 280,000 and 800,000 lbs., with an average of 577,000 lbs. (Figure 25). Landings consisted primarily of five major species: mahimahi wahoo, bonita or skipjack tuna yellowfin tuna and Pacific blue marlin (Figure 26). Other minor species caught include rainbow runner, kawakawa, double-lined mackerel, and oilfish. Sailfish and sharks were also caught during 2014.

For current information regarding the Guam troll fishery, refer to the most current WPFMC Pelagic Annual Fishery Ecosystem Report (SAFE Report).

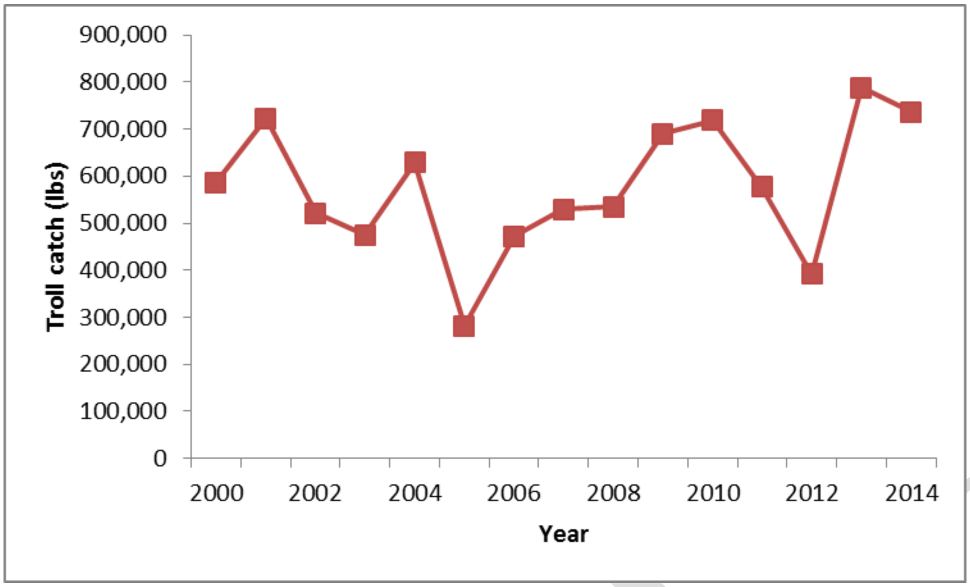


Figure 25. Annual landings of pelagic species in Guam, 2000-2014.
Source: WPRFMC (2015) and unpublished data.

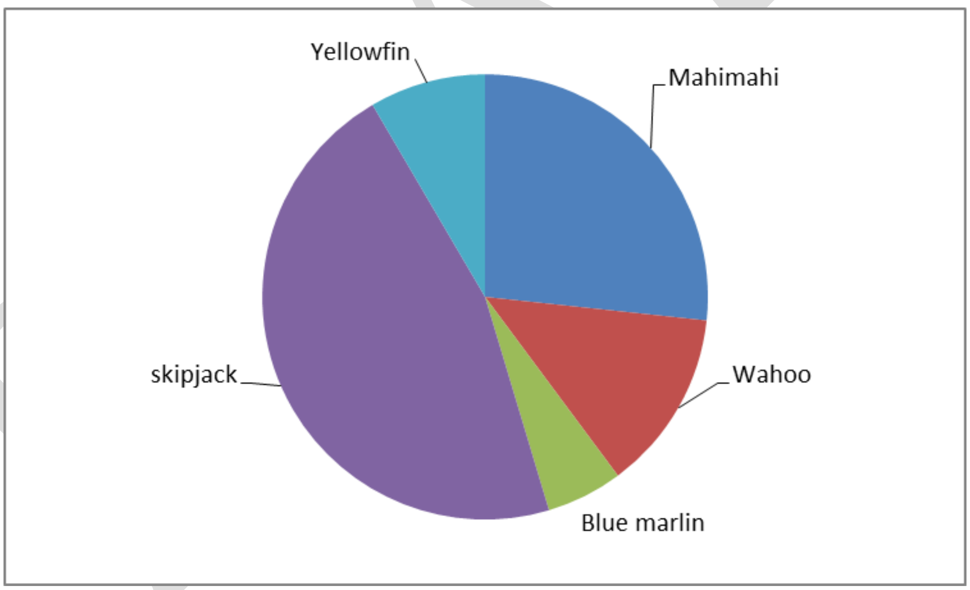


Figure 26. Average species composition of Guam troll catches, 2000-2014
Source: WPRFMC (2015) and unpublished data.

3.1.1.7.4 Fishing Areas

Guam trollers fish around the island of Guam and at a number of banks between 30 – 60 miles to the south of the island.

3.1.1.7.5 Time of Fishing

Troll fishing in Guam is conducted during the daytime.

3.1.1.7.6 Number of Fishing Trip

Fishing effort in the Guam troll fishery is measures by the annual number of fishing trips. Between 2000 and 2014, the annual number of troll fishing trips ranged from 5,000 to 13,200 fishing trips, with an average of 8,400 fishing trips per year.

3.1.1.7.7 Economics

Between 2001-2011, the average adjusted direct revenue from the Guam pelagic fishery was $490,360 (tuna = $158,677; non-tuna = $331,684). During this period, the high year was 2001 ($964,619) and the low year was 2008 ($255,713). For current information regarding revenue of the fishery, price per pound, total direct employment, and fisheries-dependent services or industries, refer to the most current WPFMC Pelagic Annual Fishery Ecosystem Report (SAFE Report).

3.1.1.7.8 Estimated and Actual Processing Capacity Utilized by U.S. Processors

All pelagic fish landed by Guam trollers are consumed locally; none of the catch is exported. Longline caught fish landed from foreign longline vessels are transshipped through Guam to Japan, although this business has contracted over the past two decades from an annual total of 12,700 mt to about 2,290 mt in 2014.

3.1.1.7.9 Present and Probable Future Condition of the Fishery

A recent study by the Secretariat of the Pacific Community (Nicol 2014) indicates that there is a standing spawning stock of skipjack alone of between 106,000 and 135,000 mt in the US EEZ around the Mariana Archipelago. The average catch from the Guam fishery is about 270 mt, and from the CNMI troll fishery to the north about 100 mt, for a combined total of 370 mt. The discrepancy between the estimated spawning stock biomass and the troll catch in the archipelago suggests that a primary target species is only lightly exploited.

Recent migrants from Micronesia, primarily Chuuk, have created a great deal of social unrest in Guam by establishing troll and reef fisheries that has been a source of conflict with indigenous fishermen. The extent to which these activities are affecting local pelagic stocks is unknown, in part because no good catch estimates exist for them.

3.1.1.7.9.1 Maximum Sustainable Yield

For the most recent MSY for the fishery, refer to the current Pelagic Annual Fishery Ecosystem Report (SAFE Report).

3.1.1.7.9.2 Optimum Yield

Optimum yield (OY) for PMUS is defined as the amount of each management unit species or species complex that can be harvested by domestic and foreign fishing vessels in the EEZ and adjacent waters to the extent regulated by the FEP without causing local overfishing or economic overfishing within the EEZ of each island area, and without causing or significantly contributing to growth overfishing or recruitment overfishing on a stock-wide basis.

This definition of OY makes clear that the Council is concerned with localized overfishing and economic overfishing. This is because there may be times when local fishermen are concerned about the availability of the MUS in their area even though that/those species are not experiencing recruitment overfishing on an ocean-wide basis. The Council intends to manage Pacific pelagic MUS so that the economic viability of commercial fisheries, the social benefits associated with healthy recreational fisheries, and traditional fishing practices (e.g., for non-market personal consumption) are maintained. The FEP promotes, within the limits of managing at OY, domestic harvest of the management unit species in the EEZ and domestic fishery values for these species by enhancing the opportunities for satisfying recreational opportunities and profitable commercial fishing operations. Any expansion of existing fisheries, or the development of new fisheries, would be managed in this context.

The non-numeric definition of OY for the Pelagics FEP makes it difficult to quantify the domestic capacity to harvest OY or that portion of OY that can be made available for foreign fishing and to date no total allowable level of foreign fishing (TALFF) has been specified for this fishery. There is limited on-board processing of the Guam troll catch apart from gilling and gutting larger fish. Thus domestic processors appear fully capable of processing 100 percent of domestic pelagic fish harvests in the Guam segment of the Western Pacific Region.

3.1.1.7.9.3 Extent to Which Fishing Vessels will Harvest OY

Since OY for PMUS is defined as the amount of each management unit species or species complex that can be harvested by domestic and foreign fishing vessels in the EEZ and adjacent waters, fishing vessels will harvest 100% of OY as currently defined.

3.1.1.7.9.4 Extent to Which U.S. Fish Processors will Process OY

All troll catches in Guam are landed and sold in Guam. There is no export of pelagic species caught by Guam trollers. Foreign longline vessels do offload fresh and frozen catches on Guam for transshipping to Japan. Between 2000-2014, 1,700 to 12,000 mt were transshipped annually from foreign vessels, with an average of 5,400 mt. The composition of transshipments was about 54% bigeye tuna 37% yellowfin tuna and 9% other species such as swordfish and other billfish.

3.1.1.7.10 Criteria for Determining Overfishing

Where stock assessments are conducted, overfishing is defined as Ft/Fmsy > 1.0, *overfished* is defined as Bt/Bmsy < Bmsst. In the absence of stock assessments other proxies are used such as the annual variation in catch per unit of effort (CPUE), changes in size frequency and average size and spawning potential ratio.

3.1.1.7.11 MSA Conservation and Management Measures

Anchoring by all fishing vessels over 50 ft. (15.25 m) length overall is prohibited in the U.S. EEZ seaward of Guam west of 144°30′E. longitude except in the event of an emergency caused by ocean conditions or by a vessel malfunction that can be documented (CRF Title 50 Part 665.399) (Figure 27).

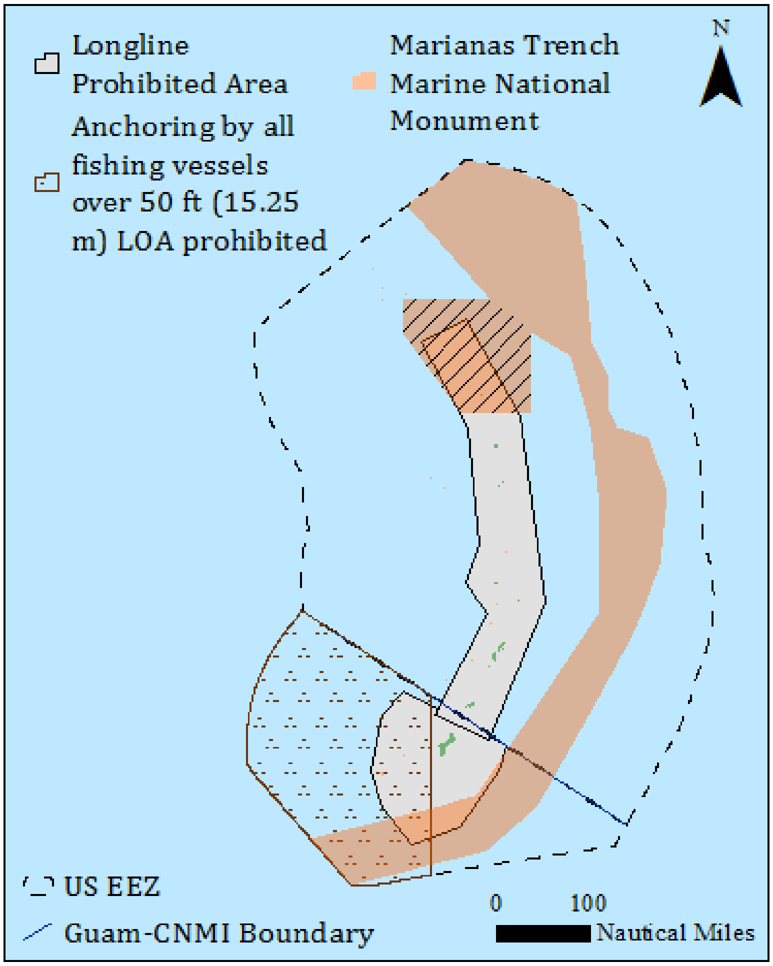


Figure 27. Map of the longline and other fishery management zones around the Hawaiian Archipelago.

Local fishery regulations ban the use of any form of longline gear within the waters of Guam (not specified) and the use of purse seine nets for pelagic fish other than the bigeye scad or atulai.

Additionally, all non-longline pelagic fishermen must also abide by the sea turtle handling requirements for hooked or entangled turtles found at 50 CFR 665.812 (FR vol. 70, No. 219, August 15, 2005, 69282-69285). These requirements are as follows:

- Sea turtles that cannot be brought aboard.
    - Disentangle and remove the gear, or cut the line as close as possible to the hook or entanglement
- Sea turtles that can be brought aboard.
    - Disentangle and remove the gear, or cut the line as close as possible to the hook or entanglement, to remove the maximum amount of the gear from the sea turtle.
- Sea turtle resuscitation (if animal appears dead or comatose)

- Place the sea turtle on its belly so that the sea turtle is right side up and its hindquarters elevated at least 6 inches for a period of no less than 4 hours and no more than 24 hours. Greater elevations are needed for larger sea turtles.
- Administer a reflex test at least once every 3 hours. The test is to be performed by gently touching the eye and pinching the tail of a sea turtle to determine if the sea turtle is responsive
- Keep the sea turtle shaded and damp or moist (but under no circumstances place the sea turtle into a container holding water). A water-soaked towel placed over the eyes, carapace and flippers is the most effective method of keeping a sea turtle moist; and
- Return to the sea any sea turtle that revives and becomes active.
- Sea turtles that fail to revive within the 24-hour period must also be returned to the sea, unless NMFS requests the retention of a dead sea turtle for research. In releasing a sea turtle the vessel owner or operator must:
    - Place the vessel engine in neutral gear so that the propeller is disengaged and the vessel is stopped, and release the sea turtle away from deployed gear and observe that the turtle is safely away from the vessel before engaging the propeller and continuing operations.

3.1.1.7.12 Bycatch

Historically, most fish that is landed by fishermen is kept regardless of size and species. Bycatch for the Guam fishery comprises sharks, shark-bitten pelagics, small pelagics, or other pelagic species. In 2004, 2010 and 2012, bycatch was not encountered by Fisheries staff when interviewing trolling vessels.

3.1.1.8 CNMI Troll Fishery

3.1.1.8.1 Description (commercial, charter, recreational)

With the exception of the purse seine support base on Tinian discussed above, CNMI has never had a large infrastructure dedicated to commercial fishing. The majority of boats in the local fishing fleet are small, outboard engine-powered vessels. The harvest of pelagic species by CNMI-based vessels has always been small, around 100 metric tons annually, caught with trolling gear. Both supply and demand conditions direct the majority of domestic commercial fishing effort in CNMI toward reef fish and bottomfish. There is less seasonality in these fisheries, and they require shorter offshore trips; moreover, their market value is often much higher than that of the commonly caught pelagic fish.

CNMI’s pelagic fishery occurs primarily from waters off the island of Farallon de Medinilla south to the Island of Rota. The pelagic fishing fleet consists primarily of trolling vessels less than 24 ft. in length which generally take one-day trips within 30 nm around the islands where they find abundant skipjack tuna. These vessels have a limited travel and fishing range and fishery participants necessarily rely on catches from waters within their reach.

There was a longline fishing company located on Saipan which began in 2010, and had four longliners fishing waters around the Mariana Archipelago, beyond 30 nm from shore but within EEZ waters. The fishery stopped operating in 2013.

The pelagic fishery is monitored using data in the Commercial Purchase Database, which currently documents landings on Saipan where the majority of the CNMI's population and fishery participants live. Staff from the Department of Land and Natural Resources, Division of Fish and Wildlife (DFW) routinely distribute and collect invoice books from 30 participating local fish purchasers on Saipan that record all fish purchases by species categories. It is believed that the commercial purchase database landings include around 90 percent of all commercial landings on Saipan. There is also an un-quantified subsistence fishery on Saipan where income is made by selling a small portion of catches door-to-door to cover fishing expenses.

The primary target and most marketable species for the pelagic fleet is skipjack tuna. In 2010, skipjack tuna continued to dominate the pelagic landings, comprising around 80 percent of commercial pelagic landings and revenues totaling about $215,946 (Table 2). Schools of skipjack tuna have historically been common in nearshore waters, providing an opportunity for trollers to catch numerous fish with a minimum of travel time and fuel costs. Yellowfin tuna and mahimahi are also easily marketable species but are seasonal. Peak mahimahi catches are usually from February through April while the yellowfin season usually runs from April through September.

3.1.1.8.2 Type and Quantity of Fishing Gear

The number of fishers (boats) making commercial pelagic landings has shown a steady decline from 2000 onwards, from nearly 120 in 2000 vessels to 19 in 2014, or an average of about 62 vessels (Figure 28). Lures may be artificial, dead, or live fish. Lures are generally towed near the surface, but weights and para-vanes can be used to catch fish below surface depths.

Up to six lines rigged with lures may be trolled when outrigger poles are used to keep the lines from tangling. Trolling gear usually consists of short, stout fiberglass rods and lever-drag hand-cranked reels. Trollers frequent anchored fish aggregation devices (FADs), drifting logs or flotsam, and areas where the bottom drops off sharply that may aggregate fish.

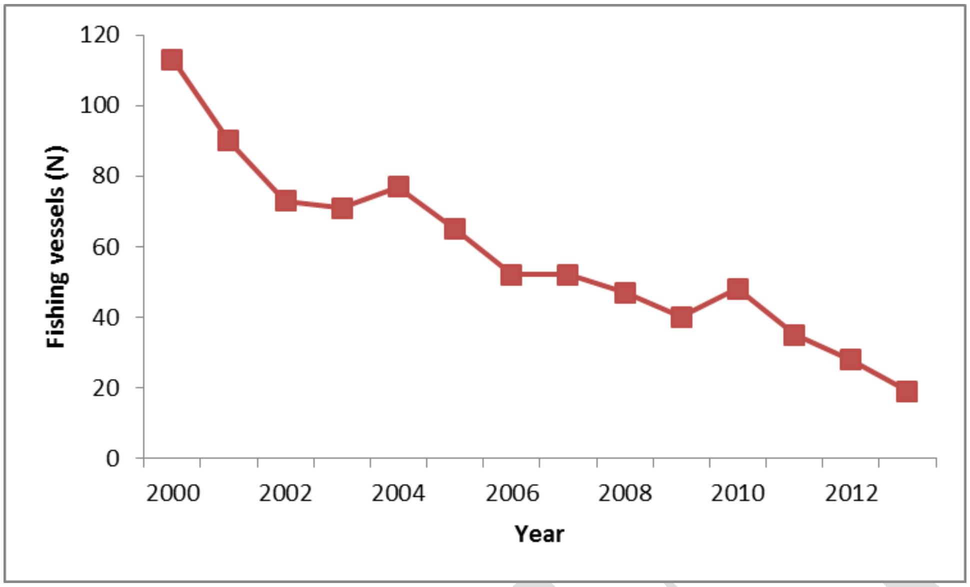


Figure 28. The annual number of commercial vessels landing pelagic species in the CNMI, 1983-2014.
Source: WPRFMC (2015) and unpublished data.

3.1.1.8.3 Catch in Numbers or Weight

Catches in the CNMI are reported from two different data streams, a commercial receipt book system and expansions from creel surveys. Based on the receipt book system, commercial pelagic catches have varied from 110,000 lbs. to 345,000 lbs. between 2000 and 2014, with a mean of 220,000 lbs. (Figure 29). Over the same time period, the total pelagic catch based on the creel survey has ranged from 370,000 lbs. to 700,000 with a mean of 530,000 lbs. (Figure 30). Both data systems show that about 80% of the CNMI troll catch is skipjack, followed by yellowfin, mahimahi and wahoo (Figure 31). For current information regarding the CNMI troll fishery, refer to the most current WPFMC Pelagic Annual Fishery Ecosystem Report (SAFE Report).

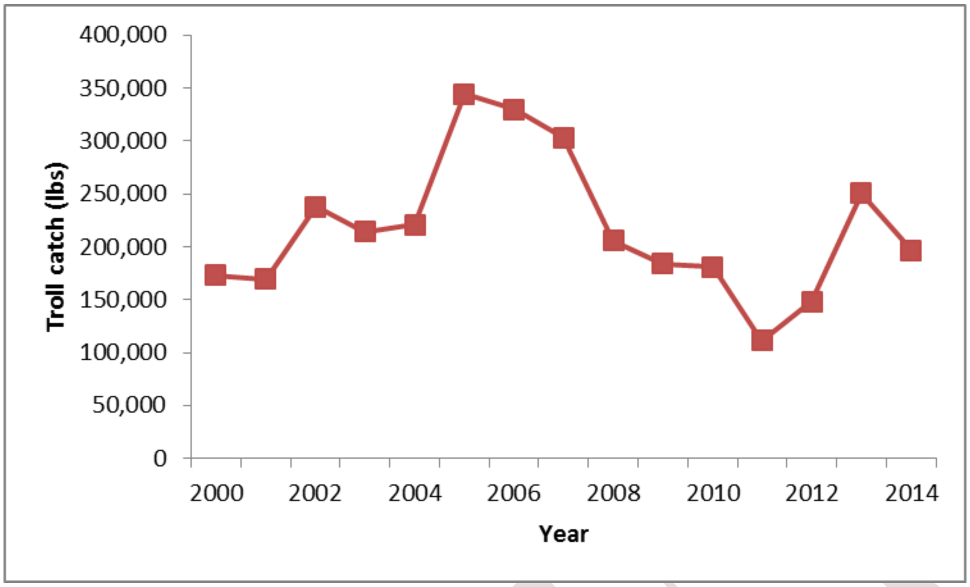


Figure 29. CNMI annual estimated total landings from commercial receipt invoices.
Source: WPRFMC (2015) and unpublsiehd data.

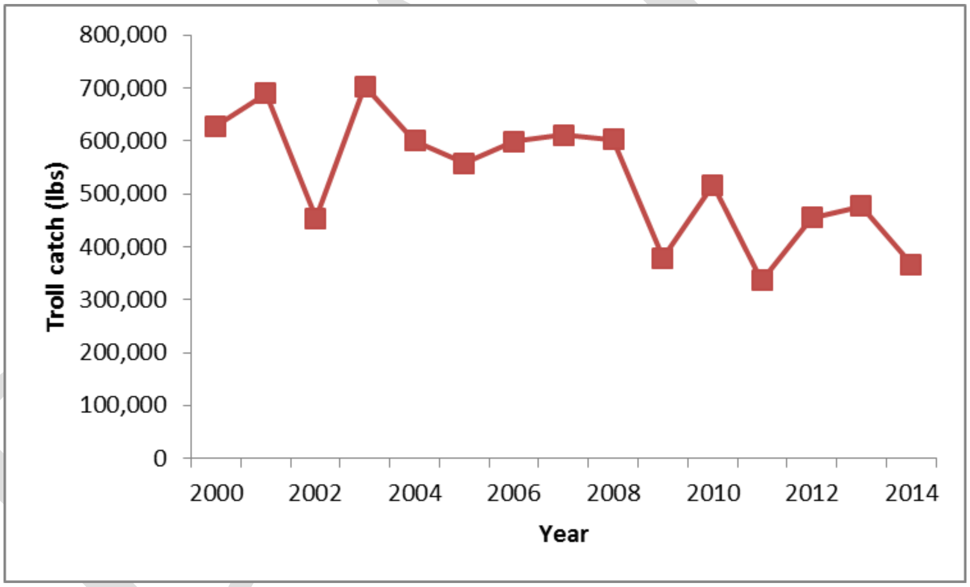
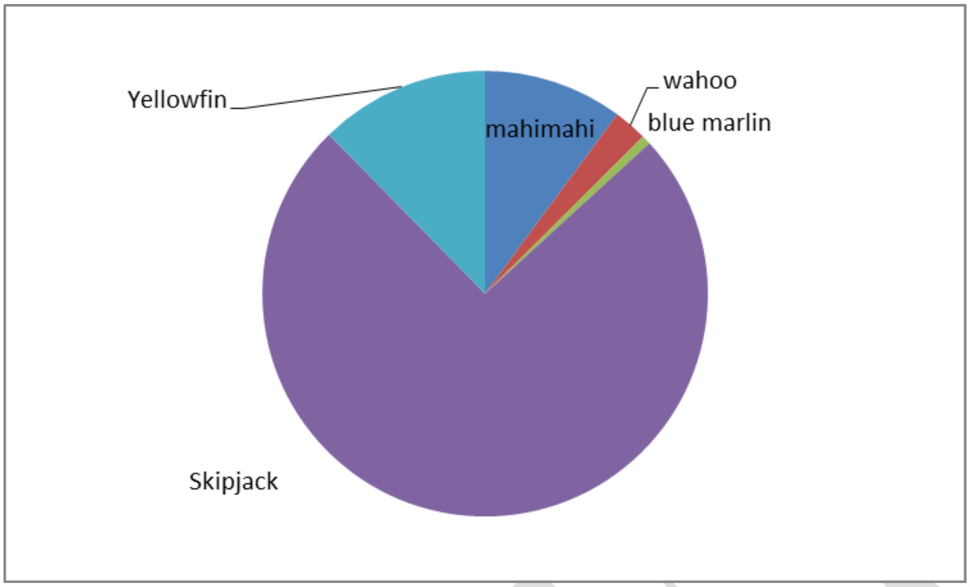


Figure 30. Creel survey estimates of pelagic landings in the CNMI, 2000-2014.
Source: WPRFMC (2015) and unpublished data.



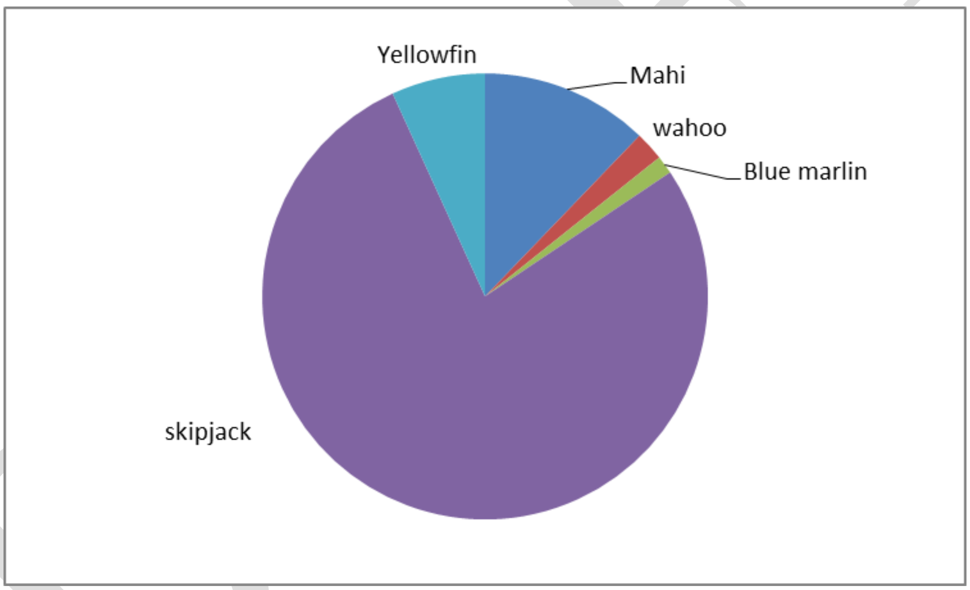


Figure 31. Species composition of CNMI troll catches from commercial receipt books (top) and creel survey (bottom).
Source: WPRFMC (2015) and unpublished data.

3.1.1.8.4 Fishing Areas

CNMI troll fishermen fish around the main southern islands of Saipan, Tinian and Rota, and on offshore banks such as Farallon de Medinilla.

3.1.1.8.5 Time of Fishing

Troll fishing in the CNMI is conducted during the daytime.

3.1.1.8.6 Number of Fishing Trips

Fishing effort in then CNMI troll fishery is measures by the annual number of troll fishing trips. Between 2000 and 2014, the annual number of troll fishing trips ranged from 3,200 to 6,800 troll fishing trips, with an average of 4,500 fishing trips per year.

3.1.1.8.7 Economics

Between 2002-2012, the average adjusted direct revenue from the CNMI pelagic fishery was $277,841 (tuna = $223,942; non-tuna = $53,899). During this period, the high year was 2003 ($562,590) and the low year was 2009 ($196,080). For current information regarding revenue of the fishery, price per pound, total direct employment, and fisheries-dependent services or industries, refer to the most current WPFMC Pelagic Annual Fishery Ecosystem Report (SAFE Report).

3.1.1.8.8 Estimated and Actual Processing Capacity Utilized by U.S. Processors

All of the pelagic fish landed in the CNMI, are landed primarily in Saipan and are consumed locally. There is no pelagic fish exported from CNMI.

3.1.1.8.9 Present and Probable Future Condition of the Fishery

A recent study by the Secretariat of the Pacific Community (Nicol 2014) indicates that there is a standing spawning stock of skipjack alone of between 106,000 and 135,000 mt in the US EEZ around the Mariana Archipelago. The average catch from the CNMI troll fishery is about 100 mt and the Guam fishery to the south catches about 270 mt, for a combined total of 370 mt. The discrepancy between the estimated spawning stock biomass and the troll catch in the archipelago suggests that a primary target species is only lightly exploited.

3.1.1.8.9.1 Maximum Sustainable Yield

For the most recent MSY for the fishery, refer to the current Pelagic Annual Fishery Ecosystem Report (SAFE Report).

3.1.1.8.9.2 Optimum Yield

Optimum yield (OY) for PMUS is defined as the amount of each management unit species or species complex that can be harvested by domestic and foreign fishing vessels in the EEZ and adjacent waters to the extent regulated by the FEP without causing local overfishing or economic overfishing within the EEZ of each island area, and without causing or significantly contributing to growth overfishing or recruitment overfishing on a stock-wide basis.

This definition of OY makes clear that the Council is concerned with localized overfishing and economic overfishing. This is because there may be times when local fishermen are concerned about the availability of the MUS in their area even though that/those species are not experiencing recruitment overfishing on an ocean-wide basis. The Council intends to manage Pacific pelagic MUS so that the economic viability of commercial fisheries, the social benefits associated with healthy recreational fisheries, and traditional fishing practices (e.g., for non-market personal consumption) are maintained. The FEP promotes, within the limits of managing at OY, domestic harvest of the management unit species in the EEZ and domestic fishery values for these species by enhancing the opportunities for satisfying recreational opportunities and profitable commercial fishing operations. Any expansion of existing fisheries, or the development of new fisheries, would be managed in this context.

The non-numeric definition of OY for the Pelagic FEP makes it difficult to quantify the domestic capacity to harvest OY or that portion of OY that can be made available for foreign fishing and to date no total allowable level of foreign fishing (TALFF) has been specified for this fishery. There is limited on-board processing of the CNMI troll catch apart from gilling and gutting larger fish. Thus domestic processors appear fully capable of processing 100 percent of domestic pelagic fish harvests in the CNMI segment of the Western Pacific Region.

3.1.1.8.9.3 Extent to Which Fishing Vessels will Harvest OY

Since OY for PMUS is defined as the amount of each management unit species or species complex that can be harvested by domestic and foreign fishing vessels in the EEZ and adjacent waters, fishing vessels will harvest 100% of OY as currently defined.

3.1.1.8.9.4 Extent to Which U.S. Fish Processors will Process OY

All pelagic fish landed by CNMI trollers are landed and processed in CNMI. No pelagic species are exported elsewhere.

3.1.1.8.10 Criteria for Determining Overfishing

Where stock assessments are conducted, overfishing is defined as Ft/Fmsy > 1.0, overfished is defined as Bt/Bmsy < Bmsst. In the absence of stock assessments other proxies are used such as the annual variation in catch per unit of effort (CPUE), changes in size frequency and average size and spawning potential ratio.

3.1.1.8.11 MSA Conservation and Management Measures

The three northernmost islands of the CNMI are part of the Islands Unit of the Mariana Trench Marine National Monument and waters out to 50 nm are closed to all commercial fishing (Figure 28).

Local fishery regulations require all commercial fishermen to report their catches.

Finally, all non-longline pelagic fishermen must also abide by the sea turtle handling requirements for hooked or entangled turtles found at 50 CFR 665.812 (FR vol. 70, No. 219, August 15, 2005, 69282-69285). These requirements are as follows:

- Sea turtles that cannot be brought aboard.
  - Disentangle and remove the gear, or cut the line as close as possible to the hook or entanglement
- Sea turtles that can be brought aboard.
  - Disentangle and remove the gear, or cut the line as close as possible to the hook or entanglement, to remove the maximum amount of the gear from the sea turtle.
- Sea turtle resuscitation (if animal appears dead or comatose)
  - Place the sea turtle on its belly so that the sea turtle is right side up and its hindquarters elevated at least 6 inches for a period of no less than 4 hours and no more than 24 hours. Greater elevations are needed for larger sea turtles.

- Administer a reflex test at least once every 3 hours. The test is to be performed by gently touching the eye and pinching the tail of a sea turtle to determine if the sea turtle is responsive
- Keep the sea turtle shaded and damp or moist (but under no circumstances place the sea turtle into a container holding water). A water-soaked towel placed over the eyes, carapace and flippers is the most effective method of keeping a sea turtle moist; and
- Return to the sea any sea turtle that revives and becomes active.
- Sea turtles that fail to revive within the 24-hour period must also be returned to the sea, unless NMFS requests the retention of a dead sea turtle for research. In releasing a sea turtle the vessel owner or operator must:
  - Place the vessel engine in neutral gear so that the propeller is disengaged and the vessel is stopped, and release the sea turtle away from deployed gear and observe that the turtle is safely away from the vessel before engaging the propeller and continuing operations.

3.1.1.8.12 Regulations Implementing International Recommendations and other Applicable Laws

There are no domestic regulations stemming from international regulations applicable to the the CNMI troll fishery.

3.1.1.8.13 Bycatch

A summary report from the year 2000 to 2012 by both non-charter and charter boats indicate less than 1% or 6 out of 49,376 of the total pelagic species landed is released. The only three species were reported as bycatch: mahimahi, yellowfin tuna and skipjack tuna. Four out of 3,136 mahimahi (0.13%) landed was released and 1 out of 2,398 Yellowfin Tuna (0.04%) landed was released. There was 1 out of 43,842 skipjack tuna recorded to be released. Charter boats had no reported bycatch.

3.1.1.9 Hawaii Aku Boat Fishery

3.1.1.9.1 Description

Hawaii used to have a very active pole-and-line bait boat fishery for skipjack or aku. This was the State of Hawaii's largest commercial fishery until its decline in the 1970s and 80s. The method uses live bait thrown from a fishing vessel to stimulate a surface school into a feeding frenzy. Fishing is then conducted frantically to take advantage of the limited time the school remains near the boat. The pole and line are of equal length, about 3m, and are used with a barbless hook with feather skirts which is slapped against the water until a fish strikes. Then the fish is yanked into the vessel in one fluid motion. The fish unhooks when the line is slackened so that the process can be repeated.

Baitfish was caught in embayments and lagoons around Hawaii, although the principal bait grounds were Pearl Harbor and Kaneohe Bay. Access to Pearl Harbor became increasingly restricted over time and commercial fishing vessels were banned entirely after September 11,

2001. The cannery closure in 1984 greatly reduced the aku boat fleet from its high in the 1950s of 32 vessels to 6 in 2000.

3.1.1.9.2 Type and Quantity of Fishing Gear

All Hawaii skipjack tuna are line-caught. Most of boats use pole and line (aku boats), using live bait to attract fish and barbless hooks to catch them. This traditional style of fishing comes from Japan. A full description of pole and line fishing is given by Wilson (2011). The fishery, such as it is, comprises less than three vessels and therefore any data is confidential, but when it was operating the aku vessels carried crews of 7-9 fishermen and fished 6 days a week.

3.1.1.9.3 Catch in Numbers or Weight

The catch between 2000 and 2009 was about 230,000 lbs. on average, ranging from 150,000 to 300,000 lbs. For current information regarding the Hawaiian aku boat fishery (should it recommence) refer to the most current WPFMC Annual Pelagic Fishery Ecosystem Report (SAFE Report).

3.1.1.9.4 Fishing Areas

Fishing is typically conducted in the coastal waters around Oahu, fishing on free swimming schools or on FADs deployed by the State of Hawaii.

3.1.1.9.5 Time of Fishing

Aku boat fishing in Hawaii conducted during the daytime.

3.1.1.9.6 Economics

The value of the aku boat landings between 2000 and 2009 averaged about $1.2 million, with a range of $0.6 million to $1.8 million.

3.1.1.9.7 Estimated and Actual Processing Capacity Utilized by U.S. Processors

All aku was processed locally.

3.1.1.9.8 Present and Probable Future Condition of the Fishery

The future condition of the fishery is highly uncertain, as no aku vessels are currently fishing.

3.1.1.9.8.1 Maximum Sustainable Yield

For the most recent MSY for the fishery, refer to the current Pelagic Annual Fishery Ecosystem Report (SAFE Report).

3.1.1.9.8.2 Optimum Yield

Optimum yield (OY) for PMUS is defined as the amount of each management unit species or species complex that can be harvested by domestic and foreign fishing vessels in the EEZ and adjacent waters to the extent regulated by the FEP without causing local overfishing or economic overfishing within the EEZ of each island area, and without causing or significantly contributing to growth overfishing or recruitment overfishing on a stock-wide basis.

This definition of OY makes clear that the Council is concerned with localized overfishing and economic overfishing. This is because there may be times when local fishermen are concerned about the availability of the MUS in their area even though that/those species are not experiencing recruitment overfishing on an ocean-wide basis. The Council intends to manage Pacific pelagic MUS so that the economic viability of commercial fisheries, the social benefits associated with healthy recreational fisheries, and traditional fishing practices (e.g., for non-market personal consumption) are maintained. The FEP promotes, within the limits of managing at OY, domestic harvest of the management unit species in the EEZ and domestic fishery values for these species by enhancing the opportunities for satisfying recreational opportunities and profitable commercial fishing operations. Any expansion of existing fisheries, or the development of new fisheries, would be managed in this context.

The non-numeric definition of OY for the Pelagic FEP makes it difficult to quantify the domestic capacity to harvest OY or that portion of OY that can be made available for foreign fishing and to date no total allowable level of foreign fishing (TALFF) has been specified for this fishery. With the exception of the American Samoa longline fishery which freezes catches, harvests by pelagic fisheries of the Western Pacific Region supply fresh fish markets, with little to no processing beyond heading and gutting of swordfish, and gilling and gutting of tunas and mahimahi > 20 lb.
There is no onboard processing of the aku boat catch other than icing the fish in the hold. Thus domestic processors appear fully capable of processing 100 percent of domestic pelagic fish harvests in the Hawaii segment of the Western Pacific Region.

3.1.1.9.8.3 Extent to Which Fishing Vessels will Harvest OY

Since OY for PMUS is defined as the amount of each management unit species or species complex that can be harvested by domestic and foreign fishing vessels in the EEZ and adjacent waters, fishing vessels will harvest 100% of OY as currently defined.

3.1.1.9.8.4 Extent to Which U.S. Fish Processors will Process OY

Landings of skipjack by the aku vessels were processed entirely in Hawaii and used mainly for making poke. Domestic processors were fully capable of processing 100 percent of catch from the fishery.

3.1.1.9.9 Criteria for Determining Overfishing

Where stock assessments are conducted, overfishing is defined as Ft/Fmsy > 1.0, overfished is defined as Bt/Bmsy < Bmsst. In the absence of stock assessments other proxies are used such as the annual variation in catch per unit of effort (CPUE), changes in size frequency and average size and spawning potential ratio.

3.1.1.9.10 MSA Conservation and Management Measures

All non-longline pelagic fishermen must also abide by the sea turtle handling requirements for hooked or entangled turtles found at 50 CFR 665.812 (FR vol. 70, No. 219, August 15, 2005, 69282-69285). These requirements are as follows:

- Sea turtles that cannot be brought aboard.
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    - Disentangle and remove the gear, or cut the line as close as possible to the hook or entanglement, to remove the maximum amount of the gear from the sea turtle.
- Sea turtle resuscitation (if animal appears dead or comatose)
    - Place the sea turtle on its belly so that the sea turtle is right side up and its hindquarters elevated at least 6 inches for a period of no less than 4 hours and no more than 24 hours. Greater elevations are needed for larger sea turtles.
    - Administer a reflex test at least once every 3 hours. The test is to be performed by gently touching the eye and pinching the tail of a sea turtle to determine if the sea turtle is responsive
    - Keep the sea turtle shaded and damp or moist (but under no circumstances place the sea turtle into a container holding water). A water-soaked towel placed over the eyes, carapace and flippers is the most effective method of keeping a sea turtle moist; and
    - Return to the sea any sea turtle that revives and becomes active.
    - Sea turtles that fail to revive within the 24-hour period must also be returned to the sea, unless NMFS requests the retention of a dead sea turtle for research. In releasing a sea turtle the vessel owner or operator must:
        - Place the vessel engine in neutral gear so that the propeller is disengaged and the vessel is stopped, and release the sea turtle away from deployed gear and observe that the turtle is safely away from the vessel before engaging the propeller and continuing operations.

3.1.1.9.11 Regulations Implementing International Recommendations and other Applicable Laws

There are international recommendations that apply to the aku vessel fleet.

3.1.1.9.12 Bycatch

There was very little bycatch in the aku boat fishery, other than fish that escaped from the pole-and-lines. Other species caught by the aku vessel fishery included mahimahi, kawakawa and yellowfin which are generally retained.

3.1.2 International Fisheries Management

3.1.2.1 Western and Central Pacific Fisheries Commission

The Western and Central Pacific Fisheries Commission (WCPFC) was established by the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPF Convention) (Figure 32) which entered into force on 19 June 2004. The Convention was concluded after six years of negotiation which commenced in 1994. The period between the conclusion of the Convention and its entry into force was taken up by a series of Preparatory Conferences that laid the foundations for the Commission to commence its work.

The WCPF Convention draws on many of the provisions of the UN Fish Stocks Agreement (UNFSA) while, at the same time, reflecting the special political, socio-economic, geographical and environmental characteristics of the western and central Pacific Ocean (WCPO) region. The WCPFC Convention seeks to address problems in the management of high seas fisheries resulting from unregulated fishing, over-capitalization, excessive fleet capacity, vessel re-flagging to escape controls, insufficiently selective gear, unreliable databases and insufficient multilateral cooperation in respect to conservation and management of highly migratory fish stocks. A framework for the participation of fishing entities in the Commission which legally binds fishing entities to the provisions of the Convention, participation by territories and possessions in the work of the Commission, recognition of special requirements of developing States, and cooperation with other Regional Fisheries Management Organizations (RFMO) whose respective areas of competence overlap with the WCPFC reflect the unique geo-political environment in which the Commission operates.

The Commission supports three subsidiary bodies; the Scientific Committee, Technical and Compliance Committee, and the Northern Committee, that each meet once during each year. The meetings of the subsidiary bodies are followed by a full session of the Commission. The work of the Commission is assisted by a Finance and Administration Committee.

The Members of the WCPC are as follows: Australia, China, Canada, Cook Islands, European Union, Federated States of Micronesia, Fiji, France, Indonesia, Japan, Kiribati, Republic of Korea, Republic of Marshall Islands, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Philippines, Samoa, Solomon Islands, Chinese Taipei, Tonga, Tuvalu, United States of America, and Vanuatu.

The Participating Territories are American Samoa, Commonwealth of the Northern Mariana Islands, French Polynesia, Guam, New Caledonia, Tokelau, and Wallis and Futuna.

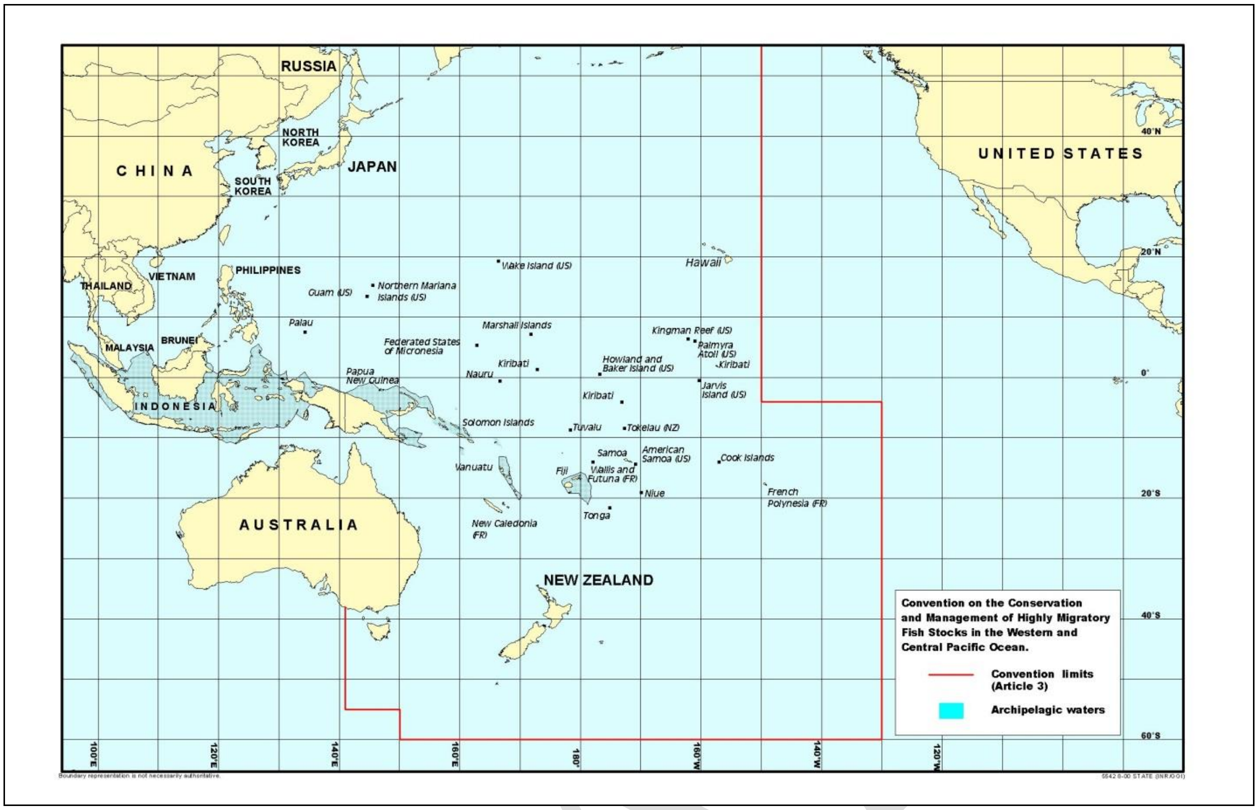

Figure 32. Area of Competence of the Western and Central Pacific Fisheries Commission

The Hawaii longline fleet is subject to Conservation and Management Measures (CMMs) from the Western and Central Pacific Fisheries Commission (WCPFC). The US engages in domestic rulemaking for the Hawaii longline fleet based on commission measures.

The principal measures enacted by this commission which have the greatest impact on the Hawaii longline fleet are for bigeye tuna. In 2008 the Hawaii longline fleet was forced to reduce its catch to 90% of its 2004 level (4,181) mt for the years 2009-2011 under WCPFC CMM 2008-01. This catch limit was maintained until the passage of CMM 2013-01, which required further 5% cuts in 2015 (3,554 mt) and 2017 (3,345 mt).

CMM 2011-04 and CMM 2013-08 prohibit the retention of oceanic white tips and silky sharks respectively, by pelagic fishing vessels operating in the WCPO.

CMM 2010-01 requires that all pelagic fisheries maintain commercial catches of striped marlin below 458 mt. This includes the Hawaii troll fishery.

3.1.2.2 The Inter-American Tropical Tuna Commission

The IATTC is responsible for the conservation and management of tuna and other marine resources in the Eastern Pacific Ocean (Figure 33).
The members of the of the IATTC are: Belize, European Union, Nicaragua, Canada, France, Panama, China, Guatemala, Peru, Colombia, Japan, Chinese Taipei, Costa Rica, Kiribati, United States, Ecuador, Korea, Vanuatu, El Salvador, Mexico, and Venezuela

Bolivia, Honduras, Indonesia and Liberia are Cooperating Non Members
Each member of the IATTC is represented by up to four Commissioners, appointed by the respective government.

The IATTC also has significant responsibilities for the implementation of the International Dolphin Conservation Program (IDCP), and provides the Secretariat for that program.

The Hawaii longline fishery is subject to the Resolutions of the Inter-American Tropical Tuna Commission (IATTC). Currently, the IATTC Resolution C-13-01, which limits vessels (US) vessels > 24 m to a catch of 500 mt of bigeye tuna, while IATTC's Resolution C-11-10 prohibits longline retention of silky sharks in the EPO.

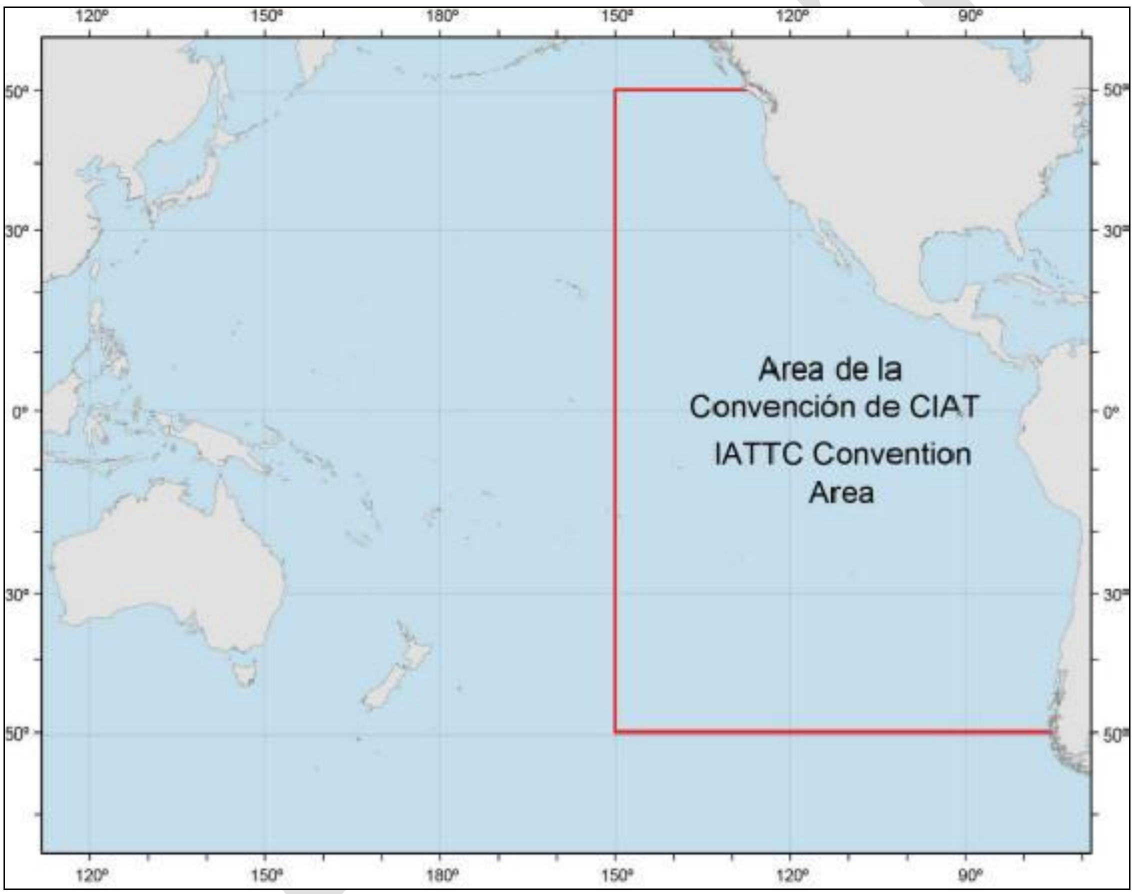

Figure 33. Area of Competence of the Inter-American Tropical Tuna Commission

3.1.2.3 South Pacific Regional Fishery Management Organization.

The South Pacific Regional Fisheries Management Organization (SPFRMO) is an inter-governmental organization that is committed to the long-term conservation and sustainable use of the fishery resources of the South Pacific Ocean and in so doing safeguarding the marine ecosystems in which the resources occur. The SPRFMO Convention applies to the high seas of the South Pacific, the largest area of responsibility for a Regional Fisheries Management

Organization so far. Currently, the main commercial resources managed by the SPRFMO are Jack mackerel and jumbo flying squid in the Southwest Pacific and, to a much lesser degree, deep-sea species associated with seamounts in the Southeast Pacific.

The Organization consists of a Commission and a number of subsidiary bodies. New Zealand is the Depositary for the SPRFMO Convention and hosts the SPRFMO Secretariat in Wellington.

The membership of SPRFMO includes: Australia, Belize, Republic of Chile, People's Republic of China, Cook Islands, Republic of Cuba, Republic of Ecuador, European Union, Kingdom of Denmark in respect of the Faroe Islands, Republic of Korea, New Zealand, the Russian Federation, Chinese Taipei, and the Republic of Vanuatu.

Cooperating non-Contracting Parties (CNCPs) include Colombia, France (Territories), Republic of Liberia, Republic of Panama, Republic of Peru and United States of America.

3.1.2.4 North Pacific Fisheries Commission

The North Pacific Fisheries Commission (NPFC) is an inter-governmental organization established by the Convention on the Conservation and Management of High Seas Fisheries Resources in the North Pacific Ocean (Figure 34). The objective of the Convention is to ensure the long-term conservation and sustainable use of the fisheries resources in the Convention Area while protecting the marine ecosystems of the North Pacific Ocean in which these resources occur.

Fisheries resources covered by the Convention is all fish, mollusks, crustaceans and other marine species caught by fishing vessels within the Convention Area, excluding:

(i) sedentary species insofar as they are subject to the sovereign rights of coastal States; and indicator species of vulnerable marine ecosystems as listed in, or adopted pursuant to the NPFC Convention;
(ii) catadromous species;
(iii) marine mammals, marine reptiles and seabirds; and
(iv) other marine species already covered by pre-existing international fisheries management instruments within the area of competence of such instruments.

Canada, China, Japan, the Republic of Korea, the Russian Federation, the United States of America, and Chinese Taipei negotiated the Convention, which was adopted on February 24, 2012. The Convention was entered into on July 19, 2015 (180 days after receipt of the 4th instrument of ratification, acceptance, approval or accession). Japan has been acting as the Interim Secretariat until the NPFC Secretariat is established.

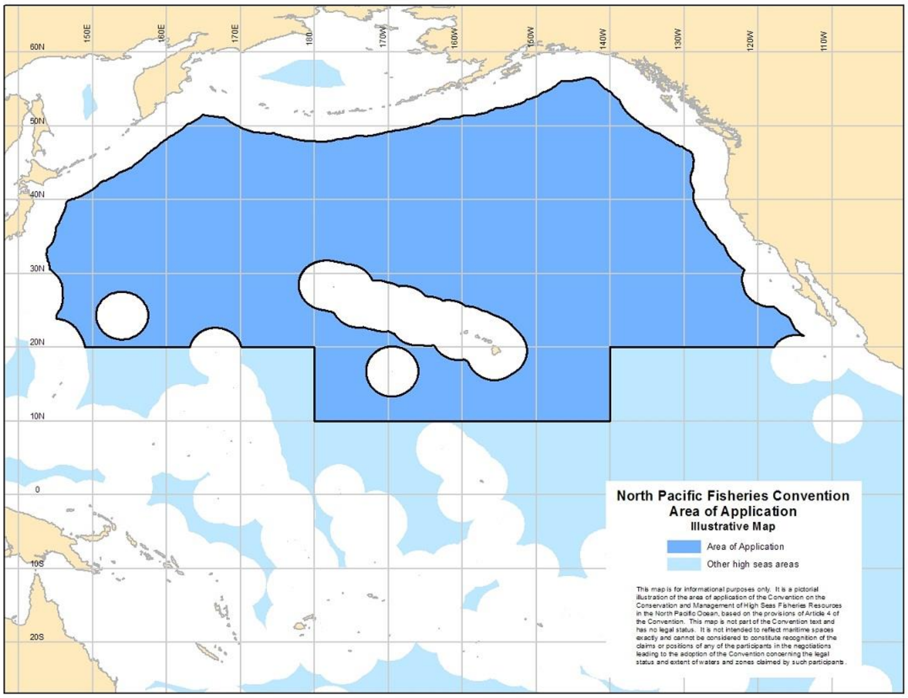

Figure 34. Area of competence for the North Pacific Fisheries Commission.

3.1.2.5 Forum Fisheries Agency

The Pacific Islands Forum Fisheries Agency (FFA) strengthens national capacity and regional solidarity so its 17 members can manage, control and develop their tuna fisheries now and in the future.

Based in Honiara, Solomon Islands, FFA's 17 Pacific Island members are Australia, Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu and Vanuatu.

FFA was established to help countries sustainably manage their fishery resources that fall within their 200 mile Exclusive Economic Zones (EEZs). FFA is an advisory body providing expertise, technical assistance and other support to its members who make sovereign decisions about their tuna resources and participate in regional decision making on tuna management through agencies such as the Western Pacific Fisher (WCPFC).

Since 1979, FFA has facilitated regional cooperation so that all Pacific countries benefit from the sustainable use of tuna – worth over $3 billion a year and important for many people's livelihoods in the Pacific.

Staff at the regional FFA headquarters in Honiara support their national contact points in departments of foreign affairs and fisheries in each member jurisdiction. FFA focuses its work on:

1. Fisheries management – providing policy and legal frameworks for the sustainable management of tuna;
2. Fisheries development – developing the capacity of members to sustainably harvest, process and market tuna to create livelihoods;
3. Fisheries operations – supporting monitoring, control and surveillance of fisheries as well as treaty administration, information technology and vessel registration and monitoring; and
4. Corporate services - supporting the organization’s work through administration, human resources, budgeting and other corporate functions.

The founding document of the Agency is the South Pacific Forum Fisheries Agency Convention. The Forum Fisheries Committee meets annually to consider regional policies and the budget and work program of FFA.

3.1.2.6 Parties to the Nauru Agreement

The Parties to the Nauru Agreement (PNA) controls the world's largest sustainable tuna purse seine fishery.

PNA Members are the Federated States of Micronesia, Kiribati, Marshall Islands, Nauru, Palau, Papua New Guinea, Solomon Islands and Tuvalu. Tokelau, though not a PNA member, has signed an agreement with that enables it to participate in the purse seine vessel day scheme.

PNA conservation measures include high seas closures to fishing, controls on Fish Aggregating Devices (FADs), protection for whale sharks and the 100% coverage of purse seine fishing vessels with observers.

In 2011, the PNA skipjack tuna caught without using FADs was certified by the Marine Stewardship Council as sustainable, creating the world's largest sustainable tuna purse seine fishery.

PNA controls around 50% of the global supply of skipjack tuna, the most commonly canned tuna. The focus of PNA efforts to sustainably manage tuna is the Vessel Day Scheme (VDS). PNA members agree on a limited number of fishing days for the year, based on scientific advice about the status of the tuna stocks. Fishing days are then allocated by country and sold to the highest bidder. In this way, Pacific Islanders reap economic benefits from their sustainable management of tuna.

3.1.2.7 Secretariat of the Pacific Community’s Ocean Fisheries Program

The Oceanic Fisheries Programme (OFP) is part of the Fisheries, Aquaculture and Marine Ecosystems (FAME) Division of SPC, and is the Pacific Community’s regional center for tuna fisheries research, fishery monitoring, stock assessment and data management. It was established by the 1980 South Pacific Conference (as the Tuna and Billfish Assessment Programme) to continue and expand the work initiated by its predecessor project, the Skipjack Survey and Assessment Program.

3.1.2.8 The Secretariat of the Pacific Regional Environment Programme (SPREP)

The Secretariat of the Pacific Regional Environment Programme (SPREP) has been charged by the governments and administrations of the Pacific region with the protection and sustainable development of the region's environment. ,SPREP is based in Apia, Samoa, with over 90 staff.

SPREP's members are American Samoa, Australia, Commonwealth of the Northern Mariana Islands, Cook Islands, Federated States of Micronesia, Fiji, France, French Polynesia, Guam, Kiribati, Marshall Islands, Nauru, New Caledonia, New Zealand, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, United Kingdom, United States of America, Vanuatu and Wallis and Futuna.

SPREP's activities are guided by its Strategic Action Plan 2011-2015. Develop through extensive consultation with Members, Secretariat program staff and partner organizations, the Plan establishes four strategic priorities:

- Climate Change;
- Biodiversity and Ecosystem Management;
- Waste Management and Pollution Control; and
- Environmental Monitoring and Governance.

3.1.2.9 Other Oceans: Indian Ocean Tuna Commission (IOTC), Commission for the Conservation of Southern Bluefin (CCSBT) and International Commission for the Conservation of Atlantic Tuna (ICCAT)

International tuna management is a global enterprise with Commissions in the Southern Ocean, the Indian Ocean and the Atlantic Ocean (Figure 35)

Figure 35. Global overview of the various tuna Regional Fisheries Management Organizations (tRFMOs), and the IOTC, CCSBT and ICCAT in relation to the Pacific tRFMOs.

3.1.2.10 United Nations Food and Agriculture Organization (FAO)

The key activities of the FAO Fisheries and Aquaculture Department are driven to support and promote responsible and sustainable development in fisheries and aquaculture
Activities reflect the main FAO mandate of managing knowledge and information, assuring a global neutral forum for Members and providing technical assistance. They also relate to the Department's overall goals and mission, specifically the management and conservation of aquatic resources; utilization, marketing and trade of fishery products; and development of fisheries policies. Each activity contains a brief introduction with links to available background and related information; some also have Web sites for specific programs or projects.

The Committee on Fisheries (COFI), a subsidiary body of the FAO Council, was established by the FAO Conference at its Thirteenth Session in 1965. The Committee presently constitutes the only global inter-governmental forum where major international fisheries and aquaculture problems and issues are examined and recommendations addressed to governments, regional fishery bodies, NGOs, fish-workers, FAO and international community, periodically on a world-wide basis. COFI has also been used as a forum in which global agreements and non-binding instruments were negotiated.

COFI membership is open to any FAO Member and non-Member eligible to be an observer of the Organization. Representatives of the UN, UN bodies and specialized agencies, regional fishery bodies, international and international non-governmental organizations participate in the debate, but without the right to vote.

The First COFI meeting was in 1966, and thereafter annually until 1975. Since 1977, the sessions have been held biennially.

The two main functions of COFI are to review the programs of work of FAO in the field of fisheries and aquaculture and their implementation, and to conduct periodic general reviews of fishery and aquaculture problems of an international character and appraise such problems and their possible solutions with a view to concerted action by nations, by FAO, inter-governmental bodies and the civil society. The Committee also reviews specific matters relating to fisheries and aquaculture referred to it by the Council or the Director-General of FAO, or placed by the Committee on its agenda at the request of Members, or the United Nations General Assembly. In its work, the Committee supplements rather than supplants other organizations working in the field of fisheries and aquaculture.

3.1.2.11 South Pacific Tuna Treaty (SPTT)

The South Pacific Tuna Treaty entered into force in 1988, with an initial five year agreement, to set operational terms and conditions for the U.S. tuna purse seine fleet to fish in the Western and Central Pacific Ocean (WCPO), including waters under the jurisdiction of the Pacific Island Parties to the Treaty. The Treaty was extended in 1993, and again in 2002, when the parties agreed to amend and extend the Treaty and to extend the related Economic Assistance Agreement between the United States and the members of the Pacific Islands Forum, as represented by the Forum Fisheries Agency, for a term of 10 years. In May of 2013, representatives from the United States and the Pacific Island Parties agreed to extend the

Economic Assistance Agreement for another 10 years, and signed an interim arrangement to extend the Treaty until December 31, 2014. In October 2013 an interim arrangement was again signed, and the Treaty extended until December 31, 2015. The Treaty continues to be under negotiation to be amended and extended.

The participating members of the SPTT include Australia, Cook Islands, Federated States of Micronesia , Fiji, Kiribati, Marshall Islands, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, United States, and Vanuatu. The area under the competence of the SPTT is shown in Figure 40.

United States operational, administrative, and enforcement commitments under the SPTT are carried out by the NMFS. These responsibilities are implemented by the NMFS Pacific Islands Regional Administrator, located in Honolulu, Hawaii and by staff in Honolulu and Pago Pago, American Samoa.

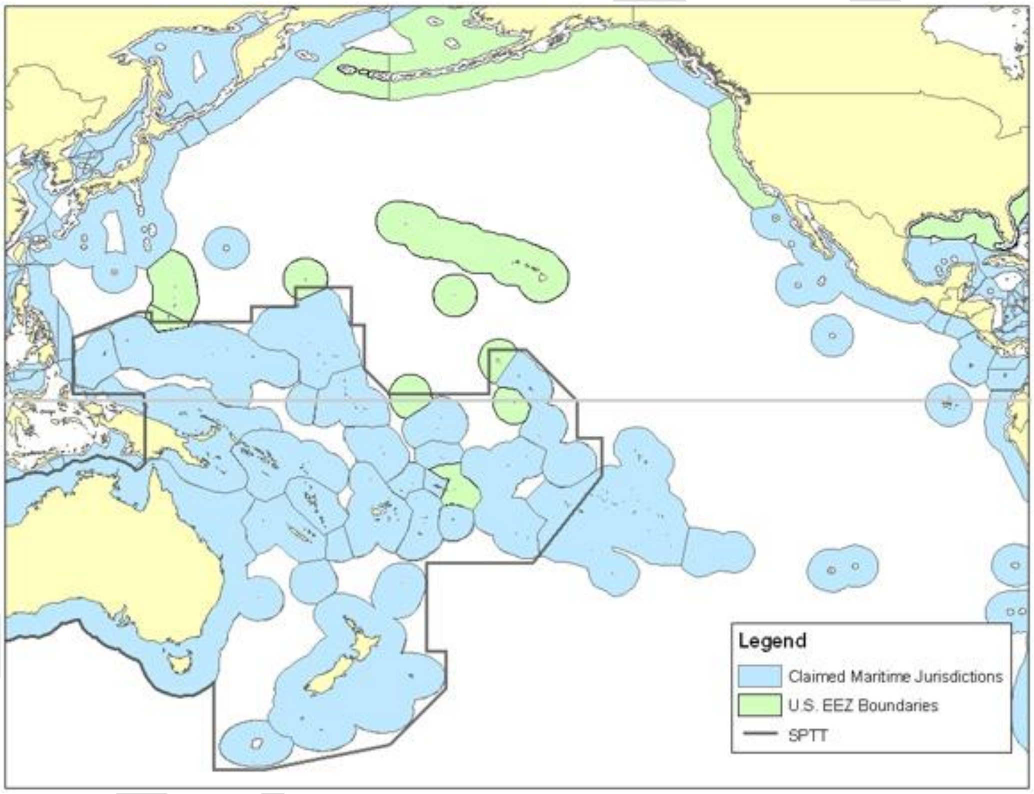

Figure 36. Area under the competence of the South Pacific Tuna Treaty.

3.1.2.12 US Purse Seine Fishery

The US purse seine fleet operates in the WCPO and has operated under the multilateral treaty between the US and the countries listed above. Management of the fishery is conducted under the terms of the SPTT, but when operating in the US EEZ in the WCPO the fleet is subject to management by the WPRFMC. In American Samoa, this takes the form of an area closure out to 50 nm closed to vessels > 50 ft. in length, which includes all US purse seiners.

Catches by the US purse seine fleet has been variable over time (Figure 37) and related to the dynamics of the fleet which declined from 39 vessels in 1998 to 14 in 2006, and back to 40 by 2013. Current catches amount to about 250,000 mt, comprised primarily of skipjack, with minor amounts of yellowfin and bigeye. The bigeye purse sein catch though small has been a major management issue for the WCPFC since it is comprised primarily of juveniles and contributes to overfishing of the WCPO bigeye stock.

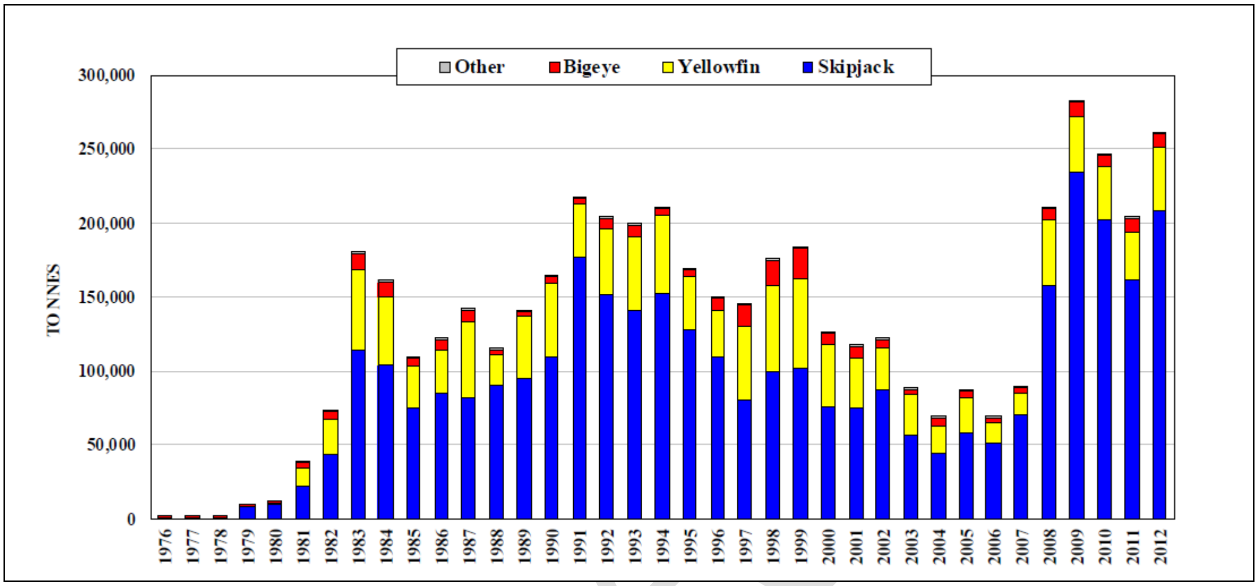

Figure 37. Catch time series for the US purse seine fleet from 1976 to 2012

3.1.2.13 Tokelau Arrangement

This Management Scheme is made pursuant to the Tokelau Arrangement for the management of the South Pacific Longline Fishery. The objective of this Management Scheme is to enhance the management of longline fishing vessel effort in the waters of the Parties by encouraging collaboration between all Parties, and:

i) promote optimal utilization, conservation and management of tuna resources;
ii) maximize economic returns, employment generation and export earnings from sustainable harvesting of tuna resources;
iii) support the development of domestic locally based longline fishing industries;
iv) secure an equitable share of fishing opportunities and equitable participation in the south pacific longline fisheries for the Parties;
v) increase control of the south Pacific longline fishery for the Parties;
vi) enhance data collection and monitoring of the fishery;
vii) promote effective and efficient administration, management and compliance; and
viii) encourage collaboration between the Parties.

Through this Management Scheme, the Parties shall seek to limit the level of fishing by longline vessels in their waters to the levels of total allowable catch agreed by the Parties to the Tokelau Arrangement.

3.2 Common to All Pelagics MUS

3.2.1 Annual Catch Limits

In the western Pacific, two international fishery agreements have been ratified by Congress and are applicable to pelagic species listed in the Fishery Ecosystem Plan for Pelagic Fisheries of the Western Pacific. The international fishery agreements are:

(1) The Convention on the Conservation and Management of Highly Migratory Species in the Western and Central Pacific (WPCFC); and

(2) The Inter-American Tropical Tuna Convention (IATTC).

Article 2 of the WCPFC Convention states "The objective of this Convention is to ensure, through effective management, the long-term conservation and sustainable use of highly migratory fish stocks in the western and central Pacific ..." Article 1 defines highly migratory fish stocks as "all fish stocks of the species listed in Annex 1 of the 1982 Convention [United Nations Convention on Law of the Sea] occurring in the [WCPFC] Convention Area, and such other species of fish as the Commission may determine, except sauries" (See Appendix 3 for a copy of Annex 1 of the United Nations Convention on Law of the Sea). Similarly, Article 1 of the IATTC Antigua Convention, which entered into force on August 27, 2010, defines fish stocks covered by this Convention as "stocks of tunas and tuna-like species and other species of fish taken by vessels fishing for tunas and tuna- like species in the Convention Area."

In evaluating the application of the criteria "subject to management under an international agreement," the Council considered the following factors:

- Whether the international agreement applies to the species and/or to vessels managed under the Pacific Pelagic FEP that fish for and retain tuna and tuna-like species;
- Whether there are relevant international conservation and management measures in place for the species;
- Whether there is an existing international stock assessment for the species; and
- Whether there is intent by the members of international agreement to undertake a stock assessment for the species.

Based on these factors, the Council has determined that all finfish listed under the Pacific Pelagic FEP meet the criteria for a statutory exemption from ACLs and AMs. Although the MSA does not preclude the Council from applying the ACL mechanism on just the U.S. portion of the catch of these stocks, the Council believes that doing so would unfairly penalize U.S. fishermen while having no beneficial impact to the conservation of these stocks throughout their range because the "relative impact" of vessels managed under the Pacific Pelagic FEP to the mortality of the stock is minimal when compared to contribution of international fishing fleets.

The United States longline fleet is subject to Conservation and Management Measures (CMMs) from the Western and Central Pacific Fisheries Commission (WCPFC) and Resolutions of the Inter-American Tropical Tuna Commission (IATTC). Some WCPFC CMMs, such as for striped marlin, apply to all pelagic fisheries – not just longliner fisheries. The US engages in domestic rulemaking for the US Island-based (i.e., Hawaii, American Samoa) and the US West-coast-based longline fleet to comply with commission measures and resolutions.

The principal measures enacted by these two commissions which have the greatest impact on the Hawaii longline fleet are for bigeye tuna. In 2008 the Hawaii longline fleet was forced to reduce its catch to 90% of its 2004 level (4,181) mt for the years 2009-2011 under WCPFC CMM 2008-01. This catch limit was maintained until the passage of CMM 2013-01, which required further 5% cuts in 2015 (3,554 mt)and 2017 (3,345 mt). Currently, the IATTC Resolution C-13-01, which limits vessels (US) vessels > 24 m to a catch of 500 mt of bigeye tuna.

The use of the international exception will not adversely reduce management of the Pelagic MUS that are proposed to be assigned to this category. The tuna regional fishery management organizations (RFMO) will likely conduct stock assessments on all species of importance other than tuna, including billfish and incidentally caught but economically important species such as mahimahi, wahoo, opah and monchong. Although stock assessments have yet to be conducted for the majority of these species the tuna RFMOs are collecting and improving the provision of catch information on all economically important pelagic species, and requiring member countries provide this information in their annual reports to the RFMOs. The NMFS guidelines require that even species subject to the international exception should have MSY, OFL, and SDC regardless of the fact that an ACL is not implemented. However, without a stock assessment for these stocks, it is not possible at this time to determine these values; these values will only be forthcoming as stock assessments are completed. The results will be included in the international fisheries module of the Council's Pelagic Annual Fishery Ecosystem Report (SAFE Report).

3.2.2 Essential Fish Habitat

The following EFH designations were developed by the Council and approved by the Secretary of Commerce on February 3, 1999 (64 FR 19068).

In describing and identifying EFH for PMUS, four alternatives were considered: (1) designate EFH based on the best available scientific information (preferred alternative), (2) designate all waters EFH, (3) designate a minimal area as EFH, and (4) no action. Ultimately, the Council selected Alternative 1 designate EFH based on observed habitat utilization patterns in localized areas as the preferred alternative.

This alternative was preferred by the Council for three reasons. First, it adhered to the intent of the MSA provisions and to the guidelines that have been set out through regulations and expanded on by NMFS because the best available scientific data were used to make carefully considered designations. Second, it resulted in more precise designations of EFH at the species complex level than would be the case if Alternative 2 were chosen. At the same time, it did not run the risk of being arbitrary and capricious as would be the case if Alternative 3 were chosen. Finally, it recognized that EFH designation is an ongoing process and set out a procedure for reviewing and refining EFH designations as more information on species' habitat requirements becomes available.

The Council has used the best available scientific information to describe EFH in text and tables that provide information on the biological requirements for each life stage (egg, larvae, juvenile, adult) of all MUS. Careful judgment was used in determining the extent of the essential fish habitat that should be designated to ensure that sufficient habitat in good condition is available to maintain a sustainable fishery and the managed species' contribution to a healthy ecosystem. Because there are large gaps in scientific knowledge about the life histories and habitat requirements of many MUS in the Western Pacific Region, the Council adopted a precautionary approach in designating EFH to ensure that enough habitats are protected to sustain managed species.

PMUS under the Council's jurisdiction are found in tropical and temperate waters throughout the Pacific Ocean. Variations in the distribution and abundance of PMUS are affected by ever changing oceanic environmental conditions including water temperature, current patterns, and the availability of food. There are large gaps in the scientific knowledge about basic life histories and habitat requirements of many PMUS. The migration patterns of PMUS stocks in the Pacific Ocean are poorly understood and difficult to categorize despite extensive tagging studies for many species. Little is known about the distribution and habitat requirements of the juvenile life stages of tuna and billfish after they leave the plankton until they recruit to fisheries. Since spawning and larvae occur only in tropical temperatures (including temperate summer), the prerecruit sizes are likely more tropically distributed than recruits, and juvenile tunas of this size (1–15 cm) are only caught in large numbers around tropical archipelagoes. Very little is known about the habitat of different life history stages of PMUS that are not targeted by fisheries (i.e., sharks, Gempylids).

To reduce the complexity and the number of EFH identifications required for individual species and life stages, the Council has designated EFH for pelagic species assemblages pursuant to Section 600.805(b) of 62 FR 66551. The species complex designations for the PMUS are temperate species, tropical species, and sharks. The designation of these complexes is based on the ecological relationships among species and their preferred habitat. The marketable species complex has been subdivided into tropical and temperate assemblages. The temperate species complex includes those PMUS that are found in greater abundance in higher latitudes such as swordfish and bigeye, bluefin, and albacore tuna. In reality, all PMUS are tropical.

3.2.2.1 Description and Identification of Essential Fish Habitat

Because of the uncertainty about the life histories and habitat utilization patterns of many PMUS, the Council has taken a precautionary approach by adopting a 1,000 meters depth as the lower bound of EFH for PMUS. Although many of the PMUS are epipelagic, bigeye tuna are abundant at depths in excess of 400 meters and swordfish have been tracked to depths of 800 meters. One thousand meters is the lower bound of the mesopelagic zone. The vertically migrating mesopelagic fishes and squids associated with the deep scattering layer are important prey organisms for PMUS and are seldom abundant below 1,000 meters. This designation is also based on anecdotal reports of fishermen that PMUS aggregate over raised bottom topographical features as deep as 2,000 meters (1,000 fm) or more. This belief is supported by research that indicates seabed features such as seamounts exert a strong influence over the superadjacent water column. For example, studies by Polzin et al. (1997) in the Atlantic and Kunze and Toole (1997) in the Northwest Pacific show that mixing occurs mostly at oceanic boundaries: along continental slopes, above seamounts and mid-ocean ridges, at fronts, and in the mixed layer at the sea surface. Mixing results in areas of high primary productivity which in turn become foraging ‘hotspots’ for pelagic species including sea turtles (Polovina et al. 2006) and tunas (Gunn et al. 2005).

The eggs and larvae of all teleost PMUS are pelagic. They are slightly buoyant when first spawned, are spread throughout the mixed layer and are subject to advection by the prevailing ocean currents. Because the eggs and larvae of the PMUS are found distributed throughout the tropical (and in summer, the subtropical) epipelagic zone, EFH for these life stages has been designated as the epipelagic zone (~200 m) from the shoreline to the outer limit of the EEZ. The only generic variation in this distribution pattern occurs in the northern latitudes of the Hawaii EEZ, which extends farther into the temperate zone than any other EEZ covered by the plan. In these higher latitudes, eggs and larvae are rarely found during the winter months (November–February).

For additional details on the life history and habitat utilization patterns of individual PMUS, please see the EFH descriptions and maps contained in Appendices G and I.

3.2.2.2 Identification of Habitat Areas of Particular Concern

The Council designated the water column down to 1,000 meters that lie above all seamounts and banks within the EEZ shallower than 2,000 meters (1,000 fm) as habitat areas of particular concern (HAPC) for PMUS. In determining whether a type or area of EFH should be designated as an HAPC, one or more of the following criteria established by NMFS must be met: (a) the ecological function provided by the habitat is important; (b) the habitat is sensitive to human-induced environmental degradation; (c) development activities are, or will be, stressing the habitat type; or (c) the habitat type is rare. However, it is important to note that if an area meets only one of the HAPC criteria, it will not necessarily be designated an HAPC.

The EFH relevance of topographic features deeper than 1,000 meters is due to the influence they have on the overlying mesopelagic zone. These deeper features themselves do not constitute EFH, but the waters from the surface to 1,000 meters deep superadjacent to these features are designated as HAPC within the EFH. The 2,000-meter depth contour captures the summits of most seamounts mentioned by fishermen, and all banks within the EEZ waters under the Council’s jurisdiction. The basis for designating these areas as HAPC is the ecological function provided, the rarity of the habitat type, the susceptibility of these areas to human-induced environmental degradation, and proposed activities that may stress the habitat type.

As noted above, localized areas of increased biological productivity are associated with seamounts, and many seamounts are important grounds for commercial fishing in the Western Pacific Region. There have been proposals to mine the manganese rich summits of the off-axis seamounts in the EEZ around Hawaii. The possible adverse impacts of this proposed activity on fishery resources are of concern to the Council.

Because the PMUS are highly migratory, the areas outside the EEZ in the Western Pacific Region are designated by the Council as “important habitat” because they provide essential spawning, breeding, and foraging habitat.

3.2.3 Marine Planning

In the Western Pacific Region, pelagic fisheries compete with other activities for fishing grounds and access to them. These activities include, but are not limited to, military bases and training activities, commercial shipping, marine protected areas, recreational activities and off-shore energy initiatives.

Issues of multiple human uses, ecosystem health and cumulative impacts and is a component of the National Ocean Policy. Since 2010, Coastal and Marine Spatial Planning (CMSP) has been the focus of several of the Council's advisory body meetings and outreach activities. During this time, the Council also began transforming its Marine Protected Area Committee first into a CMSP Committee and then into the current Marine Planning and Climate Change Committee (MPCC, see above for details on the Committee).

In 2015, the Western Pacific Regional Fishery Management Council adopted its MPCC Policy, which was drafted by the Council's MPCC Committee. The policy uses the definition of marine planning as defined in the National Ocean Policy Implementation Plan. The MPCC policy recognizes a set of overarching and specific principles and specific policy points for the Council, its advisory bodies and its staff to consider and incorporate in the Pacific Pelagic FEP as well as in Council programs and other actions. The policy notes that marine planning can be used to determine ocean management priorities across jurisdictions and identify common objectives. The MPCC Policy recognizes that traditional resource management systems, such as the `Aha Moku in Hawaii and Fa`a Samoa in American Samoa, can provide an appropriate context for marine planning. A key component of the policy is collaboration with existing organizations in data and information collection, dissemination and outreach. The Council intends to work with the Pacific Islands Regional Planning Body, community members, the private-sector, schools, policymakers and others in Hawaii, American Samoa, Guam and the CNMI. The MPCC Policy can be found on the Council's website.

The Council's Plan Team (restructured in 2015) includes a marine planning expert, and a section on marine planning will be included in the Pacific Pelagic FEP annual reports.

3.2.4 Standardized Bycatch Reporting Methodology

The standardized reporting methodology used to assess the amount and type of bycatch occurring in the pelagics fishery utilizes a combination of data collection and analysis systems implemented by NMFS and local-level fisheries agencies. NMFS PIFSC and the Western Pacific Fishery Information Network (WPacFIN) coordinate the collection and analysis of data and the Council compiles and publishes the relevant data in the Stock Assessment and Fishery Evaluation (SAFE) report, which is the Council's Pelagic Fisheries Annual Report.

Data collection systems used in the pelagics fisheries that yield information about bycatch vary between the different fishery sectors, and include vessel observer programs, vessel and trip logbook programs, and creel surveys. Fishery-independent sources of information, including experimental fishing studies and tagging studies, are also used on an as-needed and as-available basis. There are various systems to monitor sales of pelagic species, but because they yield little information about bycatch they are not addressed here.

The most reliable and precise source of bycatch data (for a given trip) is from vessel observer programs. The precision associated with fishery-wide catch and bycatch estimates derived from the data is a function of the proportion of fishing trips that are observed and the frequency of encounters for a given species.

Vessel logbook programs have the advantage of high degrees of coverage but have the disadvantage of relying solely on fishermen to record detailed information about many species, many of which are difficult to distinguish. In the case of protected species, fishermen may be disinclined to report interactions; if they believe a high interaction rate will lead to restrictions on the fishery.

Creel surveys, which rely on direct observations of landings and interviews with fishermen just after reaching port, yield reliable information about landings and somewhat reliable information about bycatch. The latter is limited by the memories (and sometimes truthfulness) of fishermen and the difficulties in accurately identifying fish, mammals, sea turtles, and seabirds to the species level. Like vessel observer data, the precision associated with fishery-wide estimates derived from creel surveys is a function of sampling intensity.

Experimental fishing data are useful for accurately measuring catch composition to the species level, which is useful for assessing the reliability of fishery logbook data (i.e., retentions and discards combined) and for generating correction factors for those data. They can also be used to measure the percentage of fish that is landed alive, which may be indicative of survival rates of discards. Tagging studies can be used to assess mortality rates of discarded species.

Data collected through any of these methods can be used independently, and where they overlap, they can be used to corroborate each other and generate corrected estimates. For example, a research project was conducted to assess the level of concurrence among several sources of catch data (logbook, observer, and sales data) collected in the Hawaii-based longline fishery and to develop predictive models to generate corrected fishery-wide catch statistics which can be used for stock assessments and other purposes (Walsh 2000; Walsh 2002). The results of this and similar studies can be used to improve logbook and creel survey design in order to eliminate systematic recording errors and to generate correction factors that can be applied to logbook and creel data (e.g., see Walsh and Kleiber 2001 and Walsh et al. 2002 for blue shark). The resulting predictive models can serve as what Walsh (2002) termed “surrogate” observers for unobserved trips that are subject to logbook reporting or creel surveys. The results can also be used to refine the design of observer programs – for example, to determine the minimum frequency and degree of coverage needed to achieve a given level of accuracy and precision in fishery-wide statistics.

In summary, creel surveys and logbook programs provide reasonably reliable data about finfish discards, but not about interactions with protected species. Observer programs provide more accurate and precise data, but at generally greater costs per unit of coverage. Observer programs with relatively small degrees of coverage, as well as fishery-independent research, can be used to adjust data gathered through creel surveys and logbooks. Information on bycatch mortality, including mortality of discards and unobserved mortality, is difficult to obtain through any means. Observer data can provide reliable information on the proportions of a given species landed alive versus dead, but additional research is necessary to gauge the survival rates of fish and other species released alive. Interactions with protected species can be assessed most reliably through vessel observer programs, and the smaller the encounter rate for a given species, the greater the degree of coverage necessary.

Data collected through each of these components are synthesized and interpreted in the annual SAFE report. The design details of each of these components (e.g., the frequency and coverage of observer programs) vary by area and gear type and may be occasionally adjusted over time in order to meet information targets in the most cost-effective manner. These information targets, such as the scope, accuracy, precision, and resolution of collected data, may also be occasionally adjusted as needed. Further detail is provided below on the basic design of each of the components of the standardized reporting methodology for the pelagic fisheries.

3.2.4.1 Observer Programs

NMFS has operated an Observer Program since 1994. The focus of the program is on interactions with sea turtles, marine mammals, and seabirds, but also recorded are details on fishing effort and retention and discards of finfish by species. The condition of released protected species is recorded. Observers have also fitted a number of live released turtles with satellite tags, in part to assess their post-hooking mortality rates. Observer coverage in the Hawaii-based longline fishery was between 3% and 5% from 1994 through 1999 and increased to 10% in 2000. Because of the difficulty in estimating interaction rates for sea turtles (which have low encounter rates), observer coverage was increased by court order to a minimum of 20%.

Following a Biological Opinion in 2001 (NMFS 2001), shallow set fishing was banned by the Council due to its high interaction rate with loggerhead and leatherback turtles. The shallow set fishery remained closed until 2004, when it was discovered that fishing with a combination large (18.0) circle hooks and mackerel type bait. When the shallow set swordfish fishery was reopened the NMFS observer coverage was set at 100% for this fishery.

Observers have been deployed on the American Samoa longline fishery since 2006. Initially the coverage rate was between 6-8% but after 2009 rose to about 20%

Bycatch is recorded by species, number, and condition (alive, dead). Data from the observer programs are compiled by the NMFS Honolulu Laboratory, which generates quarterly and annual reports regarding both finfish catches and protected species interactions. The results are incorporated into the annual SAFE report. More rigorous analyses are needed to extrapolate the observations to estimates of actual bycatch; NMFS performs these analyses on an as-needed basis.

Pursuant to the 1988 South Pacific Tuna Treaty Act, an observer program was established for US purse seiners in the treaty area, with a coverage rate of about 20%. More recently, the WCPFC established an observer program for all purse seine vessels operating in the WCPO with a coverage rate of 100%. Observers complete the South Pacific Regional Purse Seine Observer Set Details form. Discards are recorded by species, weight and/or number, and reason for discard. Sharks that are finned are also recorded, by whole weight and/or number. The observer program is administered by the South Pacific Forum Fisheries Agency (FFA). The data are stored at the

SPC and at the NMFS Southwest Regional Science Center. The results are incorporated into the annual SAFE report.

3.2.4.2 Logbook programs

Holders of Hawaii longline limited access permits and general longline permits (i.e., all longliners in the region) are required to record catch and effort data in the NMFS Western Pacific Daily Longline Fishing Log. Vessel operators are required to record the number, by species, of the PMUS kept and discarded in a given set. The form also requires data on the numbers of sharks kept and discarded. There is also space for recording the number of non-PMUS kept and discarded, but because the space is limited, the catch and bycatch of non-PMUS are substantially underreported (this shortcoming in the log is by design, as modifying the log to accommodate full reporting of non-PMUS would place an additional burden on fishermen and likely compromise the reliability of the PMUS data). The first full year of logbook data from the Hawaii-based longline fishery is 1991, and from the American Samoa fishery, 1996. Data from the logbook programs are compiled by the NMFS Honolulu Laboratory, which generates annual reports. The results are incorporated into the annual SAFE Reports.

Pursuant to the High Seas Compliance Act, albacore troll vessels are required to complete logbooks, the data from which go to the NMFS Southwest Fisheries Science Center, which shares them with HDAR and the Council.

Pursuant to the 1988 South Pacific Tuna Treaty Act, US purse seine vessels fishing in the treaty area must complete the South Pacific Regional Purse-Seine Logsheet. The form provides for the reporting of discards by species, number, and weight. The data collection program started with the Treaty in 1988 but bycatch apparently did not become rigorously reported until 1996, after a revision of the logbook format and after more emphasis was placed on the reporting of bycatch in training sessions with fishermen. The reporting requirements do not apply in the US EEZ, including the PRIA waters, where purse seine effort is sometimes substantial. To date, however, the vessels have generally been recording their activity in the US EEZ. The logbook program is administered by the SPC and the FFA. The data are stored at the SPC and at the NMFS SW Regional Science Center. The results are periodically published in SPC reports and incorporated into the annual SAFE report.

The State of Hawaii requires that any person who takes marine life for commercial purposes obtain a commercial marine license. All holders of such licenses are required to complete and submit to HDAR one of several catch reporting forms. The reporting forms include information about bycatch, recorded by species (to the extent possible), number, and disposition (released, lost to predator) (the information on fish lost to predation will provide estimates of unobserved mortality). If known, the type of predator can also be indicated by the fisherman, which will provide information about protected species interactions. The forms include detailed instructions and standardized lists of species and fishing methods to ensure consistent, complete, and accurate reporting. The fishermen do not report the value of their catch; instead this is reported by fish dealers who provide this information to HDAR. Typically, fishermen submit their catch reports on a monthly basis mailed to HDAR, although now it is possible for fishermen to report catches online through the HDAR website.

The data submitted by commercial fishermen to HDAR are compiled and analyzed by HDAR, which releases the information in the form of periodic reports. The results relevant to the Council-managed fisheries are incorporated into the annual SAFE report

Since 2002, a framework adjustment amendment to the Pelagics FMP requires a federal permit and catch and effort reporting by troll and handline vessels operating in PRIA waters.

3.2.4.3 Creel Surveys

Creel surveys (shore-side surveys of vessel-based and/or shore-side fishing) are conducted year-round in American Samoa, the CNMI, and Guam (the surveys in American Samoa and Guam include components for both vessel-based and shore-side fishing; the CNMI currently has a component only for vessel-based fishing). These surveys cover fishing by vessels engaged in subsistence, recreational, charter, and commercial pelagic fishing. The creel survey programs have been in place in American Samoa and Guam since 1985 and 1983, respectively. The creel survey in the CNMI, started in 1988, was discontinued in 1996 and reinitiated in mid-2000.

The creel survey data are collected by the respective fisheries agencies of each of the three island areas (the CNMI Division of Fish and Wildlife, the Guam Division of Aquatic and Wildlife Resources, and the American Samoa Department of Marine and Wildlife Resources). Each of the three agencies uses creel sample data to generate annual effort and catch estimates using algorithms developed with the assistance of WPacFIN. The agencies submit annual report modules to the Council and the respective Plan Teams compile them into the annual SAFE Report.

In response to the 1998 SFA amendments regarding bycatch reporting, the creel survey instruments in the three island areas were modified in 1999 (2000 in the CNMI) in order to collect bycatch data, which is recorded by species, number and/or weight, and condition (live, dead/injured). Fishery-wide bycatch estimates are derived from the sample data and expressed in the annual SAFE report in absolute terms (by number or weight), and as a percent of the total catch, by species and condition. The bycatch estimates generated in the creel surveys are expected to have relatively high levels of precision, accuracy, and reliability, but the bycatch data have not, until recently, been rigorously collected or subjected to routine examination or reporting. Guam started including bycatch data in its reports for 2000. American Samoa and the CNMI started with their year-2001 reports. The three island fisheries agencies incorporate the bycatch data into their data processing routines used to generate the fishery-wide catch (and bycatch) estimates for their annual reports.

In Hawaii, recreational fishing is not subject to any permitting or reporting requirements, yet recreational effort and catches—particularly of pelagic species—are known to be relatively large. NMFS and HDAR conduct the Hawaii Marine Recreational Fishing Survey (HMRFS). Field interviews with fishermen at boat ramps, marinas, and with charter boats are used to examine both landings and discards. Information about discards is recorded by species, number, and condition on release (dead, alive). Also recorded are fish that the fishermen plan to throw away (which would constitute bycatch). The survey results are analyzed and disseminated in two forms. NMFS publishes on the web those portions of the results that are part of the associated nationwide Marine Recreational Information Program (MRIP). The data are collected during two-month "waves" and the results for each wave are released 90 to 120 days after the end of the wave. The results of the HMRFS surveys are reported annually in the Council's Pelagic Fisheries

3.2.4.4 Fishery-Independent Data

The NMFS Cooperative Marine Game Fish Tagging Program generates information about the mortality of discarded billfish. Some recreational vessels, particularly those in the Hawaii-based charter fleet, routinely participate in the program on a voluntary basis. NMFS also conducts tagging of sea turtles, including satellite tagging by observers in the longline observer program. The program generates information about the post-hooking mortality of sea turtles.

3.2.4.5 Bycatch Measures Common to All fisheries

All pelagic fisheries, regardless of location must comply with the handling requirements for turtles captured in fishing gear as specified in the Code of Federal Regulations (Part 665.812: Sea turtle take mitigation measures).

3.2.5 Temporary Adjustments for the Safe Conduct of the Fishery

Due to the nature of the pelagic fisheries and associated regulations, the Council has not established temporary adjustments to existing FEP conservation and management measures that facilitate access to the fishery to vessels that otherwise would be preventing from harvesting because of weather or other ocean conditions affecting the safe conduct of the fishery. To the extent that temporary adjustments may be necessary in the future, the Council will consult with the US Coast Guard, fishery participants and the public in the development of temporary adjustments and will ensure that such measures will not adversely affect conservation efforts in other fisheries or discriminate among participants in the affected fishery.

3.3 Other Consideration Important for FEP Implementation

3.3.1 Sociocultural Data

The MSA states the "Pacific Insular Areas contain unique historical, cultural, legal, political, and geographical circumstances which make fisheries resources important in sustaining their economic growth." In addition, ecosystem-based fishery management recognizes and attempts to manage for the interconnectedness of biological, ecological, geological, and social management dimensions. For many in islands communities, a fishery is *social system* that includes fish as well as fishermen, their families and friends, and, in the case of more commercialized fisheries, the associated support infrastructure and industry. Even those who buy and eat fish on a regular basis might be thought of as being part of a fishery.

Because of the importance of managing fishery resources as public trust, and because of the cultural uniqueness of the Pacific Islands, the Council has established several elements in its management process to incorporate science-based social data and traditional ecological knowledge. In fact, the Council from its inception has been very sensitive to traditional and indigenous fishing issues and considerations. These issues include ensuring fishermen participation in setting ACLs, preserving indigenous way of life, navigating the relationship between federal processes and requirements and local custom and norms, and the dependence, on nearshore and pelagic resource, even in the modern era.
These process elements include formal social science input science the late 1980s via social

science recommendations to the newly-established Pelagic Fisheries Research Program, and SSC subcommittee on social science, and a Council Cultural and Social Science Research Plan. In 1988, the Council spearheaded a request for proposals focused on native fishery rights issues and was instrumental in getting a Western Pacific Community Development Program and Plan included in 1996 reauthorization of the MSA. Following and in response to that, the Council established a Community Development Planning Committee. This committee is utilized under this FEP to assist with addressing Marianas Archipelago FEP Objective: Increase Traditional and Local Knowledge in Decision-making.

Between 1999-2002, the Council worked to have the Secretary of Commerce formally designate fishing communities in American Samoa, the CNMI, Guam, and Hawaii under the MSA's fishing communities provision (National Standard 8). To date, ours is the only region that has done so. In 2002, the Council established a formal Social Science Research and Planning Committee (known now as the Social Science Committee). Among other things, this Committee vets social science information needs as part of the Council's identification of fishery research priorities.

Finally, the Council works to address sociocultural considerations via its "SEEM" process and its annual fishery (SAFE) reports. The SEEM assessment quantifies social, economic, and ecological factors, as well as management uncertainty dimensions and SEEM working groups thus recommend whether the ACL is set equal or lower than the ABC based on these considerations. The Council's annual/SAFE report was overhauled in 2015 to monitor a host of social variables.

The Western Pacific Regional Fishery Management Council is the only regional fishery management council that employs both an Indigenous Coordinator and a Social Scientist.

3.3.2 Protected Species Information

The Hawaii and American Samoa longline fisheries managed under this FEP have specific management measures in place to mitigate interactions with seabirds, sea turtles and marine mammals. These measures include gear requirements, area closures, mandatory observer coverage, and training workshop requirements for vessel operators and owners. Seabird and sea turtle measures implemented under this FEP have successfully reduced interactions by approximately 90 percent in the applicable fisheries. Specific requirements under each longline fishery are listed under Section 3.1.1 of this FEP and in 50 CFR 665 Subpart F.

The Hawaii deep-set longline fishery has additional requirements implemented under the False Killer Whale Take Reduction Plan pursuant to the MMPA. Details of these measures, which include the required use of weak circle hooks and additional area closures, are described in 50 CFR 229.37.

The Pacific Pelagic FEP also prohibits the use of drift gillnets in the US EEZ of the Western Pacific, and this measure provides benefit to protected species by preventing potential interactions with non-selective fishing gear. Troll and handline fisheries managed under this FEP have limited impacts to protected species, and no specific regulations are in place to mitigate protected species interactions at this time.

NMFS has determined that fisheries operating under the Pacific Pelagic FEP are not likely to jeopardize or not likely to adversely affect ESA-listed sea turtles, marine mammals, seabirds, and scalloped hammerhead shark, and have no effects on ESA-listed reef-building corals. NMFS will reinitiate consultation if a new species is listed or critical habitat is designated that may be affected by Pacific Pelagic FEP fisheries. The current list of ESA Section 7 consultations applicable to this FEP are listed in the Annual Report.

Longline fisheries operating under the Pacific Pelagic FEP have federal observers through which protected species interactions are recorded. The Council monitors protected species interactions in the longline fisheries in the Annual Report using observer data and other available information. For troll and handline fisheries managed under the Pacific Pelagic FEP for which there are no federal observer coverage, protected species interactions are monitored in the Annual Report using other proxy indicators such as fishing effort and changes in gear types.

Information on marine mammal interactions in fisheries are also available in the Marine Mammal Stock Assessment Reports prepared pursuant to the MMPA. Seabird interactions in the Hawaii longline fishery are compiled in the annual seabird reports prepared by NMFS PIRO Sustainable Fisheries Division. Information from these reports relevant to the fisheries managed under the Pacific Pelagic FEP are summarized in the Council's FEP Annual Report.

3.3.3 Climate Change Data and Research

3.3.3.1 Background

Changing climate is already adversely impacting island communities, ecosystems, resources, cultures and economies. Increasing pressures on valuable marine and coastal habitats and resources due to changing demands for food, energy, economic growth and community sustainability make climate change an issue of community, national and regional security. In addition to economic considerations such as commercial fisheries, Pacific Island communities must address threats to culturally important species and places as well as community health and food security. Ultimately, for many low-lying coral atoll nations, climate change is a direct threat to national security as rising sea level and changes in the availability of freshwater may make at least some of those nations uninhabitable. To escape these impacts, human migration is anticipated.

The *Executive Summary of the 2012 Pacific Islands Regional Climate Assessment* (PIRCA) notes that the indicators of climate change suggest multiple concerns for human and natural communities in the Pacific Islands region: decreased freshwater supplies, especially on atolls and low-lying islands; increased coastal flooding and erosion; increased coral bleaching; unknown, negative consequences for the entire marine ecosystem; declines in open-ocean fisheries; increased risk of species extinctions; threats to the traditional lifestyles of indigenous communities making it difficult for Pacific Island communities to sustain their connection with a defined place and their unique set of customs, beliefs, and languages; and human migration from low islands to high islands and continental sites.

At its 157th meeting in June 2013, the Council restructured its Coastal and Marine Spatial Planning (CMSP) Committee into a Marine Planning and Climate Change (MPCC) Committee.

The MPCC Committee advises the Council on new and developing research and happenings related to marine planning and climate change as it relates to Western Pacific fisheries, provides input on Council actions and associated analyses and documents as it relates to marine planning and climate change, and recommends research and program priorities, including outreach and education, to address marine planning and impacts of climate change in fisheries and fishing communities. The Committee includes up to 20 members, including at least three representatives each from Hawaii, American Samoa, Guam and the Commonwealth of the Northern Mariana Islands (one of the three is a community representative), three members representing the federal government and an ecosystem modeler. The basic criteria for Committee membership is expertise and interest in marine planning and climate change, with a focus on fisheries and fishing communities. Members of the Committee are selected by the Council and serve three-year terms.

In 2015, the Council adopted the MPCC Policy and action plan drafted by the MPCC Committee. The definition of climate change included in the MPCC Policy is the one used by the Intergovernmental Panel on Climate Change, which includes natural climate variability such as El Nino Southern Oscillation and other patterns of natural variability as well as long-term changes in climate associated with anthropogenic (human) influence on greenhouse gases and other aspects of the Earth’s climate system. The definition of climate change in the Council’s MPCC policy also includes ocean acidification. The MPCC policy notes that, in the Pacific Ocean, anticipated climate change impacts include ocean acidification; changing migratory patterns of tuna, other commercially valuable stocks and protected species, among other species; changes in coastal and marine habitats with associated changes in socially, culturally and economically valuable coastal fisheries and other sources of ocean economy; changing patterns of El Niño and other patterns of climate variability; changes in water level including, but not limited to sea level change, increased severity of extreme weather, coral reef changes; and human migration, among others. The MPCC policy recognizes a set of overarching and specific principles and specific policy points for the Council, its advisory bodies and its staff to consider and incorporate in the Pacific Pelagic FEP as well as in Council programs and other actions. The policy can be found on the Council’s website.

The Council’s MPCC Action Plan prioritizes and provides guidance on implementing climate change measures adopted by the Council, including items related to climate change research and data needs.

A working group of the MPCC Committee, with additional support from PIFSC, tentatively identified climate indicators to monitor initially for the annual reports on the Council’s FEPs. The working group suggested that, rather than focusing on the numeric changes and/or stability of these factors, the annual reports indicate whether the monitored indicators are in a green, yellow or red condition. The working group also suggested that the annual reports eventually also monitor climate change *impact* indicators, such as *socioeconomic indicators*, to be determined after community consultation. The Council’s 2015 restructured Plan Team includes climate change experts who will finalize decisions related to the monitoring of climate indicators and climate impact indicators to be included in the Pacific Pelagic FEP annual report. To identify the climate change impact indicators to be monitored in the Pacific, the Council intends to work with community members, schools and policymakers in Hawaii, American Samoa, Guam and the CNMI.

3.3.3.2 Council's Marine Planning and Climate Change Committee, Policy and Action Plan

At its 157th meeting in June 2013, the Council voted to restructure its Coastal and Marine Spatial Planning Committee into a Marine Planning and Climate Change (MPCC) Committee. The functions of the MPCC Committee are to a) advise the Council on new and developing research and happenings related to marine planning and climate change as it relates to Western Pacific fisheries ; b) provide input on Council actions and associated analyses and documents as it relates to marine planning and climate change; and c) recommend research and program priorities, including outreach and education, to address marine planning and impacts of climate change in fisheries and fishing communities. The Committee includes up to 20 members, including at least three representatives each from Hawaii, American Samoa, Guam and the Commonwealth of the Northern Mariana Islands (one of the three will be a community representative), three members representing the federal government and an ecosystem modeler. The basic criteria for Committee membership is expertise and interest in marine planning and climate change, with a focus on fisheries and fishing communities. Members of the Committee are selected by the Council and serve three-year terms.

In 2015, the Western Pacific Regional Fishery Management Council adopted MPCC Policy and action plan, drafted by the MPCC Committee. The definition of climate change included in the MPCC Policy is the one used by the Intergovernmental Panel on Climate Change (IPCC), which includes natural climate variability such as El Nino Southern Oscillation (ENSO) and other patterns of natural variability as well as long-term changes in climate associated with anthropogenic (human) influence on greenhouse gases and other aspects of the Earth's climate system. The definition of climate change in the Council's MPCC policy also includes ocean acidification. The MPCC policy notes that, in the Pacific Ocean, anticipated climate change impacts include ocean acidification; changing migratory patterns of tuna, other commercially valuable stocks and protected species, among other species; changes in coastal and marine habitats with associated changes in socially, culturally and economically valuable coastal fisheries and other sources of ocean economy; changing patterns of El Niño and other patterns of climate variability; changes in water level including, but not limited to sea level change, increased severity of extreme weather, coral reef changes; and human migration, among others. The MPCC policy also notes that the 2012 Pacific Islands Regional Climate Assessment (PIRCA) identified several important indicators of climate change in the region, including the rising of sea surface temperature, sea level, carbon dioxide concentrations, ocean heat content and surface air temperature; changing of rainfall, winds and waves, extreme events, ocean chemistry and habitats and species distributions; and decreases in base flow in streams. The MPCC policy recognizes a set of overarching and specific principles and specific policy points for the Council, its advisory bodies and its staff to consider and incorporate in the Pacific Pelagic FEP as well as in Council programs and other actions. The policy can be found on the Council's website.

The Council's MPCC Action Plan addresses climate change related actions adopted by the Council. The Action Plan prioritizes the Council's actions and provides recommendations on how to implement them.

3.3.3.3 Data and Research Needs

The Council's MPCC Action Plan includes about a half dozen items related to climate change research and data needs, which the Council staff and MPCC Committee are addressing. Additionally, a working group comprised of a subset of the MPCC Committee, including the Committee chair, with additional support from PIFSC met in May 2015 to determine data needs for the Council's restructured annual reports for the 2015 annual reports for the Pelagic and Archipelagic FEPs.

This work was taken over by the Council's 2015 restructured Plan Team. The Plan Team members responsible for the climate change modules met on Sept. 30, Nov. 17 and Dec. 17, 2015. The group determined that each annual report would include 10 preliminary climate change indicators for each of the 2015 annual reports.

Preliminary Climate Indicators for 2015 Pelagic Annual Report include a) atmospheric Concentration of CO_2; b) ocean pH; c) Oceanic Nino Index; d) Pacific Decadal Oscillation (PDO); e) Sea Surface Temperature and anomaly; f) ocean pH; g) ocean Color (chlorophyll-a concentration); h) Subtropical Front/Transition Zone Chlorophyll Front; i) fish community size structure; and j) extreme weather conditions. These factors are indicators of ocean acidification, cold/warm phases and spatial climatology and anomaly that can have a profound effect on fish distribution, abundance and catch; trends in community size structure and causes of these trends; and changes in fishing effort.

The Plan Team members also discussed including additional climate change indicators in future annual reports such as ocean currents, wave data and near-surface wind velocity climatology and anomaly for the Pelagic Annual Report. The WPRFMC is working with its MPCC Committee to hold community meetings in the second half of 2016 to garner feedback on the annual reports and other public input related to the region's climate change needs, knowledge and impacts, including potential climate change impact indicators, such as socioeconomic indicators.

Specific organizations identified in the Council's MPCC Action Plan, with whom the Council intends to work to identify the climate change impact indicators (and potentially additional climate indicators) include the Guam Bureau of Statistics, Guam Department of Agriculture, Guam permanent working group on climate change (being established by executive order by Guam Governor), University of Guam, CNMI Climate Change Working Group, CNMI Bureau of Environmental and Coastal Quality, CNMI Division of Fish and Wildlife, as well as community members, schools and policymakers in the Territory and Commonwealth.

In addition to the FEPs, themselves, climate change issues are incorporated, by process, into annual catch limit specifications, amendments to the FEPs and elements in the plans, such as the threatened status of the green sea turtle.

3.3.3.4 Marine Planning

3.3.3.4.1 Background

Marine planning is a key component of the National Ocean Policy and is a key tool being utilized regionally, nationally and globally to identify and address issues of multiple human uses, ecosystem health and cumulative impacts.

Since 2010, coastal and marine spatial planning (CMSP) has been the focus of several advisory body meetings and outreach activities, during which fishermen, community members and the public have voiced their appreciation and support for Council's undertaking and working with communities on this topic. The events include, but are not limited to, a 2010 Fishers Forum on CMSP in Honolulu, a 2011 community workshop on CMSP in Honolulu with participants from throughout the Western Pacific Region, a 2013 community workshop on CMSP in Saipan, CNMI, and a 2013 Fishers Forum and community workshop on CMSP in American Samoa.

During this time, the Council also began transforming its Marine Protected Area Committee first into a CMSP Committee and then into the current Marine Planning and Climate Change Committee. The Council used the term "Marine Planning" instead of CMSP based because the Implementation Plan for National Ocean Policy, released by the Obama Administration on April 16, 2013, did not include references to CMSP but rather to marine planning.

Council Marine Planning and Climate Change Committee and Policy

At its 157th meeting in June 2013, the Council voted to restructure its Coastal and Marine Spatial Planning Committee into a Marine Planning and Climate Change (MPCC) Committee. The functions of the MPCC Committee are to a) advise the Council on new and developing research and happenings related to marine planning and climate change as it relates to Western Pacific fisheries ; b) provide input on Council actions and associated analyses and documents as it relates to marine planning and climate change; and c) recommend research and program priorities, including outreach and education, to address marine planning and impacts of climate change in fisheries and fishing communities. The Committee includes up to 20 members, including at least three representatives each from Hawaii, American Samoa, Guam and the Commonwealth of the Northern Mariana Islands (one of the three will be a community representative), three members representing the federal government and an ecosystem modeler. The basic criteria for Committee membership is expertise and interest in marine planning and climate change, with a focus on fisheries and fishing communities. Members of the Committee are selected by the Council and serve three-year terms.

In 2015, the Western Pacific Regional Fishery Management Council adopted its MPCC Policy, which was drafted by the Council's MPCC Committee. The policy uses the definition of marine planning as defined in the National Ocean Policy Implementation Plan (released April 2013 by the National Ocean Council). The MPCC policy recognizes a set of overarching and specific principles and specific policy points for the Council, its advisory bodies and its staff to consider and incorporate in the Mariana Archipelago FEP as well as in Council programs and other actions. The policy can be found on the Council's website.

3.3.3.5 Marine Planning Considerations

Fishing and fisheries operate in an increasingly crowded marine environment. Gone are the days when fishing and shipping were the primary, and sometimes only, maritime constituents. In the Mariana Archipelago, contemporary marine spatial planning considerations include:

- Coastal military bases and marine training areas
- Commercial shipping
- Local MPAs
- Marine National Monuments

- Recreation

The Council's MPCC Policy notes the following overarching principles as related to marine planning:

- Marine planning is an appropriate approach to effectively address issues of intersecting human uses, ocean resources and ecosystem health at multiple geographic scales. This approach can be applied by the Council as a tool to align regional interests, determine ocean management priorities across jurisdictions and identify common objectives.

- The MPCC Policy recognizes that traditional resource management systems such as the ahupua`a system in Hawai`i and Fa`a Samoa in American Samoa can provide an appropriate context for marine planning.

A key component of the Council's MPCC Policy is collaboration with existing organizations in data and information collection and dissemination as well as outreach related to marine planning in the region. Among the organizations with whom the Council intends to work include the Guam Bureau of Statistics, Guam Department of Agriculture, University of Guam, CNMI Bureau of Environmental and Coastal Quality, CNMI Division of Fish and Wildlife, as well as community members, schools and policymakers in the Territory and Commonwealth.

Additionally, a key partner in the region is the Pacific Islands Regional Planning Body (RPB), which was established April 2013 in response to the call for CMSP in the National Ocean Policy. The Pacific Islands RPB members are resolved to work together to develop a regional plan for the balanced, sustainable management of the coastal and marine areas of the Pacific Islands region using guidance from the National Ocean Council, the National Ocean Policy, Implementation Plan and Marine Planning Handbook. The Pacific Islands RPB is comprised of 17 members from both federal and state/territorial government agencies, as well as the Regional Fishery Management Council. Marine planning is anticipated to be more prominent in the not so distant future as the human population and associated maritime activities, such as alternative offshore energy and offshore aquaculture, continue to increase. The Council's MPCC Policy says "The Council will review and make recommendations for and participate in the development of regional marine planning for the Pacific Islands Region so that fisheries and fishery resources are included as a component of the Pacific Islands Regional Planning Body's Ocean Plan and Guidance document and associated products."

Among other marine planning components in the Council's MPCC Policy are to a) incorporate traditional knowledge and practices of affected indigenous cultures to understand and utilize marine planning to address overlapping interests; b) consider the impact on traditional fisheries, traditional fishery resources, traditional knowledge and traditional fishing rights when addressing marine planning for activities such as offshore energy development; c) to encourage collaboration with and among state and jurisdictional government agencies and universities utilizing regional marine planning in the Pacific; and d) to encourage active participation in the Pacific Islands Regional Planning Body and facilitate access to and use of marine planning approaches, tools and techniques applicable to the region, including training and support for marine planning dialogues, workshops and other participatory approaches.

3.3.3.6 Western Pacific Community Development Program

Section 305(i)(2) of the MSA authorizes the Council and the Secretary of Commerce, through NMFS, to establish a Western Pacific Community Development Program for any fishery under the authority of the Council and NMFS. The intent of the program is to provide Western Pacific communities access to fisheries that they have traditionally depended upon, but may not have the capabilities to support continued and substantial participation in, possibly due to economic, regulatory, or other barriers.

The Western Pacific Community Development Program includes two components: (1) Development Plan Program; and (2) Demonstration Projects Program. Under the Western Pacific Community Development Program (CDP), the Council provides support for fishery projects of Western Pacific communities and indigenous communities through administrative processes. The Western Pacific Community Demonstration Project Program (CDPP) is a grant program that provides funds to Western Pacific indigenous communities for the demonstration of traditional, cultural fishery, fishery management and fishery conservation projects

To be eligible to participate in the western Pacific community development program, a community must meet the following criteria:

1. Be located in American Samoa, Guam, Hawaii, or the Northern Mariana Islands (collectively, the Western Pacific);

2. Consist of community residents descended from aboriginal people indigenous to the Western Pacific who conducted commercial or subsistence fishing using traditional fishing practices in the waters of the Western Pacific;

3. Consist of individuals who reside in their ancestral homeland

4. Have knowledge of customary practices relevant to fisheries of the Western Pacific;

5. Have a traditional dependence on fisheries of the Western Pacific;

6. Are currently experiencing economic or other constraints that have prevented full participation in the Western Pacific fisheries and, in recent years, have not had harvesting, processing or marketing capability sufficient to support substantial participation in fisheries in the area; and

7. Develop and submit a community development plan to the Council and the NMFS.

<u>Development Plan Program</u>

An eligible community seeking access to a fishery under the authority of the Council and NMFS must submit to the Council a community development plan that includes the following information[1]:

1. A statement of the purposes and goals of the plan.
2. A description and justification for the specific fishing activity being proposed, including:

   - Name, address, and telephone number of the vessel owner(s) and operator(s).
   Location of the proposed fishing activity.
   - Management unit species to be harvested, and any potential bycatch.
   - Gear type(s) to be used.
   - Frequency and duration of the proposed fishing activity.

3. A statement describing the degree of involvement by the indigenous community members, including the name, address, telephone and other contact information of each individual conducting the proposed fishing activity.

4. A description of how the community and or its members meet each of the eligibility criteria in paragraph (b) of this section.

5. If a vessel is to be used by the community to conduct fishing activities, for each vessel:

   - Vessel name and official number (USCG documentation, state, territory, or other
   registration number).
   - Vessel length overall, displacement, and fish holding capacity.
   - Any valid federal fishing permit number(s).

3.3.4 Aquaculture

Aquaculture is a growing industry in the U.S. producing an ever-increasing proportion of marine consumer products once solely harvested from the wild. NMFS defines aquaculture as the as the propagation and rearing of aquatic organisms for any commercial, recreational, or public purpose. In the Pacific it has evolved into a multi-million dollar industry producing a range of marine products including algae, pearls, and fish. In the twentieth century, most aquaculture in the U.S. was conducted at land-based facilities and was focused on freshwater species. Technical innovations, declines in wild marine stocks, and greater demand for seafood have led to a recent expansion of the industry into marine environments.

NMFS is responsible for managing fisheries in federal water and NOAA General Council determined that aquaculture is included in the definition of "fishing" under the Magnuson-Stevens Fishery Conservation and Management Act (MSA)[1]. This designation provides the statutory authority for NMFS and the regional fishery management councils (FMCs) to regulate aquaculture projects in federal waters. NMFS and the FMCs are just beginning to establish management plans for aquaculture activities. In 2009, The Gulf of Mexico FMC established the

[1] The description must be in sufficient detail for NMFS and the Council to determine consistency with the Council's fishery ecosystem plans, the Magnuson-Stevens Act, and other applicable laws.

first fishery management plan for offshore aquaculture. That same year, the Council voted to consider including management measures for offshore aquaculture in the FEPs at its 146th Meeting in October 2009.

The WPRFMC defines aquaculture as the raising and cultivation of plants or animals, both freshwater and marine, for food or other purposes. Aquaculture, as defined by the Council, includes fish farming, fish culturing, ocean ranching, and mariculture. The Western Pacific Regional Fishery Management Council recognizes that aquaculture is a rapidly developing industry in the Western Pacific Region as well as the rest of the world, and that aquaculture presents both potential benefits and potential negative impacts to the environment and society. The Council's Aquaculture Policy can be found at the Council's website, www.wpcouncil.org.

Currently, there are no offshore aquaculture projects in waters around Guam, CNMI or American Samoa and a couple of operations in State waters around Hawaii. With interest in projects increasing in the Pacific, NMFS and the Council must ensure that these endeavors are environmentally sustainable.

3.3.5 Fishing Rights of Indigenous People

The WPRFMC addresses the economic and social consequences of militarization, colonization and immigration on the aboriginal people in the Council's area of responsibility and authority through its FEPs. Generally, the resultant cultural hegemony has manifested in poverty, unemployment, social disruption, poor education, poor housing, loss of traditional and cultural practices, and health problems for indigenous communities. These social disorders affect island society. Rapid changes in the patterns of environmental utilization are disruptive to ecological systems that developed over millennia into a state of equilibrium with traditional native cultural practices. The environmental degradation and social disorder impacts the larger community by reducing the quality of life for all island residents. The result is stratification along social and economic lines and conflict within the greater community.

4 MANAGEMENT PROCESS

4.1 Council Process

4.1.1 Overview of Council Process

The Council process to make or change regulations involves many stages and includes many steps and opportunities for public input and comment. The Council reviews proposals, options papers, draft amendment documents, National Environmental Policy Act analysis documents, and eventually votes on a preferred alternative, which may become regulations at the end of the process.

The Council generally follows this process:

- An issue is presented from the public, an advisory body, etc.;
- The Council reviews the issue and decides whether to initiate analysis of alternatives;
- If an analysis is initiated, then:

- Council staff develops alternatives, analysis and other needed documents for review;
- There is a review by the Council, its advisory bodies and the public; and
- The Council may select a preferred alternative, initiate further analysis or decide on no further action.

- After a preferred alternative is selected, the Council decision is forwarded to the Secretary of Commerce in the form of a plan or amendment for review and approval; The Secretary of Commerce may do either of the following:
    - Reject the plan/amendment;
    - Approve the plan/amendment;
    - Partially approve the plan/amendment.
- If the plan/amendment is approved, draft rules are published for public comment;
- After the rules are noticed and comments are addressed, a final decision is made by the Secretary of Commerce; and
- If approved, the rules and regulations from the plan/amendment are implemented through the Code of Federal Regulations.
- If the plan/amendment is rejected or partially approved, it is returned to the Council, with rationale for rejection/partial approval, for the Council's consideration.

4.1.1.1 Development and Approval Process for Management Actions

The process for the development and approval of fishery management actions are governed by the MSA with further guidance provided through the Operational Guidelines (OG), Regional Operating Agreements (ROA) and other applicable laws (OALs). While most actions are focused specifically on the Council-initiated fishery management actions, OALs and other rulemaking authorities provide information relevant to fisheries managed by the Secretary under the "Highly Migratory Species" (HMS) provisions of the MSA.
As described in the OG, the fishery management process for Council-managed fisheries consists of five basic phases. Section C of Appendix 2 to the OG provides detailed information about phases 5 phases, but, in general, they are as follow:

1. Planning
2. Document Drafting
3. Public Review and Council Action to Recommend a Measure
4. Post Council Action to Recommend a Measure
    (a) Preparation for Transmittal
    (b) Secretarial Review and Implementation
5. Ongoing Management (additional regulatory activity, monitoring, need identification, and response – feeds back into phase1).

While the ROA's provide for NMFS/Council cooperation and sharing of workloads, it is important to note that the MSA and other applicable laws assign different responsibilities to each entity. Therefore, both NMFS and the Councils must ensure they fulfill their required roles.

4.1.1.1.1 Specific Elements and their Relationship to Decision-making

The MSA and OALs set forth specific analytical and procedural requirements that interact with NMFS's and the Councils' decision-making processes under the MSA. The mandates on NMFS, as the federal action agency, are distinct from the requirements pertaining to the activities of the Councils, in their role as advisory bodies. Nothing precludes a Council's development of analyses and documentation to support compliance with the OALs, and in fact this practice is recommended. However, ultimate legal responsibility for most requirements lies with NMFS. It is the goal to have as complete analysis and documentation as possible available during Council deliberations.

a. MSA Role of the Councils

As set forth in sections 302(h), 303, and 304 of the MSA, Councils are responsible for:

- Conducting public hearings to allow for public input into the development of FMPs and amendments,
- Reviewing pertinent information,
- Preparing fishery management plans and amendments for fisheries requiring conservation and management
- Drafting or deeming regulations to implement the plans or amendments
- Developing ACLs,
- Identifying research priorities, and
- Transmitting complete packages containing documentation necessary for NMFS to initiate a review of compliance with all applicable laws including NEPA.

b. MSA Role of NMFS

As set forth in section 304(a) of the MSA, the role of NMFS with respect to fishery management plans and plan amendments developed by the Council is to review – and approve, disapprove, or partially approve –those plans and amendments in accordance with specified procedures, including:

- Immediately upon transmittal of the FMP or FMP amendment publish a plan or amendment in the Federal Register for a 60-day comment period.
- Approve, disapprove, or partially approve a plan or amendment within 30 days of the end of the comment period on the plan or amendment. Disapproval must be based on inconsistency with the MSA or other applicable law. In addition, disapprovals must provide guidance on what was inconsistent and how to remedy the situation, if possible (see MSA section 304(a)(3)(A)-(C)).

In addition, as set forth in section 304(b) the role of NMFS with respect to Council-recommended draft regulations is to:

- Immediately upon transmittal of the proposed regulations initiate an evaluation of whether they are consistent with the fishery management plan, plan amendment, the MSA, and other applicable law.
- Within 15 days make a determination of consistency, and—
  - if that determination is affirmative, publish the regulations for a public comment period of 15 to 60 days; or,
  - if that determination is negative, notify the Council in writing of the inconsistencies and provide recommendations on revisions that would make the proposed regulations consistent.
- Consult with the Council before making any revisions to the proposed regulations,
- Promulgate final regulations within 30 days after the end of the comment period and publish in the Federal Register an explanation of any differences between the proposed and final regulations.

The MSA, at section 304(c), also authorizes NMFS to prepare a fishery management plan or amendment if:

> (a) the appropriate Council fails to develop and submit to NMFS, after a reasonable period of time, a fishery management plan for such fishery, or any necessary amendment to such a plan, if such fishery requires conservation and management;
> (b) NMFS disapproves or partially disapproves any such plan or amendment, or disapproves a revised plan or amendment, and the Council involved fails to submit a revised or further revised plan or amendment; or
> (c) NMFS is given authority to prepare such plan or amendment under the MSA.
> NMFS may also develop regulations to implement Secretarial plans and amendments. (MSA section 304(c)(6), (7)).

c. *Other Applicable Laws Roles for NMFS and COUNCIL*

As described in section D in Appendix 2 of the OG, the OALs set forth a variety of requirements for analysis, documentation, determinations, and procedures. Because of the close relationship between NMFS's actions and the Council's recommendations, compliance with the OALs will be most effective if NMFS and the Councils coordinate closely. The ROAs explain how these relationships work for each Council/Region pair. Council staff can often be responsible for drafting supporting analyses and documentation; however, it is NMFS's responsibility to ensure the resulting documents fully comply with all law.

4.1.1.1.2 Advisory Panels

Advisory Panels are established as necessary to assist in carrying out the functions of the Council under the MSA. Section 302(g)(4) of the MSA establishes Advisory Panels to "assist in the evaluation of information relevant to the development of any fishery management plan or plan amendment for a fishery." The Western Pacific Regional Fishery Management Council's Advisory Panel includes representation from various sectors of the fisheries. Members of the Subpanels are selected by the Council and serve four-year terms with an overall Advisory Panel Chair and a Vice-Chair, with a Chair for each Advisory Panel sub-panel. Sub-panels are designated by the Archipelago FEPs and have representation from user groups and interests concerned with management of the fishery including fair representation of commercial fishing interests in the Council's geographical area of authority. The Advisory Panel provides advice on the content and effects of management plans, amendments and pre-season and in-season management measures, as well as issues to be discussed at Council Meetings.

The Marianas Archipelago FEP Sub-Panel includes 16 members (8 each from Guam and CNMI), not including alternates, and meets prior to Council Meetings to discuss action items and provide comments and recommendations on issues of concern to the Council. Recommendations from the Advisory Panel and its Sub-Panels are provided to the Council for its consideration at Council Meetings.

4.1.1.1.3 Plan Teams

Plan teams are a form of advisory panel authorized under Section 302(g) of the MSA. FEP Plan Teams are comprised of Federal, State and non-government specialists that are appointed by the Council and serve indefinite terms. The Council created an Archipelagic FEP Plan Team to oversee the ongoing development and implementation of the American Samoa, Hawaii, Mariana, and PRIA FEPs. The Pelagics Plan Team oversee the ongoing development and implementation of the Pelagics FEP. The Teams are also responsible for reviewing information pertaining to the performance of all the fisheries, the status of all the stocks managed under the Pelagics FEP and the four Archipelagic FEPs, monitoring the performance of the FEPs through the production of an annual stock assessment and fishery evaluation (SAFE) report , providing information on the status of the fish stocks and other components of the ecosystem, and recommending conservation and management adjustments under framework procedures to better achieve management objectives. The Pelagic Plan Team and Archipelagic Plan Teams' findings and recommendations are reported to the Council at its regular meetings. The Pelagic Plan Team and Archipelagic Plan Teams meets at least once annually and their chairs are appointed by the Council Chair after consultation with the Council's Executive Standing Committee.

4.1.1.1.4 Science and Statistical Committee

The Scientific and Statistical Committee (SSC) is mandated under MSA 302(g) to "assist the Council in the development, collection, evaluation, and peer review of such statistical, biological, economic, social, and other scientific information as is relevant to such Council's development and amendment of any fishery management plan." The Western Pacific Regional Fishery Management Council's SSC is composed of experts with scientific or technical credentials and experience from State and Federal agencies, academic institutions, and other sources. SSC Members represent a wide range of disciplines required for preparation and review of Fishery Ecosystem Plans.

The SSC typically meetings several days prior to a Council meeting to identify scientific resources required for the development of management plans and amendments and recommend resources for Plan Teams; Identify scientific resources required for the development of management plans and amendments and recommend resources for Plan Teams; Provide ongoing multi-disciplinary review of management plans or amendments and advise the Council on their scientific content, including recommendations for acceptable biological catch, preventing overfishing, maximum sustainable yield and achieving rebuilding targets, and reports on stock status and health, bycatch, habitat status, social and economic impacts of management measures and sustainability of fishing practices; Assist the Council in the development, collection, evaluation and peer review of such statistical, biological, economic, social, and other scientific information as is relevant to the Council's activities, and recommend methods and means for the development and collection of such information; Recommend to the Council the composition of Plan Teams; and provide scientific advice to the Council through recommendations on issues and action items.

4.1.1.1.5 Fishing Industry Advisory Committee

Section 302(g) of the MSA requires the Council to establish a Fishing Industry Advisory Committee (FIAC). It includes representation from various fishing sectors of the Western Pacific region. Members of the committee are selected by the Council and serve four year terms, with representation from each of the island jurisdictions. The FIAC reports to the Council and has representation from industry user groups concerned with the management of the fishery for which a plan is being prepared or reviewed, with fair representation of the fishing industry interests in the Council's geographical area of authority. The functions of the FIAC are to advise the Council on fishery management problems; to provide input to the fishery management planning efforts; and to advise the Council on the content and effects of management plans, amendments, and pre-season and in-season management measures. The FIAC includes members from each Archipelagic FEP (with the PRIA FEP included with the Hawaii FEP).

4.1.1.1.6 REAC and other Council Committees

The Regional Ecosystem Advisory Committee (REAC)'s primary role is to provide a forum for government agencies, organizations and other entities to share information to better integrate and coordinate ocean and coastal management. Sub-committees for each area are created with members that include representation from the Council, various Federal, State and local agencies, non-government specialists and private business from each respective area. Members of the REAC are appointed by the Council with the Chair of each area sub-committee appointed by the Council Chair after consultation with the Executive and Budget Committee.

Other Council Committees created to assist the Council in carrying out its statutory functions, as provided under section 302(g)(2) of the MSA include:

- Protected Species Advisory Committee
- Social Science Planning Committee
- Community Demonstration Projects Advisory Panel
- Community Development Program Advisory Panel
- Fishery Data Collection and Research Committee
- Marine Planning and Climate Change Committee
- Education Committee
- Non-Commercial Fisheries Advisory Committee

4.1.1.1.7 Ad-hoc Committees and Working Groups

The Council develops different ad-hoc committees and working groups to deal with specific issues relevant to the FEP and assist it in carrying out its statutory function.

4.1.1.1.8 Federal Agencies

4.1.1.1.8.1 NMFS

The National Marine Fisheries Service (NMFS) to implements Council recommendations and is a primary federal enforcement agency for fisheries and other marine resource regulations. Recommendations from the Council, including transmitted amendments and plans, are provided to the NMFS and the Department of Commerce for approval. The Secretary of Commerce may approve, partially-approve, or reject any amendment or plan, in which case the Council will revisit or revise any partially-approved or rejected amendment or plan.

Regionally, the Council works in conjunction with the NMFS Pacific Islands Regional Office (PIRO) and the Pacific Islands Fisheries Science Center (PIFSC).

4.1.1.1.8.2 US Fish and Wildlife Service

The US Fish and Wildlife Service is a non-voting member of the Council and provide information as needed. In the Mariana Archipelago, the USFWS, along with NMFS, is responsible for the Marinas Trench Marine National Monument. Coordination on fishing issues and regulations between the Council and USFWS is crucial for the success of any regulations issued in the area.

4.1.1.1.8.3 US Coast Guard

The United States Coast Guard, District 14, is responsible for fishery regulation enforcement in the Mariana Archipelago, including enforcing regulations listed in the FEP.

4.1.1.1.9 Local Agencies

In the Mariana Archipelago, the local agencies that the Council work with includes in Guam: The Department of Agriculture and its Division of Aquatics and Wildlife Resources; Department of Chamorro Affairs; Bureau of Statistics and Plans; Mayors Council of Guam.

In CNMI: The Department of Land and Natural Resources and its Division of Fish and Wildlife; Bureau of Environmental and Coastal Quality and its Division of Coastal Resource Management and Division of Environmental Quality; and the Mayor's Office for each island.

4.1.1.1.10 Regional Entities

There are no current regional entities involved in fisheries management in the Mariana Archipelago.

4.1.1.1.11 Fishery Impact Statement

The Magnuson-Stevens Act requires that fishery management plan and plan amendments that submitted to the Secretary after October 1, 1990 include a Fishery Impact Statement (FIS) that assesses the likely biological and socioeconomic effects of the conservation and management measures on fishery participants and their communities; participants in the fisheries conducted in adjacent areas under the authority of another Council; and the safety of human life at sea. Appendix D contains a list of all relevant amendments that predate this FEP, as well as amendments that were approved subsequent to its adoption. These amendment documents include an FIS, as required. To find a FIS for a specific management measure contained in this FEP, see Appendix D.

4.1.1.1.12 Public Consultation Process

The public is provided opportunity to comment on provide testimony at all meetings noticed through the Federal Register. The Council also accepts comments and testimony by phone, email and fax.

4.1.1.2 Fishery Impact Statement

The Magnuson-Stevens Act requires that fishery management plan and plan amendments submitted to the Secretary after October 1, 1990 assesses the likely biological and socioeconomic effects of the conservation and management measures on fishery participants and their communities; participants in the fisheries conducted in adjacent areas under the authority of another Council; and the safety of human life at sea. This is typically referred to as a Fishery Impact Statement (FIS). Appendix D contains a list of all relevant amendments that predate this FEP, as well as amendments that were approved subsequent to its adoption. The elements of a FIS are integrated into the environmental impact analyses prepared for these amendment documents, as required. To find a FIS for a specific management measure contained in this FEP, see Appendix D.

4.1.1.3 Public Consultation Process

The public is provided opportunity to comment on provide testimony at all meetings noticed through the Federal Register. The Council also accepts comments and testimony by phone, email and fax.

4.1.1.4 The Role of Agreements, Statement of Organization Practices and Procedures, etc.

The Council enters into agreements to help define specific roles and responsibilities of the agencies in developing, approving, and implementing fishery management plans and actions under the MSA. In 2014, the Council entered into a Regional Operating Agreement with the NMFS PIRO and PIFSC to define specific roles and responsibilities of the Council and NMFS Offices in developing, approving and implementing fishery actins under the MSA. The ROA sets forth procedures and review processes to ensure that proposed management actions are adequately and completely analyzed upon decision making. The ROA functions with the general framework of the “Operational Guidelines” set forth by NOAA and can be amended as need for consistency.

In addition to external agreements, the Council establishes internal working policies and procedures to through which the Council conducts business and carries out its functions under the MSA. The Statement of Organization Practices and Procedures (SOPP) is updated periodically as needed. The SOPP defines the Council’s organizational structure, standards of conduct, policies and procedures, advisory bodies and their role and responsibilities and administrative system.

4.1.1.5 Communication Plan

Communication is an essential component of the Council’s bottom-up approach to fisheries management and is one of the Council’s seven Guiding Principles: “Conduct education and outreach to foster good stewardship principles and broad and direct public participation in the Council’s decision making process.”

The Council’s Public Involvement and Outreach Plan was prepared in 1995 and serves as the basis for the Council’s ongoing communication efforts. The plan identifies training sessions, programs, information sessions, special events and product development (audio-visual, printed materials and displays) for three targeted audiences: fishing communities, regulatory/policy setting agencies and the general public.

In 2010 and 2011, fishermen focus groups were conducted in Hawaii to assess the effectiveness of the Council’s outreach efforts and elicit suggestions for improving it. This research was conducted by an independent research firm, which also conducted interviews to gauge the effectiveness of particular Council outreach projects in the Territories and the Commonwealth. The results indicated that fishermen were aware of the Council; however, their understanding of what the Council does could be improved. In 2011, in response to these comments, the Council developed a Communications Framework among other activities.

The Council publishes meeting notices in local publications in English and, in American Samoa, also in the Samoan language. Other regular Council outreach materials include a quarterly newsletter, a monograph series, brochures, displays, magazine articles and press releases and occasional videos, public serve announcements, proceedings and books.

The Council's regularly scheduled outreach and education activities, some of which have been conducted annually for more than a decade, include Fishers Forums, student art contests with teacher resources on various themes of fishery importance, traditional lunar calendars highlighting student art and traditional fishery information, and high school summer courses. The Council also occasionally conducts International Fishers Forums, teacher workshops, student symposiums, community workshops, fishermen workshops and other special events locally, regionally, nationally and internationally.

In 2013, the Council established an Education Committee, which spearheaded a memorandum of understanding signed by federal and local governments and higher education institutions in the Western Pacific Region. The aspiration of the MOU is to improve the capacities of the US Pacific Island territories to manage their fisheries and to enhance tertiary education in fisheries science and management offered in Hawai`i. In 2015, the first outcomes of the MOU included the implementation of the US Pacific Territories Fishery Capacity-Building scholarship and internship program.

The Council has increased its outreach through social media, including the Council website, Facebook, Twitter and Constant Contact distribution. It also works with the education and outreach staff of the other seven Reginal Fishery Management Councils on the fisherycouncils.org website, Managing Our Nation's Fisheries conferences and occasional publications, displays and events.

4.1.1.6 Council Five Year Research Priorities

The reauthorized Magnuson-Stevens Fishery Conservation and Management Act (MSRA), created new responsibilities and authorities for domestic regional fishery management councils and their advisory bodies. Following is the relevant MSRA text regarding the development and implementation of five-year regional research priorities by Councils. Section 302 (h) Each Council shall develop, in conjunction with the scientific and statistical committee, multi-year research priorities for fisheries, fishery interactions, habitats, and other areas of research that are necessary for management purposes that shall –

(A) establish priorities for 5-year periods;
(B) be updated as necessary; and
(C) be submitted to the Secretary and the regional science centers of the National Marine Fisheries Service for their consideration in developing research priorities and budgets for the region of the Council.

The research priority document is vetted through the Council advisory groups and submitted to the Secretary of Commerce and NMFS on an annual basis for their consideration. These priorities are also the basis for Federal funding opportunities such as the Saltonstall Kennedy Grant Program. A process of addressing and monitoring these research priorities is yet to be developed by the Council and NMFS PIFSC.

Stock assessments for Council managed fisheries remains the highest research priority. Another priority is to understand the fishery dynamics as affected by fish imports (and exports) which is particularly critical for small island communities. For current research priorities, see the Council's website at www.wpcouncil.org.

4.1.1.7 Western Pacific Sustainable Fisheries Fund

MSA Section 204(e)(7) provides for a Western Pacific Sustainable Fisheries Fund (WPSFF) "into which any payments received by the Secretary (of Commerce) under a Pacific Insular Area fishery agreement and any funds or contributions received in support of conservation and management objectives under a marine conservation plan for any Pacific Insular Area other than American Samoa, Guam, or the Northern Mariana Islands shall be deposited." These funds are used to implement Marine Conservation Plans (MCPs) developed under MSA Section 204(e)(4) for the Pacific Insular Areas. The WPSFF may also be used for projects to support Hawaiian archipelago fisheries if there is remaining funding after funding MCP projects. The Council utilizes the WPSFF to assist in fisheries development, research, and characterization in the Western Pacific.

4.1.1.8 Annual Fishery Reports and their Use

The Council's annual fishery reports serve as Stock Assessment and Fishery Evaluation (SAFE) reports for the Western Pacific region and contain information beyond the SAFE report requirements found in National Standard 2. Because they contain the most recent information about the fisheries, they serve as the basis for developing management measures and evaluating management alternatives as well as tracking the performance of this FEP.
The reports are generated by members of the Council's Plan Team and contain information about the MUS and their associated ecosystems derived from fishery dependent and fishery independent data collection systems. The SAFE Reports will typically contain information related to describing the fisheries, the ecosystem elements the fisheries influence and are in turn influenced by, and integrated characterizations of the fisheries. The specific elements of SAFE Reports may change due to availability of information or other factors. The current contents of the SAFE Reports can be obtained by contacting the Council or reviewing the most recent reports.

A comprehensive report will be created every 3 years, while a shorter report that describes more dynamic data elements will be generated during the interim years.

4.1.1.9 Other Applicable Laws and their Role

Section 303(a)(1)(C) of the MSA requires federal fishery management plans to be consistent with other applicable laws. These other laws impose additional procedural, substantive, and timing requirements on the decision process and their applicability must be assessed on a case-by-case basis. This FEP is consistent with the Magnuson-Stevens Act (16 USC 1851), including the ten National Standards, and other applicable law. These laws typically include the following:

- Administrative Procedure Act
- Coastal Zone Management Act

- Endangered Species Act
- National Monument
- Information Quality Act
- Marine Mammal Protection Act
- National Environmental Policy Act
- National Marine Sanctuaries Act
- Paperwork Reduction Act
- Regulatory Flexibility Act
- Executive Orders 12291 (cost-benefit and avoiding duplication), 12630 (governmental actions and interference with constitutionally protected property rights), 12866 (regulatory planning and review), 12898 (environmental justice), 13089 (coral reef protection), 13132 (federalism implication of federal actions), 13158 (marine protected areas), 13175 (consultation and coordination with Indian tribal governments), 13196 (Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve), 13272 (stewardship of the ocean, our coasts, and the Great Lakes), 13547 (National Ocean Policy) and 12962 (recreational fisheries).
- Presidential Proclamation 8031 and 8112 (establishing the Papahanaumokuakea Marine National Monument)

Specific information regarding the implications of each of these can be in the Operational Guidelines for the Fishery Management Process developed by NMFS in consultation with the Council Coordinating Committee at:

http://www.nmfs.noaa.gov/sfa/laws_policies/operational_guidelines/index.html.

The statutes themselves, along with their guidance language, regulations, and associated case law are controlling in the instance of any discrepancy between them and this document.

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Appendix A: List of Acronyms

APA: Administrative Procedure Act

B: Stock biomass

B_{FLAG}: Minimum Biomass Flag

B_{MSY}: Biomass Maximum Sustainable Yield

B_{OY}: Biomass Optimum Yield

BMUS: Bottomfish Management Unit Species

CFR: Code of Federal Regulations

CITES: Council on International Trade and Endangered Species

CNMI: Commonwealth of the Northern Mariana Islands

CPUE: Catch per unit effort at the reference point

$CPUE_{MSY}$: Catch per unit effort Maximum Sustainable Yield

$CPUE_{REF}$: Catch per unit effort at the Reference Point

CRAMP: Coral Reef Assessment and Monitoring Program

CRE: Coral Reef Ecosystem

CRE-FMP: Coral Reef Ecosystem Fishery Management Plan

CRTF: Coral Reef Task Force

DAR: Division of Aquatic Resources, State of Hawaii

DOC: United States Department of Commerce

DOD: United States Department of Defense

DOI: United States Department of the Interior

EEZ: Exclusive Economic Zone

EFH: Essential Fish Habitat

EIS: Environmental Impact Statement

E_{MSY}: Effort Maximum Sustainable Yield

ENSO: El Niño Southern Oscillation

EO: Executive Order

EPAP: Ecosystem Principals Advisory Panel

ESA: Endangered Species Act

F: Fishing mortality

F_{MSY}: Fishing mortality Maximum Sustainable Yield

F_{OY}: Fishing mortality Optimum Yield

FEP: Fishery Ecosystem Plan

FLPMA: Federal Land Policy and Management Act

fm: fathoms

FMP: Fishery Management Plan

FR: Federal Register

FRFA: Final Regulatory Flexibility Analysis

ft: feet

FWCA: Fish and Wildlife Coordination Act

GIS: Geographic information systems

GPS: Global Positioning System

HAPC: Habitat Areas of Particular Concern

IQA: Information Quality Act

IRFA Initial Regulatory Flexibility Analysis

kg: kilograms

km: kilometers

lb: pounds

LOF List of Fisheries

m: meters

mt: metric tons

MFMT: maximum fishing mortality threshold

MHI: Main Hawaiian Islands

min SST: minimum spawning stock threshold

mm: millimeters

MMPA: Marine Mammal Protection Act

MPA: Marine Protected Area

MSA: Magnuson-Stevens Fishery Conservation and Management Act

MSST: Minimum Stock Size Threshold

MSY: Maximum Sustainable Yield

MUS: Management Unit Species

NDSA: Naval Defense Sea Areas

NEPA: National Environmental Policy Act

nm or nmi: nautical miles

NMFS: National Marine Fisheries Service (also known as NOAA Fisheries Service)

NOAA: National Oceanic and Atmospheric Administration

NWHI: Northwestern Hawaiian Islands

NWR: National Wildlife Refuge

NWRSAA: National Wildlife Refuge System Administration Act

OMB: Office of Management and Budget

OY: Optimum Yield

PBR: Potential Biological Removal

PIFSC: Pacific Islands Fisheries Science Center, NMFS

PIRO: Pacific Islands Regional Office, NMFS

PRA:	Paperwork Reduction Act
PRIA:	Pacific Remote Island Areas
RFA:	Regulatory Flexibility Act
RIR:	Regulatory Impact Review
SFA:	Sustainable Fisheries Act
SLA:	Submerged Lands Act
SPR:	Spawning Potential Ratio
SSC:	Scientific and Statistical Committee
TALFF:	Total Allowable Level of Foreign Fishing
TSLA:	Territorial Submerged Lands Act
USCG:	United States Coast Guard
USFWS:	United States Fish and Wildlife Service
VMS:	Vessel Monitoring System
WPacFIN:	Western Pacific Fisheries Information Network, NMFS
WPRFMC:	Western Pacific Regional Fishery Management Council

Appendix B: List of Definitions

Adaptive Management: A program that adjusts regulations based on changing conditions of the fisheries and stocks.

Bycatch: Any fish harvested in a fishery which are not sold or kept for personal use, and includes economic discards and regulatory discards.

Barrier Net: A small-mesh net used to capture coral reef or coastal pelagic fishes.

Bioprospecting: The search for commercially valuable biochemical and genetic resources in plants, animals and microorganisms for use in food production, the development of new drugs and other biotechnology applications.

Charter Fishing: Fishing from a vessel carrying a passenger for hire (as defined in section 2101(21a) of Title 46, United States Code) who is engaged in recreational fishing.

Commercial Fishing: Fishing in which the fish harvested, either in whole or in part, are intended to enter commerce or enter commerce through sale, barter or trade. For the purposes of this Fishery Ecosystem Plan, commercial fishing includes the commercial extraction of biocompounds.

Consensual Management: Decision making process where stakeholders meet and reach consensus on management measures and recommendations.

Coral Reef Ecosystem (CRE): Those species, interactions, processes, habitats and resources of the water column and substrate located within any waters less than or equal to 50 fathoms in total depth.

Council: The Western Pacific Regional Fishery Management Council (WPRFMC).

Critical Habitat: Those geographical areas that are essential for bringing an endangered or threatened species to the point where it no longer needs the legal protections of the Endangered Species Act (ESA), and which may require special management considerations or protection. These areas are designated pursuant to the ESA as having physical or biological features essential to the conservation of listed species.

Dealer: Any person who (1) Obtains, with the intention to resell management unit species, or portions thereof, that were harvested or received by a vessel that holds a permit or is otherwise regulated under this FEP; or (2) Provides recordkeeping, purchase, or sales assistance in obtaining or selling such management unit species (such as the services provided by a wholesale auction facility).

Dip Net: A hand-held net consisting of a mesh bag suspended from a circular, oval, square or rectangular frame attached to a handle. A portion of the bag may be constructed of material, such as clear plastic, other than mesh.

Ecology: The study of interactions between an organism (or organisms) and its (their) environment (biotic and abiotic).

Ecological Integrity: Maintenance of the standing stock of resources at a level that allows ecosystem processes to continue. Ecosystem processes include replenishment of resources, maintenance of interactions essential for self-perpetuation and, in the case of coral reefs, rates of accretion that are equal to or exceed rates of erosion. Ecological integrity cannot be directly measured but can be inferred from observed ecological changes.

Economic Discards: Fishery resources that are the target of a fishery but which are not retained because they are of an undesirable size, sex or quality or for other economic reasons.

Ecosystem: A geographically specified system of organisms (including humans), the environment, and the processes that control its dynamics.

Ecosystem-Based Fishery Management: Fishery management actions aimed at conserving the structure and function of marine ecosystems in addition to conserving fishery resources.

Ecotourism: Observing and experiencing, first hand, natural environments and ecosystems in a manner intended to be sensitive to their conservation.

Environmental Impact Statement (EIS): A document required under the National Environmental Policy Act (NEPA) to assess alternatives and analyze the impact on the environment of proposed major Federal actions significantly affecting the human environment.

Essential Fish Habitat (EFH): Those waters and substrate necessary to a species or species group or complex, for spawning, breeding, feeding or growth to maturity.

Exclusive Economic Zone (EEZ): The zone established by Proclamation numbered 5030, dated March 10, 1983. For purposes of the Magnuson Act, the inner boundary of that zone is a line coterminous with the seaward boundary of each of the coastal states, commonwealths, territories or possessions of the United States.

Exporter: One who sends species in the fishery management unit to other countries for sale, barter or any other form of exchange (also applies to shipment to other states, territories or islands).

Fish: Finfish, mollusks, crustaceans and all other forms of marine animal and plant life other than marine mammals and birds

Fishery: One or more stocks of fish that can be treated as a unit for purposes of conservation and management and that are identified on the basis of geographical, scientific, technical, recreational and economic characteristics; and any fishing for such stocks.

Fishery Ecosystem Plan: A fishery ecosystem management plan that contains conservation and management measures necessary and appropriate for fisheries within a given ecosystem to prevent overfishing and rebuild overfished stocks, and to protect, restore, and promote the long-term health and stability of the fishery.

Fishing: The catching, taking or harvesting of fish; the attempted catching, taking or harvesting of fish; any other activity that can reasonably be expected to result in the catching, taking or harvesting of fish; or any operations at sea in support of, or in preparation for, any activity described in this definition. Such term does not include any scientific research activity that is conducted by a scientific research vessel.

Fishing Community: A community that is substantially dependent on or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs and includes fishing vessel owners, operators and crews and United States fish processors that are based in such community.

Food Web: Inter-relationships among species that depend on each other for food (predator-prey pathways).

Framework Measure: Management measure listed in an FEP for future consideration. Implementation can occur through an administratively simpler process than a full FEP amendment.

Ghost Fishing: The chronic and/or inadvertent capture and/or loss of fish or other marine organisms by lost or discarded fishing gear.

Habitat: Living place of an organism or community, characterized by its physical and biotic properties.

Habitat Area of Particular Concern (HAPC): Those areas of EFH identified pursuant to Section 600.815(a)(8). In determining whether a type or area of EFH should be designated as a HAPC, one or more of the following criteria should be met: (1) ecological function provided by the habitat is important; (2) habitat is sensitive to human-induced environmental degradation; (3) development activities are, or will be, stressing the habitat type; or (4) the habitat type is rare.

Harvest: The catching or taking of a marine organism or fishery MUS by any means.

Hook-and-line: Fishing gear that consists of one or more hooks attached to one or more lines.

Live Rock: Any natural, hard substrate (including dead coral or rock) to which is attached, or which supports, any living marine life-form associated with coral reefs.

Longline: A type of fishing gear consisting of a main line which is deployed horizontally from which branched or dropper lines with hooks are attached.

Low-Use MPA: A Marine Protected Area zoned to allow limited fishing activities.

Main Hawaiian Islands (MHI): The islands of the Hawaiian Islands archipelago consisting of Niihau, Kauai, Oahu, Molokai, Lanai, Maui, Kahoolawe, Hawaii and all of the smaller associated islets lying east of 161° W longitude.

Marine Protected Area (MPA): An area designated to allow or prohibit certain fishing activities.

Marine National Monument (MNM):

Maximum Sustainable Yield (MSY): The largest long-term average catch or yield that can be taken, from a stock or stock complex under prevailing ecological and environmental conditions and fishery technological characteristics (e.g., gear selectivity), and the distribution of catch among fleets.

National Marine Fisheries Service (NMFS): The component of the National Oceanic and Atmospheric Administration (NOAA), Department of Commerce, responsible for the conservation and management of living marine resources. Also known as NOAA Fisheries Service.

No-Take MPA: A Marine Protected Area where no fishing or removal of living marine resources is authorized.

Northwestern Hawaiian Islands (NWHI): the islands of the Hawaiian Islands archipelago lying to the west of 161°W longitude.

Optimum Yield (OY): With respect to the yield from a fishery "optimum" means the amount of fish that: (a) will provide the greatest overall benefit to the nation, particularly with respect to food production and recreational opportunities and taking into account the protection of marine ecosystems; (b) is prescribed as such on the basis of the MSY from the fishery, as reduced by any relevant economic, social or ecological factor; and (c) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the MSY in such fishery.

Overfished: A stock or stock complex is considered "overfished" when its biomass has declined below a level that jeopardizes the capacity of the stock or stock complex to produce maximum sustainable yield on a continuing basis.

Overfishing: (to overfish) occurs whenever a stock or stock complex is subjected to a level of fishing mortality or total annual catch that jeopardizes the capacity of a stock or stock complex to produce maximum sustainable yield on a continuing basis.

Pacific Remote Island Areas (PRIA): Baker Island, Howland Island, Jarvis Island, Johnston Atoll, Kingman Reef, Midway Atoll, Wake Island and Palmyra Atoll.

Passive Fishing Gear: Gear left unattended for a period of time prior to retrieval (e.g., traps, gill nets).

Precautionary Approach: The implementation of conservation measures even in the absence of scientific certainty that fish stocks are being overexploited.

Recreational Fishing: Fishing for sport or pleasure.

Recruitment: A measure of the weight or number of fish which enter a defined portion of the stock such as fishable stock (those fish above the minimum legal size) or spawning stock (those fish which are sexually mature).

Reef: A ridgelike or moundlike structure built by sedentary calcareous organisms and consisting mostly of their remains. It is wave-resistant and stands above the surrounding sediment. It is characteristically colonized by communities of encrusting and colonial invertebrates and calcareous algae.

Reef-obligate Species: An organism dependent on coral reefs for survival.

Regulatory Discards: Any species caught that fishermen are required by regulation to discard whenever caught, or are required to retain but not sell.

Resilience: The ability of a population or ecosystem to withstand change and to recover from stress (natural or anthropogenic).

Restoration: The transplanting of live organisms from their natural habitat in one area to another area where losses of, or damage to, those organisms has occurred with the purpose of restoring the damaged or otherwise compromised area to its original, or a substantially improved, condition; additionally, the altering of the physical characteristics (e.g., substrate, water quality) of an area that has been changed through human activities to return it as close as possible to its natural state in order to restore habitat for organisms.

Rock: Any consolidated or coherent and relatively hard, naturally formed, mass of mineral matter.

Rod-and-Reel: A hand-held fishing rod with a manually or electrically operated reel attached.

Scuba-assisted Fishing: Fishing, typically by spear or by hand collection, using assisted breathing apparatus.

Secretary: The Secretary of Commerce or a designee.

Sessile: Attached to a substrate; non-motile for all or part of the life cycle.

Slurp Gun: A self-contained, typically hand-held, tube–shaped suction device that captures organisms by rapidly drawing seawater containing the organisms into a closed chamber.

Social Acceptability: The acceptance of the suitability of management measures by stakeholders, taking cultural, traditional, political and individual benefits into account.

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Slurp Gun: A self-contained, typically hand-held, tube–shaped suction device that captures organisms by rapidly drawing seawater containing the organisms into a closed chamber.

Social Acceptability: The acceptance of the suitability of management measures by stakeholders, taking cultural, traditional, political and individual benefits into account.

Spear: A sharp, pointed, or barbed instrument on a shaft, operated manually or shot from a gun or sling.

Stock Assessment: An evaluation of a stock in terms of abundance and fishing mortality levels and trends, and relative to fishery management objectives and constraints if they have been specified.

Stock of Fish: A species, subspecies, geographical grouping or other category of fish capable of management as a unit.

Submersible: A manned or unmanned device that functions or operates primarily underwater and is used to harvest fish.

Subsistence Fishing: Fishing to obtain food for personal and/or community use rather than for profit sales or recreation.

Target Resources: Species or taxa sought after in a directed fishery.

Trophic Web: A network that represents the predator/prey interactions of an ecosystem.

Trap: A portable, enclosed, box-like device with one or more entrances used for catching and holding fish or marine organism.

Western Pacific Regional Fishery Management Council (WPRFMC or Coucil): A Regional Fishery Management Council established under the MSA, consisting of the State of Hawaii, the Territory of American Samoa, the Territory of Guam, and the Commonwealth of the Northern Mariana Islands which has authority over the fisheries in the Pacific Ocean seaward of such States, Territories, Commonwealths, and Possessions of the United States in the Pacific Ocean Area. The Council has 13 voting members including eight appointed by the Secretary of Commerce at least one of whom is appointed from each of the following States: Hawaii, the Territories of American Samoa and Guam, and the Commonwealth of the Northern Mariana Islands.

Stock Assessment: An evaluation of a stock in terms of abundance and fishing mortality levels and trends, and relative to fishery management objectives and constraints if they have been specified.

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Appendix C: Regulations Implementing the Pelagic Fishery Ecosystem Plan and the Marianas Trench, Pacific Remote Islands, and Rose Atoll Marine National Monuments

PART 665—FISHERIES IN THE WESTERN PACIFIC

Contents

Subpart H—Pacific Remote Islands Marine National Monument

Subpart I—Rose Atoll Marine National Monument

AUTHORITY: 16 U.S.C. 1801 *et seq.*

SOURCE: 75 FR 2205, Jan. 14, 2010, unless otherwise noted.

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Subpart A—General

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§665.1 Purpose and scope.

(a) The regulations in this part govern fishing for western Pacific fishery ecosystem MUS by vessels of the United States that operate or are based inside the outer boundary of the U.S. EEZ around American Samoa, Hawaii, Guam, the Northern Mariana Islands, Palmyra Atoll, Kingman Reef, Jarvis Island, Baker Island, Howland Island, Johnston Atoll, and Wake Island.

(b) General regulations governing fishing by all vessels of the United States and by fishing vessels other than vessels of the United States are contained in 50 CFR part 600.

(c) Regulations governing the harvest, possession, landing, purchase, and sale of shark fins are found in 50 CFR part 600 subpart N.

(d) This subpart contains regulations that are common to all western Pacific fisheries managed under Fishery Ecosystem Plans (FEPs) prepared by the Western Pacific Fishery Management Council under the Magnuson-Stevens Act.

(e) Regulations specific to individual areas and fisheries are included in subparts B through F of this part.

(f) Nothing in subparts B through F of this part is intended to supersede any valid state or Federal regulations that are more restrictive than those published here.

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§665.2 Relation to other laws.

NMFS recognizes that any state law pertaining to vessels registered under the laws of that state while operating in the fisheries regulated under this part, that is consistent with this part and the FEPs implemented by this part, shall continue in effect with respect to fishing activities regulated under this part.

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§665.3 Licensing and registration.

Any person who is required to do so by applicable state law or regulation must comply with licensing and registration requirements in the exact manner required by applicable state law or regulation.

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§665.4 Annual catch limits.

(a) *General.* For each fishing year, the Regional Administrator shall specify an annual catch limit, including any overage adjustments, for each stock or stock complex of management unit species defined in subparts B through F of this part, as recommended by the Council, and considering the best available scientific, commercial, and other information about the fishery for that stock or stock complex. The annual catch limit shall serve as the basis for invoking accountability measures in paragraph (f) of this section.

(b) *Overage adjustments.* If landings of a stock or stock complex exceed the specified annual catch limit in a fishing year, the Council will take action in accordance with 50 CFR 600.310(g), which may include recommending that the Regional Administrator reduce the annual catch limit for the subsequent year by the amount of the overage or other measures, as appropriate.

(c) *Exceptions.* The Regional Administrator is not required to specify an annual catch limit for a management unit species that is statutorily excepted from the requirement pursuant to 50 CFR 600.310(h)(2), or that the Council has identified as an ecosystem component species. The Regional Administrator will publish in the FEDERAL REGISTER the list of ecosystem component species, and will publish any changes to the list, as necessary.

(d) *Annual catch target.* For each fishing year, the Regional Administrator may also specify an annual catch target that is below the annual catch limit of a stock or stock complex, as recommended by the Council. When used, the annual catch target shall serve as the basis for invoking accountability measures in paragraph (f) of this section.

(e) *Procedures and timing.* (1) No later than 60 days before the start of a fishing year, the Council shall recommend to the Regional Administrator an annual catch limit, including any overage adjustment, for each stock or stock complex. The recommended limit should be based on a recommendation of the SSC of the acceptable biological catch for each stock or stock complex. The Council may not recommend an annual catch limit that exceeds the acceptable biological catch recommended by the SSC. The Council may also recommend an annual catch target below the annual catch limit.

(2) No later than 30 days before the start of a fishing year, the Regional Administrator shall publish in the FEDERAL REGISTER a notice of the proposed annual catch limit specification and any associated annual catch target, and request public comment.

(3) No later than the start of a fishing year, the Regional Administrator shall publish in the FEDERAL REGISTER and use other methods to notify permit holders of the final annual catch limit specification and any associated annual catch target.

(f) *Accountability measures.* When any annual catch limit or annual catch target is projected to be reached, based on available information, the Regional Administrator shall publish notification to that effect in the FEDERAL REGISTER and shall use other means to notify permit holders.

(1) The notice will include an advisement that fishing for that stock or stock complex will be restricted beginning on a specified date, which shall not be earlier than 7 days after the date of filing the notice for public inspection at the Office of the Federal Register. The restriction may include, but is not limited to, closure of the fishery, closure of specific areas, changes to bag limits, or restrictions in effort. The restriction will remain in effect until the end of the fishing year, except that the Regional Administrator may, based on a recommendation from the Council, remove or modify the restriction before the end of the fishing year.

(2) It is unlawful for any person to conduct fishing in violation of the restrictions specified in the notification issued pursuant to paragraph (f)(1) of this section.

[76 FR 37286, June 27, 2011]

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§§665.5-665.11 [Reserved]

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§665.12 Definitions.

In addition to the definitions in the Magnuson-Stevens Act, §600.10 of this chapter, and subparts B through F of this part, general definitions for western Pacific fisheries have the following meanings:

American Samoa FEP means the Fishery Ecosystem Plan for American Samoa.

Bottomfish FMP means the Fishery Management Plan for Bottomfish and Seamount Groundfish of the Western Pacific Region established in 1986 and replaced by FEPs.

Carapace length means a measurement in a straight line from the ridge between the two largest spines above the eyes, back to the rear edge of the carapace of a spiny lobster (see Figure 1 to this part).

Circle hook means a fishing hook with the point turned perpendicularly back towards the shank.

Commercial fishing means fishing in which the fish harvested, either in whole or in part, are intended to enter commerce or enter commerce through sale, barter, or trade. All lobster fishing in Crustacean Permit Area 1 is considered commercial fishing.

Commonwealth of the Northern Mariana Islands (CNMI) means the Northern Mariana Islands.

Coral Reef Ecosystems FMP means the Fishery Management Plan for Coral Reef Ecosystems of the Western Pacific Region established in 2004 and replaced by FEPs.

Council means the Western Pacific Fishery Management Council.

Crustacean receiving vessel means a vessel of the United States to which lobsters taken in a crustacean management area are transferred from another vessel.

Crustaceans FMP means the Fishery Management Plan for Crustacean Fisheries of the Western Pacific Region established in 1982 and replaced by FEPs.

Currently harvested coral reef taxa (CHCRT) means coral reef associated species, families, or subfamilies, as defined in §§665.121, 665.221, 665.421, and 665.621, that have annual landings greater than 454.54 kg (1,000 lb) as reported on individual state, commonwealth, or territory catch reports or through creel surveys. Fisheries and research data from many of these species have been analyzed by regional management agencies.

Customary exchange means the non-market exchange of marine resources between fishermen and community residents, including family and friends of community residents, for goods, and/or services for cultural, social, or religious reasons. Customary exchange may include cost recovery through monetary reimbursements and other means for actual trip expenses, including but not limited to ice, bait, fuel, or food, that may be necessary to participate in fisheries in the western Pacific. Actual trip expenses do not include expenses that a fisherman would incur without making a fishing trip, including expenses relating to dock space, vessel mortgage payments, routine vessel maintenance, vessel registration fees, safety equipment required by U.S. Coast Guard, and other incidental costs and expenses normally associated with ownership of a vessel.

Dead coral means any precious coral that no longer has any live coral polyps or tissue.

Ecosystem component species means any western Pacific MUS that the Council has identified to be, generally, a non-target species, not determined to be subject to overfishing, approaching overfished, or overfished, not likely to become subject to overfishing or overfished, and generally not retained for sale or personal use.

EFP means an experimental fishing permit.

First level buyer means:

(1) The first person who purchases, with the intention to resell, management unit species, or portions thereof, that were harvested by a vessel that holds a permit or is otherwise regulated under crustacean fisheries in subparts B through E of this part; or

(2) A person who provides recordkeeping, purchase, or sales assistance in the first transaction involving MUS (such as the services provided by a wholesale auction facility).

Fishing gear, as used in regulations for the American Samoa, CNMI, Hawaii, and PRIA bottomfish fisheries in subparts B through E of this part, includes:

(1) Bottom trawl, which means a trawl in which the otter boards or the footrope of the net are in contact with the sea bed;

(2) Gillnet, (see §600.10);

(3) Hook-and-line, which means one or more hooks attached to one or more lines;

(4) Set net, which means a stationary, buoyed, and anchored gill net; and

(5) Trawl, (see §600.10).

Fishing trip means a period of time during which fishing is conducted, beginning when the vessel leaves port and ending when the vessel lands fish.

Fishing year means the year beginning at 0001 local time on January 1 and ending at 2400 local time on December 31, with the exception of fishing for Hawaii Restricted Bottomfish Species and any precious coral MUS.

Freeboard means the straight line vertical distance between a vessel's working deck and the sea surface. If the vessel does not have gunwale door or stern door that exposes the working deck, freeboard means the straight line vertical distance between the top of a vessel's railing and the sea surface.

Harvest guideline means a specified numerical harvest objective.

Hawaiian Archipelago means the Main and Northwestern Hawaiian Islands, including Midway Atoll.

Hawaii FEP means the Fishery Ecosystem Plan for the Hawaiian Archipelago.

Hookah breather means a tethered underwater breathing device that pumps air from the surface through one or more hoses to divers at depth.

Incidental catch or incidental species means species caught while fishing for the primary purpose of catching a different species.

Land or landing means offloading fish from a fishing vessel, arriving in port to begin offloading fish, or causing fish to be offloaded from a fishing vessel.

Large vessel means, as used in this part, any vessel equal to or greater than 50 ft (15.2 m) in length overall.

Length overall (LOA) or length of a vessel as used in this part, means the horizontal distance, rounded to the nearest foot (with any 0.5 foot or 0.15 meter fraction rounded upward), between the foremost part of the stem and the aftermost part of the stern, excluding bowsprits, rudders, outboard motor brackets, and similar fittings or attachments (see Figure 2 to this part). “Stem” is the foremost part of the vessel, consisting of a section of timber or fiberglass, or cast forged or rolled metal, to which the sides of the vessel are united at the fore end, with the lower end united to the keel, and with the bowsprit, if one is present, resting on the upper end. “Stern” is the aftermost part of the vessel.

Live coral means any precious coral that has live coral polyps or tissue.

Live rock means any natural, hard substrate, including dead coral or rock, to which is attached, or which supports, any living marine life form associated with coral reefs.

Low-use marine protected area (MPA) means an area of the U.S. EEZ where fishing operations have specific restrictions in order to protect the coral reef ecosystem, as specified under area restrictions in subparts B through F of this part.

Main Hawaiian Islands (MHI) means the islands of the Hawaii Archipelago lying to the east of 161° W. long.

Mariana Archipelago means Guam and the Northern Mariana Islands.

Mariana FEP means the Fishery Ecosystem Plan for the Mariana Archipelago.

Medium vessel, as used in this part, means any vessel equal to or more than 40 ft (12.2 m) and less than 50 ft (15.2 m) LOA.

Non-commercial fishing means fishing that does not meet the definition of commercial fishing in the Magnuson-Stevens Fishery Conservation and Management Act, and includes, but is not limited to, sustenance, subsistence, traditional indigenous, and recreational fishing.

Non-precious coral means any species of coral other than those listed under the definitions for precious coral in §§665.161, 665.261, 665.461, and 665.661.

Non-selective gear means any gear used for harvesting coral that cannot discriminate or differentiate between types, size, quality, or characteristics of living or dead coral.

Northwestern Hawaiian Islands (NWHI) means the islands of the Hawaiian Archipelago lying to the west of 161° W. long.

No-take MPA means an area of the U.S. EEZ that is closed to fishing for or harvesting of any MUS, as defined in subparts B through F of this part.

Offload means to remove MUS from a vessel.

Offset circle hook means a circle hook in which the barbed end of the hook is displaced relative to the parallel plane of the eyed end, or shank, of the hook when laid on its side.

Owner, as used in the regulations for the crustacean fisheries in subparts B through E of this part and §665.203(i) and (j), means a person who is identified as the current owner of the vessel as described in the Certificate of Documentation (Form CG-1270) issued by the United States Coast Guard (USCG) for a documented vessel, or in a registration certificate issued by a state, a territory, or the USCG for an undocumented vessel. As used in the regulations for the precious coral fisheries in subparts B through E of this part and §665.203(c) through (h), the definition of “owner” in §600.10 of this chapter continues to apply.

Pacific Islands Regional Office (PIRO) means the headquarters of the Pacific Islands Region, NMFS, located at 1845 Wasp Blvd., Bldg. 176, Honolulu, HI 96818; telephone number: 808-725-5000.

Pacific remote island areas (PRIA, or U.S. island possessions in the Pacific Ocean) means Palmyra Atoll, Kingman Reef, Jarvis Island, Baker Island, Howland Island, Johnston Atoll, Wake Island, and Midway Atoll.

Pelagics FEP means the Fishery Ecosystem Plan for Pacific Pelagic Fisheries of the Western Pacific Region.

Pelagics FMP means the Fishery Management Plan for Pelagic Fisheries of the Western Pacific Region that was established in 1987 and replaced by the western Pacific pelagic FEP.

Potentially harvested coral reef taxa (PHCRT) means coral reef associated species, families, or subfamilies, as defined in §§665.121, 665.221, 665.421, and 665.621, for which little or no information is available beyond general taxonomic and distribution descriptions. These species have either not been caught in the past or have been harvested annually in amounts less than 454.54 kg (1,000 lb).

Precious Corals FMP means the Fishery Management Plan for Precious Corals of the Western Pacific Region established in 1983 and replaced by fishery ecosystem plans (FEPs).

PRIA FEP means the Fishery Ecosystem Plan for the Pacific Remote Island Areas of Palmyra Atoll, Kingman Reef, Jarvis Island, Baker Island, Howland Island, Johnston Atoll, and Wake Island.

Protected species means an animal protected under the MMPA, as amended, listed under the ESA, as amended, or subject to the Migratory Bird Treaty Act, as amended.

Receiving vessel means a vessel that receives fish or fish products from a fishing vessel, and with regard to a vessel holding a permit under §665.801(e), that also lands western Pacific pelagic MUS taken by other vessels using longline gear.

Recreational fishing means fishing conducted for sport or pleasure, including charter fishing.

Regional Administrator means Regional Administrator, Pacific Islands Region, NMFS (see Table 1 of §600.502 of this chapter for address).

Selective gear means any gear used for harvesting coral that can discriminate or differentiate between type, size, quality, or characteristics of living or dead coral.

Special Agent-In-Charge (SAC) means the Special Agent-In-Charge, NMFS, Pacific Islands Enforcement Division, located at 1845 Wasp Blvd., Bldg. 176, Honolulu, HI 96818; telephone number: 808-725-6100, or a designee.

Special permit means a permit issued to allow fishing for coral reef ecosystem MUS in low-use MPAs or to fish for any PHCRT.

SSC means the Scientific and Statistical Committee of the Western Pacific Fishery Management Council.

State of Hawaii commercial marine license means the license required by the State of Hawaii for anyone to take marine life for commercial purposes (also known as the commercial fishing license).

Transship means to offload or otherwise transfer MUS or products thereof to a receiving vessel.

Trap means a box-like device used for catching and holding lobsters or fish.

U.S. harvested coral means coral caught, taken, or harvested by vessels of the United States within any fishery for which an FMP or FEP has been implemented under the Magnuson-Stevens Act.

Vessel monitoring system unit (VMS unit) means the hardware and software owned by NMFS, installed on vessels by NMFS, and required to track and transmit the positions of certain vessels.

Western Pacific fishery management area means those waters shoreward of the outer boundary of the EEZ around American Samoa, Guam, Hawaii, CNMI, Midway, Johnston and Palmyra Atolls, Kingman Reef, and Wake, Jarvis, Baker, and Howland Islands.

[75 FR 2205, Jan. 14, 2010, as amended at 76 FR 37286, June 27, 2011; 78 FR 33003, June 3, 2013; 79 FR 64111, Oct. 28, 2014]

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§665.13 Permits and fees.

(a) *Applicability.* The requirements for permits for specific western Pacific fisheries are set forth in subparts B through I of this part.

(b) *Validity.* Each permit is valid for fishing only in the specific fishery management areas identified on the permit.

(c) *Application.* (1) An application for a permit to operate in a Federal western Pacific fishery that requires a permit and is regulated under subparts B through I of this part may be obtained from NMFS PIRO. The completed application must be submitted to PIRO for consideration. In no case shall PIRO accept an application that is not on a Federal western Pacific fisheries permit application form.

(2) A minimum of 15 days after the day PIRO receives a complete application should be allowed for processing the application for fisheries under subparts B through I of this part. If an incomplete or improperly completed application is filed, NMFS will notify the applicant of the deficiency. If the applicant fails to correct the deficiency within 30 days following the date of the letter of notification of deficiency, the application will be administratively closed.

(d) *Change in application information.* Any change in the permit application information or vessel documentation, submitted under paragraph (c) of this section, must be reported to PIRO in writing within 15 days of the change to avoid a delay in processing the permit application. A minimum of 10 days from the day the information is received by PIRO should be given for PIRO to record any change in information from the permit application submitted under paragraph (c) of this section. Failure to report such changes may result in a delay in processing an application, permit holders failing to receive important notifications, or sanctions pursuant to the Magnuson-Stevens Act at 16 U.S.C. 1858(g) or 15 CFR part 904, subpart D.

(e) *Issuance.* After receiving a complete application submitted under paragraph (c) of this section, the Regional Administrator will issue a permit to an applicant who is eligible under this part, as appropriate.

(f) *Fees.* (1) PIRO will not charge a fee for a permit issued under §§665.142, 665.162, 665.242, 665.262, 665.442, 665.462, 665.642, or 665.662 of this part, for a Ho'omalu limited access permit issued under §665.203, or for a Guam bottomfish permit issued under §665.404.

(2) PIRO will charge a non-refundable processing fee for each application (including transfer and renewal) for each permit listed in paragraphs (f)(2)(i) through (f)(2)(xiii) of this section. The amount of the fee is calculated in accordance with the procedures of the NOAA Finance Handbook for determining the administrative costs incurred in processing the permit. The fee may not exceed such costs. The appropriate fee is specified with each application form and must accompany each application. Failure to pay the fee will preclude the issuance, transfer, or renewal of any of the following permits:

(i) Hawaii longline limited access permit.

(ii) Mau Zone limited access permit.

(iii) Coral reef ecosystem special permit.

(iv) American Samoa longline limited access permit.

(v) MHI non-commercial bottomfish permit.

(vi) Western Pacific squid jig permit.

(vii) Crustacean permit.

(viii) CNMI commercial bottomfish permit.

(ix) Marianas Trench Monument non-commercial permit.

(x) Marianas Trench Monument recreational charter permit.

(xi) Pacific Remote Islands Monument recreational charter permit.

(xii) Rose Atoll Monument non-commercial permit.

(xiii) Rose Atoll Monument recreational charter permit.

(g) *Expiration.* A permit issued under subparts B through I of this part is valid for the period specified on the permit unless revoked, suspended, transferred, or modified under 15 CFR part 904.

(h) *Replacement.* Replacement permits may be issued, without charge, to replace lost or mutilated permits. An application for a replacement permit is not considered a new application.

(i) *Transfer.* An application for a permit transfer under §§665.203(d), 665.242(e), or 665.801(k), or for registration of a permit for use with a replacement vessel under §665.203(i), must be submitted to PIRO as described in paragraph (c) of this section.

(j) *Alteration.* Any permit that has been altered, erased, or mutilated is invalid.

(k) *Display.* Any permit issued under this subpart, or a facsimile of such permit, must be on board the vessel at all times while the vessel is fishing for, taking, retaining, possessing, or landing MUS shoreward of the outer boundary of the fishery management area. Any permit issued under this section must be displayed for inspection upon request of an authorized officer.

(l) *Sanctions.* Procedures governing sanctions and denials are found at subpart D of 15 CFR part 904.

(m) *Permit appeals.* Procedures for appeals of permitting and administrative actions are specified in the relevant subparts of this part.

[75 FR 2205, Jan. 14, 2010, as amended at 78 FR 33003, June 3, 2013; 78 FR 39583, July 2, 2013]

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§665.14 Reporting and recordkeeping.

(a) Except for precious coral and crustacean fisheries, any person who is required to do so by applicable state law or regulation must make and/or file all reports of MUS landings containing all data and in the exact manner required by applicable state law or regulation.

(b) *Fishing record forms*—(1) *Applicability.* (i) The operator of a fishing vessel subject to the requirements of §§665.124, 665.142, 665.162, 665.203(a)(2), 665.224, 665.242, 665.262, 665.404, 665.424, 665.442, 665.462, 665.603, 665.624, 665.642, 665.662, 665.801, 665.905, 665.935, or 665.965 must maintain on board the vessel an accurate and complete record of catch, effort, and other data on paper report forms provided by the Regional Administrator, or electronically as specified and approved by the Regional Administrator, except as allowed in paragraph (b)(1)(iii) of this section.

(ii) All information specified by the Regional Administrator must be recorded on paper or electronically within 24 hours after the completion of each fishing day. The logbook information, reported on paper or electronically, for each day of the fishing trip must be signed and dated or otherwise authenticated by the vessel operator in the manner determined by the Regional Administrator, and be submitted or transmitted via an approved method as specified by the Regional Administrator, and as required by this paragraph (b).

(iii) In lieu of the requirements in paragraph (a)(1)(i) of this section, the operator of a fishing vessel registered for use under a Western Pacific squid jig permit pursuant to the requirements of §665.801(g) may participate in a state reporting system. If participating in a state reporting system, all required information must be recorded and submitted in the exact manner required by applicable state law or regulation.

(2) *Timeliness of submission.* (i) If fishing was authorized under a permit pursuant to §§665.142, 665.242, 665.442, 665.404, 665.162, 665.262, 665.462, 665.662, or 665.801, the vessel operator must submit the original logbook information for each day of the fishing trip to the Regional Administrator within 72 hours of the end of each fishing trip, except as allowed in paragraph (iii) of this section.

(ii) If fishing was authorized under a permit pursuant to §665.203(a)(2), the vessel operator or vessel owner must submit the original logbook form for each day of the fishing trip to the Regional Administrator within 72 hours of the end of each fishing trip.

(iii) If fishing was authorized under a PRIA bottomfish permit pursuant to §665.603(a), PRIA pelagic troll and handline permit pursuant to §665.801(f), crustacean fishing permit for the PRIA (Permit Area 4) pursuant to §665.642(a), or a precious coral fishing permit for Permit Area X-P-PI pursuant to §665.662, the original logbook form for each day of fishing within EEZ waters around the PRIA must be submitted to the Regional Administrator within 30 days of the end of each fishing trip.

(iv) If fishing was authorized under a permit pursuant to §§665.124, 665.224, 665.424, 665.624, 665.905, 665.935, or 665.965, the original logbook information for each day of fishing must be submitted to the Regional Administrator within 30 days of the end of each fishing trip.

(c) *Transshipment logbooks.* Any person subject to the requirements of §§665.124(a)(2), 665.224(a)(2), 665.424(a)(2), 665.624(a)(2), or 665.801(e) must maintain on board the vessel an accurate and complete NMFS transshipment logbook containing report forms provided by the Regional Administrator. All information specified on the forms must be recorded on the forms within 24 hours after the day of transshipment. Each form must be signed and dated by the receiving vessel operator. The original logbook for each day of transshipment activity must be submitted to the Regional Administrator within 72 hours of each landing of western Pacific pelagic MUS. The original logbook for each day of transshipment activity must be submitted to the Regional Administrator within 7 days of each landing of coral reef ecosystem MUS.

(d) *Sales report.* The operator of any fishing vessel subject to the requirements of §§665.142, 665.242, 665.442, or 665.642, or the owner of a medium or large fishing vessel subject to the requirements of §665.404(a)(2) must submit to the Regional Administrator, within 72 hours of offloading of crustacean MUS, an accurate and complete sales report on a form provided by the Regional Administrator. The form must be signed and dated by the fishing vessel operator.

(e) *Packing or weigh-out slips.* The operator of any fishing vessel subject to the requirements of §§665.142, 665.242, 665.442, or 665.642 must attach packing or weighout slips provided to the operator by the first-level buyer(s), unless the packing or weighout slips have not been provided in time by the buyer(s).

(f) *Modification of reporting and recordkeeping requirements.* The Regional Administrator may, after consultation with the Council, initiate rulemaking to modify the information to be provided on the fishing record forms, transshipment logbook, and sales report forms and timeliness by which the information is to be provided, including the submission of packing or weighout slips.

(g) *Availability of records for inspection.* (1) Western Pacific pelagic MUS. Upon request, any fish dealer must immediately provide an authorized officer access to inspect and copy all records of purchases, sales, or other transactions involving western Pacific pelagic MUS taken or handled by longline vessels that have permits issued under this subpart or that are otherwise subject to subpart F of this part, including, but not limited to, information concerning:

(i) The name of the vessel involved in each transaction and the owner and operator of the vessel.

(ii) The weight, number, and size of each species of fish involved in each transaction.

(iii) Prices paid by the buyer and proceeds to the seller in each transaction.

(2) *Crustacean MUS.* Upon request, any first-level buyer must immediately allow an authorized officer and any employee of NMFS designated by the Regional Administrator, to access, inspect, and copy all records relating to the harvest, sale, or transfer of crustacean MUS taken by vessels that have permits issued under this subpart or §§665.140 through 665.145, 665.240 through 665.252, 665.440 through 665.445, or 665.640 through 665.645 of this part. This requirement may be met by furnishing the information on a worksheet provided by the Regional Administrator. The information must include, but is not limited to:

(i) The name of the vessel involved in each transaction and the owner or operator of the vessel.

(ii) The amount, number, and size of each MUS involved in each transaction.

(iii) Prices paid by the buyer and proceeds to the seller in each transaction.

(3) Bottomfish and seamount groundfish MUS. Any person who is required by state laws and regulations to maintain records of landings and sales for vessels regulated by this subpart and by §§665.100 through 665.105, 665.200 through 665.212, 665.400 through 665.407, and 665.600 through 665.606 of this part must make those records immediately available for Federal inspection and copying upon request by an authorized officer.

(4) *Coral reef ecosystem MUS.* Any person who has a special permit and who is required by state laws and regulations to maintain and submit records of catch and effort, landings and sales for coral reef ecosystem MUS by this subpart and §§665.120 through 665.128, 665.220 through 665.228, 665.420 through 665.428, or 665.620 through 665.628 of this part must make those records immediately available

for Federal inspection and copying upon request by an authorized officer as defined in §600.10 of this chapter.

(h) *State reporting.* Any person who has a permit under §§665.124, 665.203, 665.224, 665.404, 665.424, 665.603, or 665.624 and who is regulated by state laws and regulations to maintain and submit records of catch and effort, landings and sales for vessels regulated by subparts B through F of this part must maintain and submit those records in the exact manner required by state laws and regulations.

[75 FR 2205, Jan. 14, 2010, as amended at 78 FR 33003, June 3, 2013; 78 FR 39583, July 2, 2013]

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§665.15 Prohibitions.

In addition to the prohibitions in §600.725 of this chapter, it is unlawful for any person to:

(a) Engage in fishing without a valid permit or facsimile of a valid permit on board the vessel and available for inspection by an authorized officer, when a permit is required under §§665.13 or 665.17, unless the vessel was at sea when the permit was issued under §665.13, in which case the permit must be on board the vessel before its next trip.

(b) File false information on any application for a fishing permit under §665.13 or an EFP under §665.17.

(c) Fail to file reports in the exact manner required by any state law or regulation, as required in §665.14.

(d) Falsify or fail to make, keep, maintain, or submit any logbook or logbook form or other record or report required under §§665.14 and 665.17.

(e) Refuse to make available to an authorized officer or a designee of the Regional Administrator for inspection or copying, any records that must be made available in accordance with §665.14.

(f) Fail to affix or maintain vessel or gear markings, as required by §§665.16, 665.128, 665.228, 665.246, 665.428, 665.628, or 665.804.

(g) Violate a term or condition of an EFP issued under §665.17.

(h) Fail to report any take of or interaction with protected species as required by §665.17(k).

(i) Fish without an observer on board the vessel after the owner or agent of the owner has been directed by NMFS to make accommodations available for an observer under §§665.17, 665.105, 665.145, 665.207, 665.247, 665.407, 665.445, 665.606, 665.645, or 665.808.

(j) Refuse to make accommodations available for an observer when so directed by the Regional Administrator under §§665.105, 665.145, 665.207, 665.247, 665.407, 665.445, 665.606, 665.645, or 665.808, or under any provision in an EFP issued under §665.17.

(k) Fail to notify officials as required in §§665.126, 665.144, 665.205, 665.226, 665.244, 665.426, 665.444, 665.626, 665.644, 665.803, or 665.808.

(l) Fish for, take or retain within a no-take MPA, defined in §§665.99, 665.199, 665.399, or 665.599, any bottomfish MUS, crustacean MUS, western Pacific pelagic MUS, precious coral, seamount groundfish or coral reef ecosystem MUS.

(m) Fail to comply with a term or condition governing the vessel monitoring system in violation of §665.19.

(n) Fish for, catch, or harvest MUS without an operational VMS unit on board the vessel after installation of the VMS unit by NMFS, in violation of §665.19(e)(2).

(o) Possess MUS, that were harvested after NMFS has installed the VMS unit on the vessel, on board that vessel without an operational VMS unit, in violation of §665.19(e)(2).

(p) Interfere with, tamper with, alter, damage, disable, or impede the operation of a VMS unit or attempt any of the same; or move or remove a VMS unit without the prior permission of the SAC in violation of §665.19(e)(3).

(q) Make a false statement, oral or written, to an authorized officer, regarding the use, operation, or maintenance of a VMS unit, in violation of §665.19(e).

(r) Interfere with, impede, delay, or prevent the installation, maintenance, repair, inspection, or removal of a VMS unit, in violation of §665.19(e).

(s) Interfere with, impede, delay, or prevent access to a VMS unit by a NMFS observer, in violation of §665.808(f)(4).

(t) Connect or leave connected additional equipment to a VMS unit without the prior approval of the SAC, in violation of §665.19(f).

(u) Fail to comply with the restrictions specified in the notification issued pursuant to §665.4(f)(1), in violation of §665.15(f)(2).

[75 FR 2205, Jan. 14, 2010, as amended at 76 FR 37287, June 27, 2011]

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§665.16 Vessel identification.

(a) Applicability. Each fishing vessel subject to this part, except those identified in paragraph (e) of this section, must be marked for identification purposes, as follows:

(1) A vessel that is registered for use with a valid permit issued under §665.801 and used to fish on the high seas within the Convention Area as defined in §300.211 of this title must be marked in accordance with the requirements at §§300.14 and 300.217 of this title.

(2) A vessel that is registered for use with a valid permit issued under §665.801 of this part and not used to fish on the high seas within the Convention Area must be marked in accordance with either:

(i) Sections 300.14 and 300.217 of this title, or

(ii) Paragraph (b) of this section.

(3) A vessel that is registered for use with a valid permit issued under subparts B through E and subparts G through I of this part must be marked in accordance with paragraph (b) of this section.

(b) Identification. Each vessel subject to this section must be marked as follows:

(1) The vessel's official number must be affixed to the port and starboard sides of the deckhouse or hull, and on an appropriate weather deck, so as to be visible from enforcement vessels and aircraft. Marking must be legible and of a color that contrasts with the background.

(2) For fishing and receiving vessels of 65 ft (19.8 m) LOA or longer, the official number must be displayed in block Arabic numerals at least 18 inches (45.7 cm) in height, except that vessels in precious coral fisheries that are 65 ft (19.8 m) LOA or longer must be marked in block Arabic numerals at least 14 inches (35.6 cm) in height.

(3) For all other vessels, the official number must be displayed in block Arabic numerals at least 10 inches (25.4 cm) in height.

(c) The vessel operator must ensure that the official number is clearly legible and in good repair.

(d) The vessel operator must ensure that no part of the vessel, its rigging, or its fishing gear obstructs the view of the official number from an enforcement vessel or aircraft.

(e) The following fishing vessels are exempt from the vessel identification requirements in this section:

(1) A vessel registered for use under a MHI non-commercial bottomfish permit that is in compliance with State of Hawaii bottomfish vessel registration and marking requirements.

(2) A vessel less than 40 ft (12.2 m) LOA registered for use under a CNMI commercial bottomfish permit that is in compliance with CNMI bottomfish vessel registration and marking requirements.

[75 FR 2205, Jan. 14, 2010, as amended at 75 FR 3417, Jan. 21, 2010; 78 FR 33003, June 3, 2013; 78 FR 39583, July 2, 2013]

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§665.17 Experimental fishing.

(a) *General.* The Regional Administrator may authorize, for limited purposes, the direct or incidental harvest of MUS that would otherwise be prohibited by this part. No experimental fishing may be conducted unless authorized by an EFP issued by the Regional Administrator in accordance with the criteria and procedures specified in this section. EFPs will be issued without charge.

(b) *Observers.* No experimental fishing for crustacean MUS may be conducted unless a NMFS observer is aboard the vessel.

(c) *Application.* An applicant for an EFP must submit to the Regional Administrator at least 60 days before the desired date of the EFP a written application including, but not limited to, the following information:

(1) The date of the application.

(2) The applicant's name, mailing address, and telephone number.

(3) A statement of the purposes and goals of the experiment for which an EFP is needed, including a general description of the arrangements for disposition of all species harvested under the EFP.

(4) A statement of whether the proposed experimental fishing has broader significance than the applicant's individual goals.

(5) For each vessel to be covered by the EFP:

(i) Vessel name.

(ii) Name, address, and telephone number of owner and operator.

(iii) USCG documentation, state license, or registration number.

(iv) Home port.

(v) Length of vessel.

(vi) Net tonnage.

(vii) Gross tonnage.

(6) A description of the species (directed and incidental) to be harvested under the EFP and the amount of such harvest necessary to conduct the experiment.

(7) For each vessel covered by the EFP, the approximate times and places fishing will take place, and the type, size, and amount of gear to be used.

(8) The signature of the applicant.

(d) *Incomplete applications.* The Regional Administrator may request from an applicant additional information necessary to make the determinations required under this section. An applicant will be notified of an incomplete application within 10 working days of receipt of the application. An incomplete application will not be considered until corrected in writing.

(e) *Issuance.* (1) If an application contains all of the required information, NMFS will publish a notice of receipt of the application in the FEDERAL REGISTER with a brief description of the proposal and will give interested persons an opportunity to comment. The Regional Administrator will also forward copies of the application to the Council, the USCG, and the fishery management agency of the affected state, accompanied by the following information:

(i) The current utilization of domestic annual harvesting and processing capacity (including existing experimental harvesting, if any) of the directed and incidental species for which an EFP is being requested.

(ii) A citation of the regulation or regulations that, without the EFP, would prohibit the proposed activity.

(iii) Biological information relevant to the proposal.

(2) At a Council meeting following receipt of a complete application, the Regional Administrator will consult with the Council and the Director of the affected state fishery management agency concerning the permit application. The applicant will be notified in advance of the meeting at which the application will be considered, and invited to appear in support of the application, if the applicant desires.

(3) Within 5 working days after the consultation in paragraph (e)(2) of this section, or as soon as practicable thereafter, NMFS will notify the applicant in writing of the decision to grant or deny the EFP and, if denied, the reasons for the denial. Grounds for denial of an EFP include, but are not limited to, the following:

(i) The applicant has failed to disclose material information required, or has made false statements as to any material fact, in connection with his or her application.

(ii) According to the best scientific information available, the harvest to be conducted under the permit would detrimentally affect any species of fish in a significant way.

(iii) Issuance of the EFP would inequitably allocate fishing privileges among domestic fishermen or would have economic allocation as its sole purpose.

(iv) Activities to be conducted under the EFP would be inconsistent with the intent of this section or the management objectives of the FEP.

(v) The applicant has failed to demonstrate a valid justification for the permit.

(vi) The activity proposed under the EFP would create a significant enforcement problem.

(4) The decision to grant or deny an EFP is final and unappealable. If the permit is granted, NMFS will publish a notice in the FEDERAL REGISTER describing the experimental fishing to be conducted under the EFP. The Regional Administrator may attach terms and conditions to the EFP consistent with the purpose of the experiment including, but not limited to:

(i) The maximum amount of each species that can be harvested and landed during the term of the EFP, including trip limits, where appropriate.

(ii) The number, sizes, names, and identification numbers of the vessels authorized to conduct fishing activities under the EFP.

(iii) The times and places where experimental fishing may be conducted.

(iv) The type, size, and amount of gear which may be used by each vessel operated under the EFP.

(v) The condition that observers be carried aboard vessels operating under an EFP.

(vi) Data reporting requirements.

(vii) Such other conditions as may be necessary to assure compliance with the purposes of the EFP consistent with the objectives of the FEP.

(f) *Duration.* Unless otherwise specified in the EFP or a superseding notice or regulation, an EFP is effective for no longer than one (1) year from the date of issuance, unless revoked, suspended, or modified. EFPs may be renewed following the application procedures in this section.

(g) *Alteration.* Any EFP that has been altered, erased, or mutilated is invalid.

(h) *Transfer.* EFPs issued under subparts B through F of this part are not transferable or assignable. An EFP is valid only for the vessel(s) for which it is issued.

(i) *Inspection.* Any EFP issued under subparts B through F of this part must be carried aboard the vessel(s) for which it was issued. The EFP must be presented for inspection upon request of any authorized officer.

(j) *Sanctions.* Failure of the holder of an EFP to comply with the terms and conditions of an EFP, the provisions of subparts A through F of this part, any other applicable provision of this part, the Magnuson-Stevens Act, or any other regulation promulgated thereunder, is grounds for revocation, suspension, or modification of the EFP with respect to all persons and vessels conducting activities under the EFP. Any action taken to revoke, suspend, or modify an EFP will be governed by 15 CFR part 904 subpart D. Other sanctions available under the statute will be applicable.

(k) *Protected species.* Persons fishing under an EFP must report any incidental take or fisheries interaction with protected species on a form provided for that purpose. Reports must be submitted to the Regional Administrator within 3 days of arriving in port.

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§665.18 Framework adjustments to management measures.

Framework measures described below for each specific fishery are valid for all management areas, except where specifically noted in this section.

(a) *Pelagic measures*—(1) *Introduction.* Adjustments in management measures may be made through rulemaking if new information demonstrates that there are biological, social, or economic concerns in the fishery. The following framework process authorizes the implementation of measures that may affect the operation of the fisheries, gear, harvest guidelines, or changes in catch and/or effort.

(2) *Annual report.* By June 30 of each year, the Council-appointed pelagics monitoring team will prepare an annual report on the fisheries in the management area. The report shall contain, among other things, recommendations for Council action and an assessment of the urgency and effects of such action(s).

(3) *Procedure for established measures.* (i) Established measures are regulations for which the impacts have been evaluated in Council or NMFS documents in the context of current conditions.

(ii) The Council may recommend to the Regional Administrator that established measures be modified, removed, or reinstituted. Such recommendation shall include supporting rationale and analysis, and shall be made after advance public notice, public discussion, and consideration of public comment. NMFS may implement the Council's recommendation by rulemaking if approved by the Regional Administrator.

(4) *Procedure for new measures.* (i) New measures are regulations for which the impacts have not been evaluated in Council or NMFS documents in the context of current conditions.

(ii) The Council will publicize, including by FEDERAL REGISTER notice, and solicit public comment on, any proposed new management measure. After a Council meeting at which the measure is discussed, the Council will consider recommendations and prepare a FEDERAL REGISTER notice summarizing the Council's deliberations, rationale, and analysis for the preferred action, and the time and place for any subsequent Council meeting(s) to consider the new measure. At subsequent public meeting(s), the Council will consider public comments and other information received to make a recommendation to the Regional Administrator about any new measure. NMFS may implement the Council's recommendation by rulemaking if approved by the Regional Administrator.

(b) *Crustacean measures*—(1) *Introduction.* New management measures may be added through rulemaking if new information demonstrates that there are biological, social, or economic concerns in Permit Areas 1, 2, or 3. The following framework process authorizes the implementation of measures that may affect the operation of the fisheries, gear, harvest guidelines, or changes in catch and/or effort.

(2) *Annual report.* By June 30 of each year, the Council-appointed team will prepare an annual report on the fisheries in the management area. The report shall contain, among other things, recommendations for Council action and an assessment of the urgency and effects of such action(s).

(3) *Procedure for established measures.* (i) Established measures are regulations for which the impacts have been evaluated in Council or NMFS documents in the context of current conditions.

(ii) The Council may recommend to the Regional Administrator that established measures be modified, removed, or reinstituted. Such recommendation shall include supporting rationale and analysis, and shall be made after advance public notice, public discussion, and consideration of public comment. NMFS may implement the Council's recommendation by rulemaking if approved by the Regional Administrator.

(4) *Procedure for new measures.* (i) New measures are regulations for which the impacts have not been evaluated in Council or NMFS documents in the context of current conditions.

(ii) The Council will publicize, including by a FEDERAL REGISTER document, and solicit public comment on, any proposed new management measure. After a Council meeting at which the measure is discussed, the Council will consider recommendations and prepare a FEDERAL REGISTER document summarizing the Council's deliberations, rationale, and analysis for the preferred action, and the time and place for any subsequent Council meeting(s) to consider the new measure. At subsequent public meeting(s), the Council will consider public comments and other information received to make a recommendation to the Regional Administrator about any new measure. NMFS may implement the Council's recommendation by rulemaking if approved by the Regional Administrator.

(c) *Bottomfish measures*—(1) *Annual reports.* By June 30 of each year, a Council-appointed bottomfish monitoring team will prepare an annual report on the fishery by area covering the following topics:

(i) Fishery performance data.

(ii) Summary of recent research and survey results.

(iii) Habitat conditions and recent alterations.

(iv) Enforcement activities and problems.

(v) Administrative actions (*e.g.,* data collection and reporting, permits).

(vi) State and territorial management actions.

(vii) Assessment of need for Council action (including biological, economic, social, enforcement, administrative, and state/Federal needs, problems, and trends). Indications of potential problems warranting further investigation may be signaled by the following indicator criteria:

(A) Mean size of the catch of any species in any area is a pre-reproductive size.

(B) Ratio of fishing mortality to natural mortality for any species.

(C) Harvest capacity of the existing fleet and/or annual landings exceed best estimate of MSY in any area.

(D) Significant decline (50 percent or more) in bottomfish catch per unit of effort from baseline levels.

(E) Substantial decline in ex-vessel revenue relative to baseline levels.

(F) Significant shift in the relative proportions of gear in any one area.

(G) Significant change in the frozen/fresh components of the bottomfish catch.

(H) Entry/exit of fishermen in any area.

(I) Per-trip costs for bottomfish fishing exceed per-trip revenues for a significant percentage of trips.

(J) Significant decline or increase in total bottomfish landings in any area.

(K) Change in species composition of the bottomfish catch in any area.

(L) Research results.

(M) Habitat degradation or environmental problems.

(N) Reported interactions between bottomfish fishing operations and protected species in the NWHI.

(viii) Recommendations for Council action.

(ix) Estimated impacts of recommended action.

(2) *Recommendation of management action.* (i) The team may present management recommendations to the Council at any time. Recommendations may cover actions suggested for Federal regulations, state/territorial action, enforcement or administrative elements, and research and data collection. Recommendations will include an assessment of urgency and the effects of not taking action.

(ii) The Council will evaluate the team's reports and recommendations, and the indicators of concern. The Council will assess the need for one or more of the following types of management action: Catch limits, size limits, closures, effort limitations, access limitations, or other measures.

(iii) The Council may recommend management action by either the state/territorial governments or by Federal regulation.

(3) *Federal management action.* (i) If the Council believes that management action should be considered, it will make specific recommendations to the Regional Administrator after requesting and

considering the views of its Scientific and Statistical Committee and Bottomfish Advisory Panel and obtaining public comments at a public hearing.

(ii) The Regional Administrator will consider the Council's recommendation and accompanying data, and, if he or she concurs with the Council's recommendation, will propose regulations to carry out the action. If the Regional Administrator rejects the Council's proposed action, a written explanation for the denial will be provided to the Council within 2 weeks of the decision.

(iii) The Council may appeal a denial by writing to the Assistant Administrator, who must respond in writing within 30 days.

(iv) The Regional Administrator and the Assistant Administrator will make their decisions in accord with the Magnuson-Stevens Act, other applicable law, and the bottomfish measures of the FEPs.

(v) To minimize conflicts between the Federal and state management systems, the Council will use the procedures in paragraph (c)(2) of this section to respond to state/territorial management actions. Council consideration of action would normally begin with a representative of the state or territorial government bringing a potential or actual management conflict or need to the Council's attention.

(4) *Access limitation procedures.* (i) Access limitation may be adopted under this paragraph (c)(4) only for the NWHI, American Samoa, and Guam.

(ii) If access limitation is proposed for adoption or subsequent modification through the process described in this paragraph (c)(4), the following requirements must be met:

(A) The bottomfish monitoring team must consider and report to the Council on present participation in the fishery; historical fishing practices in, and dependence on, the fishery; economics of the fishery; capability of fishing vessels used in the fishery to engage in other fisheries; cultural and social framework relevant to the fishery; and any other relevant considerations.

(B) Public hearings must be held specifically addressing the limited access proposals.

(C) A specific advisory subpanel of persons experienced in the fishing industry will be created to advise the Council and the Regional Administrator on administrative decisions.

(D) The Council's recommendation to the Regional Administrator must be approved by a two-thirds majority of the voting members.

(5) *Five-year review.* The Council will conduct a comprehensive review on the effectiveness of the Mau Zone limited access program 5 years following implementation of the program. The Council will consider the extent to which the FEP objectives have been met and verify that the target number of vessels established for the fishery is appropriate for current fishing activity levels, catch rates, and biological condition of the stocks. The Council may establish a new target number based on the 5-year review.

(d) *Precious coral measures*—(1) *Introduction.* Established management measures may be revised and new management measures may be established and/or revised through rulemaking if new information demonstrates that there are biological, social, or economic concerns in a precious coral permit area. The following framework process authorizes the implementation of measures that may affect the operation of the fisheries, gear, quotas, season, or levels of catch and/or in effort.

(2) *Annual report.* By June 30 of each year, the Council-appointed precious coral team will prepare an annual report on the fisheries in the management area. The report will contain, among other things, recommendations for Council action and an assessment of the urgency and effects of such action(s).

(3) *Procedure for established measures.* (i) Established measures are regulations for which the impacts have been evaluated in Council or NMFS documents in the context of current conditions.

(ii) The Council may recommend to the Regional Administrator that established measures be modified, removed, or reinstituted. Such recommendation will include supporting rationale and analysis and will be made after advance public notice, public discussion, and consideration of public comment. NMFS may implement the Council's recommendation by rulemaking if approved by the Regional Administrator.

(4) *Procedure for new measures.* (i) New measures are regulations for which the impacts have not been evaluated in Council or NMFS documents in the context of current conditions.

(ii) The Council will publicize, including by a FEDERAL REGISTER document, and solicit public comment on, any proposed new management measure. After a Council meeting at which the measure is discussed, the Council will consider recommendations and prepare a FEDERAL REGISTER document summarizing the Council's deliberations, rationale, and analysis for the preferred action and the time and place for any subsequent Council meeting(s) to consider the new measure. At a subsequent public meeting, the Council will consider public comments and other information received before making a recommendation to the Regional Administrator about any new measure. If approved by the Regional Administrator, NMFS may implement the Council's recommendation by rulemaking.

(e) *Coral reef ecosystem measures*—(1) *Procedure for established measures.* (i) Established measures are regulations for which the impacts have been evaluated in Council or NMFS documents in the context of current conditions.

(ii) The Council may recommend to the Regional Administrator that established measures be modified, removed, or reinstituted. Such recommendation shall include supporting rationale and analysis, and shall be made after advance public notice, public discussion and consideration of public comment. NMFS may implement the Council's recommendation by rulemaking if approved by the Regional Administrator.

(2) *Procedure for new measures.* (i) New measures are regulations for which the impacts have not been evaluated in Council or NMFS documents in the context of current conditions. New measures include, but are not limited to, catch limits, resource size limits, closures, effort limitations, reporting and recordkeeping requirements.

(ii) The Regional Administrator will publicize, including by FEDERAL REGISTER notice, and solicit public comment on, any proposed new management measure. After a Council meeting at which the measure is discussed, the Council will consider recommendations and prepare a document summarizing the Council's deliberations, rationale, and analysis for the preferred action, and the time and place for any subsequent Council meeting(s) to consider the new measure. At subsequent public meeting(s), the Council will consider public comments and other information received to make a recommendation to the Regional Administrator about any new measure. NMFS may implement the Council's recommendation by rulemaking if approved by the Regional Administrator.

(A) The Regional Administrator will consider the Council's recommendation and supporting rationale and analysis, and, if the Regional Administrator concurs with the Council's recommendation, will propose regulations to carry out the action. If the Regional Administrator rejects the Council's proposed action, the Regional Administrator will provide a written explanation for the denial within 2 weeks of the decision.

(B) The Council may appeal a denial by writing to the Assistant Administrator, who must respond in writing within 30 days.

(C) The Regional Administrator and the Assistant Administrator will make their decisions in accordance with the Magnuson-Stevens Act, other applicable laws, and the FEPs.

(D) To minimize conflicts between the Federal and state/territorial/commonwealth management systems, the Council will use the procedures in this paragraph (e)(2)(ii) to respond to state/territorial/commonwealth management actions. The Council's consideration of action would normally begin with a representative of the state, territorial or commonwealth government bringing a potential or actual management conflict or need to the Council's attention.

(3) *Annual report.* By July 31 of each year, a Council-appointed coral reef ecosystem monitoring team will prepare an annual report on coral reef fisheries of the western Pacific region. The report will contain, among other things:

(i) Fishery performance data, summaries of new information and assessments of need for Council action.

(ii) Recommendation for Council action. The Council will evaluate the annual report and advisory body recommendations and may recommend management action by either the state/territorial/commonwealth governments or by Federal regulation.

(iii) If the Council believes that management action should be considered, it will make specific recommendations to the Regional Administrator after considering the views of its advisory bodies.

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§665.19 Vessel monitoring system.

(a) *Applicability.* The holder of any of the following permits is subject to the vessel monitoring system requirements in this part:

(1) Hawaii longline limited access permit issued pursuant to §665.801(b);

(2) American Samoa longline limited entry permit, for vessel size Class C or D, issued pursuant to §665.801(c);

(3) Vessels permitted to fish in Crustacean Permit Area 1 VMS Subarea; or

(4) CNMI commercial bottomfish permit, if the vessel is a medium or large bottomfish vessel, issued pursuant to §665.404(a)(2).

(b) *VMS unit.* Only a VMS unit owned by NMFS and installed by NMFS complies with the requirement of this subpart.

(c) *Notification.* After a permit holder subject to §665.19(a) has been notified by the SAC of a specific date for installation of a VMS unit on the permit holder's vessel, the vessel must carry and operate the VMS unit after the date scheduled for installation.

(d) *Fees and charges.* During the experimental VMS program, the holder of a permit subject to §665.19(a) shall not be assessed any fee or other charges to obtain and use a VMS unit, including the communication charges related directed to requirements under this section. Communication charges related to any additional equipment attached to the VMS unit by the owner or operator shall be the responsibility of the owner or operator and not NMFS.

(e) *Permit holder duties.* The holder of a permit subject to §665.19(a) and master of the vessel must:

(1) Provide opportunity for the SAC to install and make operational a VMS unit after notification.

(2) Carry and continuously operate the VMS unit on board whenever the vessel is at sea.

(3) Not remove, relocate, or make non-operational the VMS unit without prior approval from the SAC.

(f) *Authorization by the SAC.* The SAC has authority over the installation and operation of the VMS unit. The SAC may authorize the connection or order the disconnection of additional equipment, including a computer, to any VMS unit when deemed appropriate by the SAC.

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§665.20 Western Pacific Community Development Program.

(a) *General.* In accordance with the criteria and procedures specified in this section, the Regional Administrator may authorize the direct or incidental harvest of management unit species that would otherwise be prohibited by this part.

(b) *Eligibility.* To be eligible to participate in the western Pacific community development program, a community must meet the following criteria:

(1) Be located in American Samoa, Guam, Hawaii, or the Northern Mariana Islands (collectively, the western Pacific);

(2) Consist of community residents descended from aboriginal people indigenous to the western Pacific who conducted commercial or subsistence fishing using traditional fishing practices in the waters of the western Pacific;

(3) Consist of individuals who reside in their ancestral homeland;

(4) Have knowledge of customary practices relevant to fisheries of the western Pacific;

(5) Have a traditional dependence on fisheries of the western Pacific;

(6) Are currently experiencing economic or other constraints that have prevented full participation in the western Pacific fisheries and, in recent years, have not had harvesting, processing or marketing capability sufficient to support substantial participation in fisheries in the area; and

(7) Develop and submit a community development plan to the Council and the NMFS that meets the requirements in paragraph (c) of this section.

(c) *Community development plan.* An eligible community seeking access to a fishery under the authority of the Council and NMFS must submit to the Council a community development plan that includes, but is not limited to, the following information:

(1) A statement of the purposes and goals of the plan.

(2) A description and justification for the specific fishing activity being proposed, including:

(i) Location of the proposed fishing activity.

(ii) Management unit species to be harvested, and any potential bycatch.

(iii) Gear type(s) to be used.

(iv) Frequency and duration of the proposed fishing activity.

(3) A statement describing the degree of involvement by the indigenous community members, including the name, address, telephone and other contact information of each individual conducting the proposed fishing activity.

(4) A description of how the community and or its members meet each of the eligibility criteria in paragraph (b) of this section.

(5) If a vessel is to be used by the community to conduct fishing activities, for each vessel:

(i) Vessel name and official number (USCG documentation, state, territory, or other registration number).

(ii) Vessel length overall, displacement, and fish holding capacity.

(iii) Any valid federal fishing permit number(s).

(iv) Name, address, and telephone number of the vessel owner(s) and operator(s).

(d) *Council review.* The Council will review each community development plan to ensure that it meets the intent of the Magnuson-Stevens Act and contains all required information. The Council may consider advice of its advisory panels in conducting this review. If the Council finds the community development plan is complete, it will transmit the plan to the Regional Administrator for review.

(e) *Agency review and approval.* (1) Upon receipt of a community development plan from the Council, the Regional Administrator will review the plan for consistency with paragraphs (b), (c), and (d) of this section, and other applicable laws. The Regional Administrator may request from the applicant additional information necessary to make the determinations pursuant to this section and other applicable laws before proceeding with the review pursuant to paragraph (e)(2) of this section.

(2) If the Regional Administrator determines that a plan contains the required information and is consistent with paragraphs (b), (c), and (d) of this section, and other applicable laws, NMFS will publish a notice in the FEDERAL REGISTER to solicit public comment on the proposed plan and any associated environmental review documents. The notice will include the following:

(i) A description of the fishing activity to be conducted.

(ii) The current utilization of domestic annual harvesting and processing capacity (including existing experimental harvesting, if any) of the target, incidental, and bycatch species.

(iii) A summary of any regulations that would otherwise prohibit the proposed fishing activity.

(iv) Biological and environmental information relevant to the plan, including appropriate statements of environmental impacts on target and non-target stocks, marine mammals, and threatened or endangered species.

(3) Within 90 days from the end of the comment period on the plan, the Regional Administrator will notify the applicant in writing of the decision to approve or disapprove the plan.

(4) If disapproved, the Regional Administrator will provide the reasons for the plan's disapproval and provide the community with the opportunity to modify the plan and resubmit it for review. Reasons for disapproval may include, but are not limited to, the following:

(i) The applicant failed to disclose material information or made false statements related to the plan.

(ii) The harvest would contribute to overfishing or would hinder the recovery of an overfished stock, according to the best scientific information available.

(iii) The activity would be inconsistent with an applicable law.

(iv) The activity would create a significant enforcement, monitoring, or administrative problem, as determined by the Regional Administrator.

(5) If approved, the Regional Administrator will publish a notice of the authorization in the FEDERAL REGISTER, and may attach limiting terms and conditions to the authorization including, but not limited to, the following:

(i) The maximum amount of each management unit species and potential bycatch species that may be harvested and landed during the term of the authorization.

(ii) The number, sizes, names, identification numbers, and federal permit numbers of the vessels authorized to conduct fishing activities.

(iii) Type, size, and amount of gear used by each vessel, including trip limits.

(iv) The times and places where fishing may or may not be conducted.

(v) Notification, observer, vessel monitoring, and reporting requirements.

(f) *Duration.* Unless otherwise specified, and unless revoked, suspended, or modified, a plan may be effective for no longer than five years.

(g) *Transfer.* Plans authorized under this section are not transferable or assignable.

(h) *Sanctions.* The Regional Administrator may revoke, suspend or modify a community development plan in the case of failure to comply with the terms and conditions of the plan, any other applicable provision of this part, the Magnuson-Stevens Act, or other applicable laws.

(i) *Program review.* NMFS and the Council will periodically review and assess each plan. If fishery, environmental, or other conditions have changed such that the plan's goals or requirements are not being met, or the fishery has become in an overfished state or overfishing is occurring, the Regional Administrator may revoke, suspend, or modify the plan.

[75 FR 54046, Sept. 3, 2010]

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Subpart F—Western Pacific Pelagic Fisheries

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§665.798 Management area.

The western Pacific Pelagic fishery management area includes all areas of fishing operations in the EEZ or on the high seas for any vessels of the United States or persons that:

(a) Fish for, possess, or transship western Pacific pelagic fishery MUS within the EEZ waters around American Samoa, CNMI, Guam, Hawaii, or PRIA; or

(b) Land western Pacific pelagic fishery MUS in American Samoa, CNMI, Guam, Hawaii, or PRIA.

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§665.799 Area restrictions.

(a) Fishing is prohibited in all no-take MPAs designated in this section.

(b) No-take MPAs. The following U.S. EEZ waters are no-take MPAs:

(1) Landward of the 50-fathom (fm) (91.5-m) curve at Jarvis, Howland, and Baker Islands, and Kingman Reef; as depicted on National Ocean Survey Chart Numbers 83116 and 83153;

(2) Landward of the 50-fm (91.5-m) curve around Rose Atoll, as depicted on National Ocean Survey Chart Number 83484.

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§665.800 Definitions.

As used in §§665.798 through 665.818:

American Samoa longline limited access permit means the permit required by §665.801 to use a vessel shoreward of the outer boundary of the EEZ around American Samoa to fish for western Pacific pelagic MUS using longline gear or to land or transship western Pacific pelagic MUS that were caught in the EEZ around American Samoa using longline gear.

American Samoa pelagics mailing list means the list maintained by PIRO of names and mailing addresses of parties interested in receiving notices of availability for American Samoa longline limited access permits.

Basket-style longline gear means a type of longline gear that is divided into units called “baskets” each consisting of a segment of main line to which 10 or more branch lines with hooks are spliced. The mainline and all branch lines are made of multiple braided strands of cotton, nylon, or other synthetic fibers impregnated with tar or other heavy coatings that cause the lines to sink rapidly in seawater.

Branch line (or *dropper line*) means a line with a hook that is attached to the mainline.

Deep-set or Deep-setting means the deployment of longline gear in a manner consistent with all the following criteria: All float lines are at least 20 meters in length; a minimum of 15 branch lines are attached between any two floats (except basket-style longline gear which may have as few as 10 branch lines between any two floats); and no light sticks are used. As used in this definition, “float line” means a line used to suspend the main longline beneath a float, and “light stick” means any type of light emitting device, including any fluorescent “glow bead,” chemical, or electrically-powered light that is affixed underwater to the longline gear.

Effective date means the date upon which the Regional Administrator provides written notice to the authorized official or designated representative of the U.S. participating territory that a specified fishing agreement meets the requirements of this section.

Fish dealer means any person who:

(1) Obtains, with the intention to resell, western Pacific pelagic MUS, or portions thereof, that were harvested or received by a vessel that holds a permit or is otherwise regulated under bottomfish fisheries in this subpart; or

(2) Provides recordkeeping, purchase, or sales assistance in obtaining or selling such MUS (such as the services provided by a wholesale auction facility).

Float line means a line attached to a mainline used to buoy, or suspend, the mainline in the water column.

Hawaii longline limited access permit means the permit required by §665.801 to use a vessel to fish for western Pacific pelagic MUS with longline gear in the EEZ around Hawaii or to land or transship longline-caught western Pacific pelagic MUS shoreward of the outer boundary of the EEZ around Hawaii.

Longline fishing prohibited area means the portions of the EEZ in which longline fishing is prohibited as specified in §665.806.

Longline fishing vessel means a vessel that has longline gear on board the vessel.

Longline gear means a type of fishing gear consisting of a main line that exceeds 1 nm in length, is suspended horizontally in the water column either anchored, floating, or attached to a vessel, and from which branch or dropper lines with hooks are attached; except that, within the protected species zone as defined in §665.806, longline gear means a type of fishing gear consisting of a main line of any length that is suspended horizontally in the water column either anchored, floating, or attached to a vessel, and from which branch or dropper lines with hooks are attached.

Pelagic handline fishing means fishing for western Pacific pelagic MUS from a stationary or drifting vessel using hook and line gear other than longline gear.

Pelagic troll fishing (trolling) means fishing for western Pacific pelagic MUS from a moving vessel using hook and line gear.

PRIA pelagic troll and handline fishing permit means the permit required by §665.801 to use a vessel shoreward of the outer boundary of the EEZ around the PRIA to fish for western Pacific pelagic MUS using pelagic handline or troll fishing methods.

Receiving vessel permit means a permit required by §665.801(c) for a receiving vessel to transship or land western Pacific pelagic MUS taken by other vessels using longline gear.

Shallow-set or shallow-setting means the deployment of, or deploying, respectively, longline gear in a manner that does not meet the definition of deep-set or deep-setting as defined in this section.

Squid jig fishing means fishing for squid that are western Pacific pelagic MUS using a hook or hooks attached to a line that is raised and lowered in the water column by manual or mechanical means.

U.S. participating territory means a U.S. participating territory to the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (including any annexes, amendments, or protocols that are in force, or have come into force, for the United States), and includes American Samoa, Guam, and the Northern Mariana Islands.

WCPFC means the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean, including its employees and contractors.

Western Pacific general longline permit means the permit authorized under §665.801 to use a vessel shoreward of the outer boundary of the EEZ around Guam, CNMI, Johnston or Palmyra Atolls, Kingman Reef, or Wake, Jarvis, Baker or Howland Islands to fish for western Pacific pelagic MUS using longline gear or to land or to transship western Pacific pelagic MUS that were caught using longline gear.

Western Pacific pelagic management unit species means the following species:

English common name	**Scientific name**
Tunas:	
Albacore	*Thunnus alalunga.*
bigeye tuna	*Thunnus obesus.*
Pacific bluefin tuna	*Thunnus orientalis*
yellowfin tuna	*Thunnus albacares.*
skipjack tuna	*Katsuwonus pelamis.*
Kawakawa	*Euthynnus affinis.*
other tuna relatives	*Auxis* spp., *Scomber* spp., *Allothunnus* spp.
Billfishes:	
Black marlin	*Istiompax indica*
Striped marlin	*Kajikia audax*
Pacific blue marlin	*Makaira nigricans*
shortbill spearfish	*Tetrapturus angustirostris.*
Swordfish	*Xiphias gladius.*
Sailfish	*Istiophorus platypterus.*
Sharks:	

pelagic thresher shark	*Alopias pelagicus.*
bigeye thresher shark	*Alopias superciliosus.*
common thresher shark	*Alopias vulpinus.*
silky shark	*Carcharhinus falciformis.*
oceanic whitetip shark	*Carcharhinus longimanus.*
blue shark	*Prionace glauca.*
shortfin mako shark	*Isurus oxyrinchus.*
longfin mako shark	*Isurus paucus.*
salmon shark	*Lamna ditropis.*
Other pelagic fishes:	
mahimahi (dolphinfish)	*Coryphaena* spp.
Wahoo	*Acanthocybium solandri.*
Moonfish	*Lampris* spp.
Oilfish	Gempylidae.
Pomfret	Bramidae.
Squid:	
diamondback squid	*Thysanoteuthis rhombus.*
neon flying squid	*Ommastrephes bartramii.*
purpleback flying squid	*Sthenoteuthis oualaniensis.*

[75 FR 2205, Jan. 14, 2010, as amended at 76 FR 52889, Aug. 24, 2011; 77 FR 43722, July 26, 2012; 79 FR 64111, Oct. 28, 2014]

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§665.801 Permits.

(a) A vessel of the United States must be registered for use with a valid permit under the High Seas Fishing Compliance Act if that vessel is used to fish on the high seas, as required under §300.15 of this title.

(b) A vessel of the United States must be registered for use under a valid Hawaii longline limited access permit if that vessel is used:

(1) To fish for western Pacific pelagic MUS using longline gear in the EEZ around the Hawaiian Archipelago; or

(2) To land or transship, shoreward of the outer boundary of the EEZ around the Hawaiian Archipelago, western Pacific pelagic MUS that were harvested using longline gear.

(c) A vessel of the United States must be registered for use under a valid American Samoa longline limited access permit, in accordance with §665.816, if that vessel is used to:

(1) Fish for western Pacific pelagic MUS using longline gear in the EEZ around American Samoa;

(2) Land shoreward of the outer boundary of the EEZ around American Samoa western Pacific pelagic MUS that were harvested using longline gear in the EEZ around American Samoa; or

(3) Transship shoreward of the outer boundary of the EEZ around American Samoa western Pacific pelagic MUS that were harvested using longline gear in the EEZ around American Samoa or on the high seas.

(d) A vessel of the United States must be registered for use under a valid Western Pacific general longline permit, American Samoa longline limited access permit, or Hawaii longline limited access permit if that vessel is used to:

(1) Fish for western Pacific pelagic MUS using longline gear in the EEZ around Guam, CNMI, or PRIA (with the exception of Midway Atoll); or

(2) Land or transship shoreward of the outer boundary of the EEZ around Guam, CNMI, or PRIA (with the exception of Midway Atoll), western Pacific pelagic MUS that were harvested using longline gear.

(e) A receiving vessel of the United States must be registered for use with a valid receiving vessel permit if that vessel is used to land or transship, shoreward of the outer boundary of the EEZ around American Samoa, Hawaii, Guam, CNMI, or PRIA, western Pacific pelagic MUS that were harvested using longline gear.

(f) A vessel of the United States must be registered for use with a valid PRIA pelagic troll and handline fishing permit if that vessel is used to fish for western Pacific pelagic MUS using pelagic handline or trolling fishing methods in the EEZ around the PRIA (with the exception of Midway Atoll).

(g) A vessel of the United States must be registered for use under a Western Pacific squid jig fishing permit, if that vessel is more than 50 ft (15.4 m) LOA and is used to squid jig fish in EEZ waters around American Samoa, CNMI, Guam, Hawaii, or PRIA.

(h) Any required permit must be valid and on board the vessel and available for inspection by an authorized agent, except that, if the permit was issued (or registered to the vessel) during the fishing trip in question, this requirement applies only after the start of any subsequent fishing trip.

(i) A permit is valid only for the vessel for which it is registered. A permit not registered for use with a particular vessel may not be used.

(j) An application for a permit required under this section will be submitted to PIRO as described in §665.13.

(k) General requirements governing application information, issuance, fees, expiration, replacement, transfer, alteration, display, and sanctions for permits issued under this section, as applicable, are contained in §665.13.

(l) A Hawaii longline limited access permit may be transferred as follows:

(1) The owner of a Hawaii longline limited access permit may apply to transfer the permit:

(i) To a different person for registration for use with the same or another vessel; or

(ii) For registration for use with another U.S. vessel under the same ownership.

(2) [*Reserved*]

(m) A Hawaii longline limited access permit will not be registered for use with a vessel that has a LOA greater than 101 ft (30.8 m).

(n) Only a person eligible to own a documented vessel under the terms of 46 U.S.C. 12102(a) may be issued or may hold (by ownership or otherwise) a Hawaii longline limited access permit.

(o) Permit appeals. Except as provided in subpart D of 15 CFR part 904, any applicant for a permit or any permit owner may appeal to the Regional Administrator the granting, denial, conditioning, suspension, or transfer of a permit or requested permit under this section. To be considered by the Regional Administrator, the appeal must be in writing, must state the action(s) appealed, and the reasons therefore, and must be submitted within 30 days of the action(s) by the Regional Administrator. The appellant may request an informal hearing on the appeal.

(1) Upon receipt of an appeal authorized by this section, the Regional Administrator may request additional information. Upon receipt of sufficient information, the Regional Administrator will decide the appeal in accordance with the criteria set out in this part for qualifying for, or renewing, limited access permits. In making such decision, the Administrator will review relevant portions of the Western Pacific Pelagic FEP, to the extent such review would clarify the criteria in this part. Such decision will be based upon information relative to the application on file at NMFS and the Council and any additional information available; the summary record kept of any hearing and the hearing officer's recommended decision, if any, as provided in paragraph (o)(3) of this section; and such other considerations as deemed appropriate. The Regional Administrator will notify the appellant of the decision and the reasons therefore, in writing, normally within 30 days of the receipt of sufficient information, unless additional time is needed for a hearing.

(2) If a hearing is requested, or if the Regional Administrator determines that one is appropriate, the Regional Administrator may grant an informal hearing before a hearing officer designated for that purpose. Such a hearing normally shall be held no later than 30 days following receipt of the appeal, unless the hearing officer extends the time. The appellant and, at the discretion of the hearing officer, other interested persons, may appear personally and/or be represented by counsel at the hearing and submit information and present arguments as determined appropriate by the hearing officer. Within 30 days of the last day of the hearing, the hearing officer shall recommend, in writing, a decision to the Regional Administrator.

(3) The Regional Administrator may adopt the hearing officer's recommended decision, in whole or in part, or may reject or modify it. In any event, the Regional Administrator will notify the appellant, and interested persons, if any, of the decision, and the reason(s) therefore, in writing, within 30 days of receipt of the hearing officer's recommended decision. The Regional Administrator's action shall constitute final Agency action for purposes of the Administrative Procedure Act.

(4) In the case of a timely appeal from an American Samoa longline limited access permit initial permit decision, the Regional Administrator will issue the appellant a temporary American Samoa longline limited access permit. A temporary permit will expire 20 days after the Regional Administrator's final decision on the appeal. In no event will a temporary permit be effective for longer than 60 days.

(5) With the exception of temporary permits issued under paragraph (o)(4) of this section, the Regional Administrator, for good cause, may extend any time limit prescribed in this section for a period

not to exceed 30 days, either upon his/her own motion or upon written request from the appellant stating the reason(s) therefore.

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§665.802 Prohibitions.

In addition to the prohibitions specified in §600.725 of this chapter, it is unlawful for any person to do any of the following:

(a) Falsify or fail to make and/or file all reports of western Pacific pelagic MUS landings, containing all data and in the exact manner, as required by applicable state law or regulation, as specified in §665.14(a), provided that the person is required to do so by applicable state law or regulation.

(b) Use a vessel without a valid permit issued under the High Seas Fishing Compliance Act to fish for western Pacific pelagic MUS using longline gear, on the high seas, in violation of §§665.801(a), and 300.15 of this title.

(c) Use a vessel in the EEZ around the Hawaiian Archipelago without a valid Hawaii longline limited access permit registered for use with that vessel, to fish for western Pacific pelagic MUS using longline gear, in violation of §665.801(b)(1).

(d) Use a vessel shoreward of the outer boundary of the EEZ around the Hawaiian Archipelago without a valid Hawaii longline limited access permit registered for use with that vessel, to land or transship western Pacific pelagic MUS that were harvested with longline gear, in violation of §665.801(b)(2).

(e) Use a vessel in the EEZ around American Samoa without a valid American Samoa longline limited access permit registered for use with that vessel, to fish for western Pacific pelagic MUS using longline gear, in violation of §665.801(c)(1).

(f) Use a vessel shoreward of the outer boundary of the EEZ around American Samoa without a valid American Samoa longline limited access permit registered for use with that vessel, to land western Pacific pelagic MUS that were caught with longline gear within the EEZ around American Samoa, in violation of §665.801(c)(2).

(g) Use a vessel within the EEZ around American Samoa without a valid American Samoa longline limited access permit registered for use with that vessel, to transship western Pacific pelagic MUS that were caught with longline gear, in violation of §665.801(c)(3).

(h) Use a vessel in the EEZ around Guam, CNMI, or PRIA (with the exception of Midway Atoll) without either a valid Western Pacific general longline permit, American Samoa longline limited access permit or a Hawaii longline limited access permit registered for use with that vessel, to fish for western Pacific pelagic MUS using longline gear, in violation of §665.801(d)(1).

(i) Use a vessel shoreward of the outer boundary of the EEZ around Guam, CNMI, or PRIA (with the exception of Midway Atoll) without either a valid Western Pacific general longline permit, American Samoa longline limited access permit or a Hawaii longline limited access permit registered for use with that vessel, to land or transship western Pacific pelagic MUS that were harvested using longline gear, in violation of §665.801(d)(2).

(j) Use a vessel shoreward of the outer boundary of the EEZ around American Samoa, CNMI, Guam, Hawaii, or PRIA, to land or transship western Pacific pelagic MUS caught by other vessels using longline gear, without a valid receiving vessel permit registered for use with that vessel, in violation of §665.801(e).

(k) Use a vessel in the EEZ around the PRIA employing handline or trolling methods to fish for western Pacific pelagic MUS without a valid PRIA pelagic troll and handline fishing permit registered for use for that vessel, in violation of §665.801(f).

(l) Fish in the fishery after failing to comply with the notification requirements in §665.803.

(m) Fail to comply with notification requirements set forth in §665.803 or in any EFP issued under §665.17.

(n) Fail to comply with a term or condition governing longline gear configuration in §665.813(k) if using a vessel longer than 40 ft (12.2 m) registered for use with any valid longline permit issued pursuant to §665.801 to fish for western Pacific pelagic MUS using longline gear south of the Equator (0° lat.).

(o) Use a fishing vessel to retain on board, transship, or land pelagic MUS captured by longline gear in the WCPFC Convention Area, as defined in §300.211 of this title, in violation of any restriction announced in accordance with §665.819(d)(2).

(p)-(u) [*Reserved*]

(v) Use longline gear to fish within a longline fishing prohibited area in violation of §665.806, except as allowed pursuant to an exemption issued under §§665.17 or 665.807.

(w) Fish for western Pacific pelagic MUS with longline gear within the protected species zone, in violation of §665.806(b).

(x) Fail to comply with a term or condition governing the observer program established in §665.808, if using a vessel registered for use with a Hawaii longline limited access permit, or a vessel registered for use with a size Class B, C or D American Samoa longline limited access permit, to fish for western Pacific pelagic MUS using longline gear.

(y) Fail to comply with other terms and conditions that the Regional Administrator imposes by written notice to either the permit holder or the designated agent of the permit holder to facilitate the details of observer placement.

(z) Fail to fish in accordance with the seabird take mitigation techniques set forth at §§665.815(a)(1) or 665.815(a)(2) when operating a vessel registered for use under a Hawaii longline limited access permit.

(aa)-(bb) [*Reserved*]

(cc) Own or operate a vessel registered for use under any longline permit issued under §665.801 while engaged in longline fishing for western Pacific pelagic MUS and fail to be certified for completion of a NMFS protected species workshop, in violation of §665.814(a).

(dd) Own or operate a vessel registered for use under any longline permit issued under §665.801 while engaged in longline fishing for western Pacific pelagic MUS without having on board a valid protected species workshop certificate issued by NMFS or a legible copy thereof, in violation of §665.814(d).

(ee) Possess light sticks on board a vessel registered for use under a Hawaii longline limited access permit at any time during a trip for which notification to NMFS under §665.803(a) indicated that deep-setting would be done, in violation of §665.813(d).

(ff) Fail to carry, or fail to use, a line clipper, dip net, or dehooker on a vessel registered for use under any longline permit issued under §665.801, in violation of §665.812.

(gg)-(hh) [*Reserved*]

(ii) When operating a vessel registered for use under any longline limited access permit issued under §665.801, fail to comply with the sea turtle handling, resuscitation, and release requirements, in violation of §665.812(b).

(jj) Engage in shallow-setting from a vessel registered for use under any longline permit issued under §665.801 north of the Equator (0° lat.) with hooks other than circle hooks sized 18/0 or larger with an offset not to exceed 10 degrees, in violation of §665.813(f).

(kk) Engage in shallow-setting from a vessel registered for use under any longline permit issued under §665.801 north of the Equator (0° lat.) with bait other than mackerel-type bait, in violation of §665.813(g).

(ll) [*Reserved*]

(mm) Fail to use a line setting machine or line shooter, with weighted branch lines, to set the main longline when operating a vessel that is registered for use under a Hawaii longline limited access permit and equipped with monofilament main longline, when making deep sets north of 23° N. lat., in violation of §665.815(a)(1) or (a)(2).

(nn) Fail to employ basket-style longline gear such that the mainline is deployed slack when operating a vessel registered for use under a Hawaii longline limited access north of 23° N. lat., in violation of §665.815(a)(2)(v).

(oo) Fail to maintain and use blue dye to prepare thawed bait when operating a vessel registered for use under a Hawaii longline limited access permit that is fishing north of 23° N. lat., in violation of §665.815(a)(2)(vi) through (viii).

(pp) Fail to retain, handle, and discharge fish, fish parts, and spent bait, strategically when operating a vessel registered for use under a Hawaii longline limited access permit that is fishing north of 23° N. lat., in violation of §665.815(a)(2)(i) through (iv).

(qq) Fail to be begin the deployment of longline gear at least 1 hour after local sunset or fail to complete the setting process before local sunrise from a vessel registered for use under a Hawaii longline limited access permit while shallow-setting north of 23° N. lat., in violation of §665.815(a)(4).

(rr) Fail to handle short-tailed albatrosses that are caught by pelagic longline gear in a manner that maximizes the probability of their long-term survival, in violation of §665.815(b).

(ss) Engage in shallow-setting from a vessel registered for use under a Hawaii longline limited access permit after the shallow-set longline fishery has been closed pursuant to §665.813(b), in violation of §665.813(i).

(tt) Fail to immediately retrieve longline fishing gear upon receipt of actual notice that the shallow-set longline fishery has been closed pursuant to §665.813(b), in violation of §665.813(i).

(uu)-(vv) [*Reserved*]

(ww) Fail to handle seabirds other than short-tailed albatrosses that are caught by pelagic longline gear in a manner that maximizes the probability of their long-term survival, in violation of §665.815(c).

(xx) Use a large vessel to fish for western Pacific Pelagic MUS within an American Samoa large vessel prohibited area in violation of §665.806, except as allowed pursuant to an exemption issued under §§665.17 or 665.818.

(yy) Fish for western Pacific pelagic MUS using gear prohibited under §665.810 or not permitted by an EFP issued under §665.17.

(zz) Use a vessel that is greater than 50 ft (15.4 m) LOA to squid jig fish in EEZ waters around American Samoa, CNMI, Guam, Hawaii, or PRIA, without a Western Pacific squid jig fishing permit registered for use with that vessel, in violation of §665.801(g).

[75 FR 2205, Jan. 14, 2010, as amended at 76 FR 37288, June 27, 2011; 76 FR 52889, Aug. 24, 2011; 77 FR 60649, Oct. 4, 2012; 79 FR 64111, Oct. 28, 2014]

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§665.803 Notifications.

(a) The permit holder, or designated agent, for any vessel registered for use under a Hawaii longline limited access permit, or for any vessel greater than 40 ft (12.2 m) LOA that is registered for use under an American Samoa longline limited access permit, shall provide a notice to the Regional Administrator at least 72 hours (not including weekends and Federal holidays) before the vessel leaves port on a fishing trip, any part of which occurs in the EEZ around the Hawaiian Archipelago or American Samoa. The vessel operator will be presumed to be an agent designated by the permit holder unless the Regional Administrator is otherwise notified by the permit holder. The permit holder or designated agent for a vessel registered for use under Hawaii longline limited access permits must also provide notification of the trip type (either deep-setting or shallow-setting).

(b) The permit holder, or designated agent, for any vessel registered for use under a Western Pacific squid jig fishing permit that is greater than 50 ft (15.4 m) LOA, shall provide a notice to the Regional Administrator at least 72 hours (not including weekends and Federal holidays) before the vessel leaves port on a fishing trip, any part of which occurs in western Pacific EEZ waters. The vessel operator will be presumed to be an agent designated by the permit holder unless the Regional Administrator is otherwise notified by the permit holder.

(c) For purposes of this section, the notice must be provided to the office or telephone number designated by the Regional Administrator. The notice must provide the official number of the vessel, the name of the vessel, the intended departure date, time, and location, the name of the operator of the vessel, and the name and telephone number of the permit holder or designated agent to be available between 8 a.m. and 5 p.m. (local time) on weekdays for NMFS to contact to arrange observer placement.

(d) The operator of any vessel subject to the requirements of this subpart who does not have on board a VMS unit while transiting the protected species zone as defined in §665.806, must notify the NMFS Special-Agent-In-Charge immediately upon entering and immediately upon departing the protected species zone. The notification must include the name of the vessel, name of the operator, date and time (GMT) of access or exit from the protected species zone, and location by latitude and longitude to the nearest minute.

(e) The permit holder for any American Samoa longline limited access permit, or an agent designated by the permit holder, must notify the Regional Administrator in writing within 30 days of any change to the permit holder's contact information or any change to the vessel documentation associated with a permit registered to an American Samoa longline limited access permit. Complete changes in the ownership of the vessel registered to an American Samoa longline limited access permit must also be reported to PIRO in writing within 30 days of the change. Failure to report such changes may result in a delay in processing an application, permit holders failing to receive important notifications, or sanctions pursuant to the Magnuson-Stevens Act at 16 U.S.C. 1858(g) or 15 CFR part 904, subpart D.

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§665.804 Gear identification.

(a) *Identification.* The operator of each permitted vessel in the fishery management area must ensure that the official number of the vessel be affixed to every longline buoy and float, including each buoy and float that is attached to a radar reflector, radio antenna, or flag marker, whether attached to a deployed longline or possessed on board the vessel. Markings must be legible and permanent, and must be of a color that contrasts with the background material.

(b) *Enforcement action.* Longline gear not marked in compliance with paragraph (a) of this section and found deployed in the EEZ will be considered unclaimed or abandoned property, and may be disposed of in any manner considered appropriate by NMFS or an authorized officer.

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§665.805 [Reserved]

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§665.806 Prohibited area management.

(a) *Longline fishing prohibited areas.* Longline fishing is prohibited in the longline fishing prohibited areas as defined in paragraphs (a)(1) through (a)(4) of this section.

(1) *NWHI protected species zone.* The NWHI protected species zone is the portion of the EEZ within 50 nm of the center geographical positions of certain islands and reefs in the NWHI, as follows:

Name	N. lat.	W. long.
Nihoa Island	23°05′	161°55′
Necker Island	23°35′	164°40′
French Frigate Shoals	23°45′	166°15′
Gardner Pinnacles	25°00′	168°00′
Maro Reef	25°25′	170°35′
Laysan Island	25°45′	171°45′

Lisianski Island	26°00′	173°55′
Pearl and Hermes Reef	27°50′	175°50′
Midway Island	28°14′	177°22′
Kure Island	28°25′	178°20′

Where the areas are not contiguous, parallel lines drawn tangent to and connecting those semicircles of the 50-nm areas that lie between Nihoa Island and Necker Island, French Frigate Shoals and Gardner Pinnacles, Gardner Pinnacles and Maro Reef, and Lisianski Island and Pearl and Hermes Reef, delimit the remainder of the NWHI longline protected species zone.

(2) *Main Hawaiian Islands (MHI).* The MHI longline fishing prohibited area is the portion of the EEZ around Hawaii bounded by straight lines connecting the following coordinated in the order listed:

Point	**N. lat.**	**W. long.**
A	18°05′	155°40′
B	18°20′	156°25′
C	20°00′	157°30′
D	20°40′	161°40′
E	21°40′	161°55′
F	23°00′	161°30′
G	23°05′	159°30′
H	22°55′	157°30′
I	21°30′	155°30′
J	19°50′	153°50′
K	19°00′	154°05′
A	18°05′	155°40′

(3) *Guam.* The Guam longline fishing prohibited area is the portion of the EEZ around Guam bounded by straight lines connecting the following coordinates in the order listed:

Point	N. lat.	E. long.
A	14°25′	144°00′
B	14°00′	143°38′
C	13°41′	143°33′33“
D	13°00′	143°25′30“
E	12°20′	143°37′
F	11°40′	144°09′
G	12°00′	145°00′
H	13°00′	145°42′
I	13°27′	145°51′

(4) *CNMI.* The CNMI longline fishing prohibited area is the portion of the EEZ around the CNMI bounded by straight lines connecting the following coordinates in the order listed:

Point	N. lat.	E. long.
A	14°00′	144°34′
B	15°49′	145°29′
C	16°21′	145°06′
D	17°03′	145°22′
E	19°07′	145°09′
F	20°39′	144°19′
G	21°04′	145°06′
H	19°19′	146°04′
I	16°00′	146°32′
J	13°32′	145°32′

A	14°00′	144°34′

(b) *American Samoa large vessel prohibited areas.* A large vessel of the United States may not be used to fish for western Pacific pelagic MUS in the American Samoa large vessel prohibited areas as defined in paragraphs (b)(1) and (b)(2) of this section, except as allowed pursuant to an exemption issued under §665.818.

(1) *Tutuila Island, Manua Islands, and Rose Atoll (AS-1).* The large vessel prohibited area around Tutuila Island, the Manua Islands, and Rose Atoll consists of the waters of the EEZ around American Samoa enclosed by straight lines connecting the following coordinates:

Point	S. lat.	W. long.
AS-1-A	13°41′54″	167°17′
AS-1-B	15°23′10″	167°17′
AS-1-C	15°23′10″	169°00′42″
AS-1-D	15°13′	169°00′42″
and from point AS-1-A westward along latitude 13°41′54″ S. until intersecting the U.S. EEZ boundary with Samoa, and from point AS-1-D westward along latitude 15°13′ S. until intersecting the U.S. EEZ boundary with Samoa.		

(2) *Swains Island (AS-2).* The Swains Island large vessel prohibited area is the portion of the EEZ around American Samoa enclosed by straight lines connecting the following coordinates:

Point	S. lat.	W. long.
AS-2-A	11°48′	171°50′
AS-2-B	11°48′	170°20′
and from Point AS-2-A northward along the longitude 171°50′ W. until intersecting the U.S. EEZ boundary with Tokelau, and from Point AS-2-B northward along the longitude 170°20′ W. until intersecting the U.S. EEZ boundary with Tokelau.		

[76 FR 37289, June 27, 2011, as amended at 77 FR 34261, June 11, 2012; 77 FR 71286, Nov. 29, 2012]

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§665.807 Exemptions for Hawaii longline fishing prohibited areas; procedures.

(a) An exemption permitting a person to use longline gear to fish in a portion(s) of the Hawaii longline fishing prohibited area will be issued to a person who can document that he or she:

(1) Currently owns a Hawaii longline limited access permit issued under this part and registered for use with his or her vessel;

(2) Before 1970, was the owner or operator of a vessel when that vessel landed western Pacific pelagic MUS taken on longline gear in an area that is now within the Hawaii longline fishing prohibited area;

(3) Was the owner or operator of a vessel that landed western Pacific pelagic MUS taken on longline gear in an area that is now within the Hawaii longline fishing prohibited area, in at least 5 calendar years after 1969, which need not be consecutive; and

(4) In any one of the 5 calendar years, was the owner or operator of a vessel that harvested at least 80 percent of its total landings, by weight, of longline-caught western Pacific pelagic MUS in an area that is now in the Hawaii longline fishing prohibited area.

(b) Each exemption shall specify the portion(s) of the Hawaii longline fishing prohibited area, bounded by longitudinal and latitudinal lines drawn to include each statistical area, as appearing on Hawaii State Commercial Fisheries Charts, in which the exemption holder made the harvest documented for the exemption application under paragraph (a)(4) of this section.

(c) Each exemption is valid only within the portion(s) of the Hawaii longline fishing prohibited area specified on the exemption.

(d) A person seeking an exemption under this section must submit an application and supporting documentation to PIRO at least 15 days before the desired effective date of the exemption.

(e) If the Regional Administrator determines that a gear conflict has occurred and is likely to occur again in the Hawaii longline fishing prohibited area between a vessel used by a person holding an exemption under this section and a non-longline vessel, the Regional Administrator may prohibit all longline fishing in the Hawaii longline fishing prohibited area around the island where the conflict occurred, or in portions thereof, upon notice to each holder of an exemption who would be affected by such a prohibition.

(f) The Council will consider information provided by persons with Hawaii longline limited access permits issued under this part who believe they have experienced extreme financial hardship resulting from the Hawaii longline area closure, and will consider recommendations of the Pelagic Advisory Review Board to assess whether exemptions under this section should continue to be allowed, and, if appropriate, revise the qualifying criteria in paragraph (a) of this section to permit additional exemptions.

(1) If additional exemptions are needed, the Council will advise the Regional Administrator in writing of its recommendation, including criteria by which financial hardships will be mitigated, while retaining the effectiveness of the longline fishing prohibited area.

(2) Following a review of the Council's recommendation and supporting rationale, the Regional Administrator may:

(i) Reject the Council's recommendation, in which case written reasons will be provided by the Regional Administrator to the Council for the rejection; or

(ii) Concur with the Council's recommendation and, after finding that it is consistent with the goals and objectives of the Pelagics FEP, the national standards, and other applicable law, initiate rulemaking to implement the Council's recommendations.

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§665.808 Conditions for at-sea observer coverage.

(a) NMFS shall advise the permit holder or the designated agent of any observer requirement at least 24 hours (not including weekends and Federal holidays) before any trip for which NMFS received timely notice in compliance with these regulations.

(b) The "Notice Prior to Fishing Trip" requirements in this subpart commit the permit holder to the representations in the notice. The notice can be modified by the permit holder or designated agent because of changed circumstance, if the Regional Administrator is promptly provided a modification to the notice that complies with the notice requirements. The notice will also be considered modified if the Regional Administrator and the permit holder or designated agent agrees to placement changes.

(c) When NMFS notifies the permit holder or designated agent of the obligation to carry an observer in response to a notification under this subpart, or as a condition of an EFP issued under §665.17, the vessel may not engage in the fishery without taking the observer.

(d) A NMFS observer shall arrive at the observer's assigned vessel 30 minutes before the time designated for departure in the notice or the notice as modified, and will wait 1 hour for departure.

(e) A permit holder must accommodate a NMFS observer assigned under these regulations. The Regional Administrator's office, and not the observer, will address any concerns raised over accommodations.

(f) The permit holder, vessel operator, and crew must cooperate with the observer in the performance of the observer's duties, including:

(1) Allowing for the embarking and debarking of the observer.

(2) Allowing the observer access to all areas of the vessel necessary to conduct observer duties.

(3) Allowing the observer access to communications equipment and navigation equipment as necessary to perform observer duties.

(4) Allowing the observer access to VMS units to verify operation, obtain data, and use the communication capabilities of the units for official purposes.

(5) Providing accurate vessel locations by latitude and longitude or loran coordinates, upon request by the observer.

(6) Providing sea turtle, marine mammal, or seabird specimens as requested.

(7) Notifying the observer in a timely fashion when commercial fishing operations are to begin and end.

(g) The permit holder, operator, and crew must comply with other terms and conditions to ensure the effective deployment and use of observers that the Regional Administrator imposes by written notice.

(h) The permit holder must ensure that assigned observers are provided living quarters comparable to crew members and are provided the same meals, snacks, and amenities as are normally provided to other vessel personnel. A mattress or futon on the floor or a cot is not acceptable if a regular bunk is provided to any crew member, unless other arrangements are approved in advance by the Regional Administrator.

(i) Reimbursement requirements are as follows:

(1) Upon observer verification of vessel accommodations and the number of assigned days on board, NMFS will reimburse vessel owners a reasonable amount for observer subsistence as determined by the Regional Administrator.

(2) If requested and properly documented, NMFS will reimburse the vessel owner for the following:

(i) Communications charges incurred by the observer.

(ii) Lost fishing time arising from a seriously injured or seriously ill observer, provided that notification of the nature of the emergency is transmitted to the Observer Program, NMFS (see address for PIRO Regional Administrator) at the earliest practical time. NMFS will reimburse the owner only for those days during which the vessel is unable to fish as a direct result of helping the NMFS employee who is seriously injured or seriously ill. Lost fishing time is based on time traveling to and from the fishing grounds and any documented out-of-pocket expenses for medical services. Payment will be based on the current target fish market prices and that vessel's average target fish catch retained per day at sea for the previous 2 years, but shall not exceed $5,000 per day or $20,000 per claim. Detailed billing with receipts and supporting records are required for allowable communication and lost fishing time claims. The claim must be completed in ink, showing the claimant's printed name, address, vessel name, observer name, trip dates, days observer was on board, an explanation of the charges, and claimant's dated signature with a statement verifying the claim to be true and correct. Requested reimbursement claims must be submitted to the Fisheries Observer Branch, Pacific Islands Region, NMFS. NMFS will not process reimbursement invoices and documentation submitted more than 120 days after the occurrence.

(j) If a vessel normally has cabins for crew members, female observers on a vessel with an all-male crew must be accommodated either in a single person cabin or, if NMFS concludes that adequate privacy can be ensured by installing a curtain or other temporary divider, in a two-person shared cabin. If the vessel normally does not have cabins for crew members, alternative accommodations must be approved by NMFS. If a cabin assigned to a female observer does not have its own toilet and shower facilities that can be provided for the exclusive use of the observer, or if no cabin is assigned, then arrangements for sharing common facilities must be established and approved in advance by NMFS.

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§665.809 Port privileges and transiting for unpermitted U.S. longline vessels.

A U.S. longline fishing vessel that does not have a permit under subpart A of this part may enter waters of the fishery management area with western Pacific pelagic MUS on board, but may not land or transship any western Pacific pelagic MUS on board the vessel. The vessel's longline gear must be stowed or secured so it is rendered unusable during the time the vessel is in those waters.

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§665.810 Prohibition of drift gillnetting.

Fishing with drift gillnets in the fishery management area is prohibited, except where authorized by an EFP issued under §665.17.

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§665.811 [Reserved]

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§665.812 Sea turtle take mitigation measures.

(a) Possession and use of required mitigation gear. The gear required in paragraph (a) of this section must be used according to the sea turtle handling requirements set forth in paragraph (b) of this section.

(1) Hawaii longline limited access permits. Any owner or operator of a vessel registered for use under a Hawaii longline limited access permit must carry aboard the vessel line clippers meeting the minimum design standards specified in paragraph (a)(5) of this section, dip nets meeting the minimum design standards specified in paragraph (a)(6) of this section, and dehookers meeting the minimum design and performance standards specified in paragraph (a)(7) of this section.

(2) Other longline vessels with freeboards of more than 3 ft (0.91m). Any owner or operator of a longline vessel with a permit issued under §665.801 other than a Hawaii limited access longline permit and that has a freeboard of more than 3 ft (0.91 m) must carry aboard the vessel line clippers meeting the minimum design standards specified in paragraph (a)(5) of this section, dip nets meeting the minimum design standards specified in paragraph (a)(6) of this section, and dehookers meeting this minimum design and performance standards specified in paragraph (a)(7) of this section.

(3) Other longline vessels with freeboards of 3 ft (0.91 m) or less. Any owner or operator of a longline vessel with a permit issued under §665.801 other than a Hawaii limited access longline permit and that has a freeboard of 3 ft (0.91 m) or less must carry aboard their vessels line clippers capable of cutting the vessels fishing line or leader within approximately 1 ft (0.3 m) of the eye of an embedded hook, as well as wire or bolt cutters capable of cutting through the vessel's hooks.

(4) Handline, troll, pole-and-line, and other vessels using hooks other than longline vessels. Any owner or operator of a vessel fishing under the Pelagics FEP with hooks other than longline gear are not required to carry specific mitigation gear, but must comply with the handling requirements set forth in paragraph (b) of this section.

(5) *Line clippers.* Line clippers are intended to cut fishing line as close as possible to hooked or entangled sea turtles. NMFS has established minimum design standards for line clippers. The Arceneaux line clipper (ALC) is a model line clipper that meets these minimum design standards and may be fabricated from readily available and low-cost materials (see Figure 3 to this part). The minimum design standards are as follows:

(i) A protected cutting blade. The cutting blade must be curved, recessed, contained in a holder, or otherwise afforded some protection to minimize direct contact of the cutting surface with sea turtles or users of the cutting blade.

(ii) Cutting blade edge. The blade must be capable of cutting 2.0-2.1 mm monofilament line and nylon or polypropylene multistrand material commonly known as braided mainline or tarred mainline.

(iii) An extended reach holder for the cutting blade. The line clipper must have an extended reach handle or pole of at least 6 ft (1.82 m).

(iv) Secure fastener. The cutting blade must be securely fastened to the extended reach handle or pole to ensure effective deployment and use.

(6) *Dip nets.* Dip nets are intended to facilitate safe handling of sea turtles and access to sea turtles for purposes of cutting lines in a manner that minimizes injury and trauma to sea turtles. The minimum design standards for dip nets that meet the requirements of this section nets are:

(i) An extended reach handle. The dip net must have an extended reach handle of at least 6 ft (1.82 m) of wood or other rigid material able to support a minimum of 100 lb (34.1 kg) without breaking or significant bending or distortion.

(ii) Size of dip net. The dip net must have a net hoop of at least 31 inches (78.74 cm) inside diameter and a bag depth of at least 38 inches (96.52 cm). The bag mesh openings may be no more than 3 inches by 3 inches (7.62 cm by 7.62 cm).

(7) *Dehookers.* (i) Long-handled dehooker for ingested hooks. This item is intended to be used to remove ingested hooks from sea turtles that cannot be boated, and to engage a loose hook when a turtle is entangled but not hooked and line is being removed. One long-handled dehooker for ingested hooks is required on board. The minimum design and performance standards are as follows:

(A) *Hook removal device.* The hook removal device must be constructed of $\frac{5}{16}$ inch (7.94 mm) 316L stainless steel and have a dehooking end no larger than $1\frac{7}{8}$ inches (4.76 cm) outside diameter. The device must be capable of securely engaging and controlling the leader while shielding the barb of the hook to prevent the hook from re-engaging during removal. It must not have any unprotected terminal points (including blunt ones), as these could cause injury to the esophagus during hook removal. The device must be of a size capable of securing the range of hook sizes and styles used by the vessel.

(B) *Extended reach handle.* The hook removal device must be securely fastened to an extended reach handle or pole with a length equal to or greater than 150 percent of the vessel's freeboard or 6 ft (1.83 m), whichever is greater. It is recommended that the handle be designed so that it breaks down into sections. The handle must be sturdy and strong enough to facilitate the secure attachment of the hook removal device.

(ii) Long-handled dehooker for external hooks. This item is intended to be used to remove externally-hooked hooks from sea turtles that cannot be boated. The long-handled dehooker for ingested hooks described in paragraph (a)(7)(i) of this section meets this requirement. The minimum design and performance standards are as follows:

(A) *Construction.* The device must be constructed of $\frac{5}{16}$ inch (7.94 mm) 316 L stainless steel rod. A 5 inch (12.70 cm) tube T-handle of 1 inch (2.54 cm) outside diameter is recommended, but not required. The dehooking end must be blunt with all edges rounded. The device must be of a size capable of securing the range of hook sizes and styles used by the vessel.

(B) *Handle.* The handle must have a length equal to or greater than the vessel's freeboard or 3 ft (0.91 m), whichever is greater.

(iii) Long-handled device to pull an “inverted V.” This item is intended to be used to pull an “inverted V” in the fishing line when disentangling and dehooking entangled sea turtles. One long-handled device to pull an “inverted V” is required on the vessel. The minimum design and performance standards are as follows:

(A) *Hook end.* It must have a hook-shaped end, like that of a standard boat hook or gaff, which must be constructed of stainless steel or aluminum.

(B) *Handle.* The handle must have a length equal to or greater than 150 percent of the vessel's freeboard or 6 ft (1.83 m), whichever is greater. The handle must be sturdy and strong enough to allow the hook end to be effectively used to engage and pull an “inverted V” in the line.

(C) The long-handled dehookers described in paragraphs (a)(7)(i) and (ii) of this section meet this requirement.

(iv) Short-handled dehooker for ingested hooks. This item is intended to be used to remove ingested hooks, externally hooked hooks, and hooks in the front of the mouth of sea turtles that can be boated. One short-handled dehooker for ingested hooks is required on board. The minimum design and performance standards are as follows:

(A) *Hook removal device.* The hook removal device must be constructed of ¼ inch (6.35 mm) 316 L stainless steel, and the design of the dehooking end must be such to allow the hook to be secured and the barb shielded without re-engaging during the hook removal process. The dehooking end must be no larger than 1-5/16 inch (3.33 cm) outside diameter. It must not have any unprotected terminal points (including blunt ones), as this could cause injury to the esophagus during hook removal. The dehooking end must be of a size appropriate to secure the range of hook sizes and styles used by the vessel.

(B) *Sliding plastic bite block.* The dehooker must have a sliding plastic bite block, which is intended to be used to protect the sea turtle's beak and facilitate hook removal if the turtle bites down on the dehooker. The bite block must be constructed of a ¾ inch (1.91 cm) inside diameter high impact plastic cylinder (for example, Schedule 80 PVC) that is 10 inches (25.40 cm) long. The dehooker and bite block must be configured to allow for 5 inches (12.70 cm) of slide of the bite block along the shaft of the dehooker.

(C) *Shaft and handle.* The shaft must be 16 to 24 inches (40.64 to 60.69 cm) in length, and must have a T-handle 4 to 6 inches (10.16 to 15.24 cm) in length and ¾ to 1¼ inches (1.90 to 3.18 cm) in diameter.

(v) Short-handled dehooker for external hooks. This item is intended to be used to remove externally hooked hooks from sea turtles that can be boated. One short-handled dehooker for external hooks is required on board. The short-handled dehooker for ingested hooks required to comply with paragraph (a)(7)(v) of this section meets this requirement. The minimum design and performance standards are as follows:

(A) *Hook removal device.* The hook removal device must be constructed of 5⁄16 inch (7.94 cm) 316 L stainless steel, and the design must be such that a hook can be rotated out without pulling it out at an angle. The dehooking end must be blunt, and all edges rounded. The device must be of a size appropriate to secure the range of hook sizes and styles used by the vessel.

(B) *Shaft and handle.* The shaft must be 16 to 24 inches (40.64 to 60.69 cm) in length, and must have a T-handle 4 to 6 inches (10.16 to 15.24 cm) in length and ¾ to 1¼ inches (1.90 to 3.18 cm) in diameter.

(8) Tire. This item is intended to be used for supporting a turtle in an upright orientation while it is on board. One tire is required on board, but an assortment of sizes is recommended to accommodate a range of turtle sizes. The tire must be a standard passenger vehicle tire and must be free of exposed steel belts.

(9) Long-nose or needle-nose pliers. This item is intended to be used to remove deeply embedded hooks from the turtle's flesh that must be twisted in order to be removed, and also to hold in place PVC splice couplings when used as mouth openers. One pair of long-nose or needle-nose pliers is required on board. The minimum design standards are as follows: The pliers must be 8 to 14 inches (20.32 to 35.56 cm) in length. It is recommended that they be constructed of stainless steel material.

(10) Wire or bolt cutters. This item is intended to be used to cut through hooks in order to remove all or part of the hook. One pair of wire or bolt cutters is required on board. The minimum design and performance standards are as follows: The wire or bolt cutters must be capable of cutting hard metals, such as stainless or carbon steel hooks, and they must be capable of cutting through the hooks used by the vessel.

(11) Monofilament line cutters. This item is intended to be used to cut and remove fishing line as close to the eye of the hook as possible if the hook is swallowed or cannot be removed. One pair of monofilament line cutters is required on board. The minimum design standards are as follows: Monofilament line cutters must be 6 to 9 inches (15.24 to 22.86 cm) in length. The blades must be 1¾ (4.45 cm) in length and ⅝ inches (1.59 cm) wide when closed.

(12) Mouth openers and gags. These items are intended to be used to open the mouths of boated sea turtles, and to keep them open when removing ingested hooks in a way that allows the hook or line to be removed without causing further injury to the turtle. At least two of the seven different types of mouth openers and gags described below are required on board. The seven types and their minimum design standards are as follows.

(i) A block of hard wood. A block of hard wood is intended to be used to gag open a turtle's mouth by placing it in the corner of the jaw. It must be made of hard wood of a type that does not splinter (for example, maple), and it must have rounded and smoothed edges. The dimensions must be 10 to 12 inches (24.50 to 30.48 cm) by ¾ to 1¼ inches (1.90 to 3.18 cm) by ¾ to 1¼ inches (1.90 to 3.18 cm).

(ii) A set of three canine mouth gags. A canine mouth gag is intended to be used to gag open a turtle's mouth while allowing hands-free operation after it is in place. A set of canine mouth gags must include one of each of the following sizes: small (5 inches, 12.7 cm), medium (6 inches, 15.2 cm), and large (7 inches, 17.8 cm). They must be constructed of stainless steel. A 1¾ inch (4.45 cm) long piece of vinyl tubing (¾ inch, 1.91 cm) outside diameter and ⅝ inch (1.59 cm) inside diameter) must be placed over the ends of the gags to protect the turtle's beak.

(iii) A set of two sturdy canine chew bones. A canine chew bone is intended to be used to gag open a turtle's mouth by placing it in the corner of the jaw. They must be constructed of durable nylon, zylene resin, or thermoplastic polymer, and strong enough to withstand biting without splintering. To accommodate a variety of turtle beak sizes, a set must include one large (5½ to 8 inches (13.97 to 20.32 cm) in length) and one small (3½ to 4½ inches (8.89 to 11.43 cm) in length) canine chew bones.

(iv) A set of two rope loops covered with hose. A set of two rope loops covered with a piece of hose is intended to be used as a mouth opener and to keep a turtle's mouth open during hook and/or line removal. A set consists of two 3-foot (0.91 m) lengths of poly braid rope, each covered with an 8 inch (20.32 cm) section of ½ inch (1.27 cm) or ¾ inch (1.91 cm) light-duty garden hose, and each tied into a loop.

(v) A hank of rope. A hank of rope is intended to be used to gag open a sea turtle's mouth by placing it in the corner of the jaw. A hank of rope is made from a 6 foot (1.83 m) lanyard of braided nylon rope that is folded to create a hank, or looped bundle, of rope. The hank must be 2 to 4 inches (5.08 to 10.16 cm) in thickness.

(vi) A set of four PVC splice couplings. PVC splice couplings are intended to be used to allow access to the back of the mouth of a turtle for hook and line removal by positioning them inside a turtle's mouth and holding them in place with long-nose or needle-nose pliers. The set must consist of the following Schedule 40 PVC splice coupling sizes: 1 inch (2.54 cm), $1\frac{1}{4}$ inches (3.18 cm), $1\frac{1}{2}$ inches (3.81 cm), and 2 inches (5.08 cm).

(vii) A large avian oral speculum. A large avian oral speculum is intended to be used to hold a turtle's mouth open and control the head with one hand while removing a hook with the other hand. It must be 9 inches (22.86 cm) in length and constructed of $\frac{3}{16}$ inch (4.76 mm) wire diameter surgical stainless steel (Type 304). It must be covered with 8 inches (20.32 cm) of clear vinyl tubing $\frac{5}{16}$ inch (7.94 mm) outside diameter, $\frac{3}{16}$ inch (4.76 mm) inside diameter.

(b) Handling requirements. If a sea turtle is observed to be hooked or entangled in fishing gear from any vessel fishing under the Pelagics FEP, vessel owners and operators must use the required mitigation gear set forth in paragraph (a) of this section to comply with these handling requirements. Any hooked or entangled sea turtle must be handled in a manner to minimize injury and promote survival.

(1) Sea turtles that cannot be brought aboard. In instances where a sea turtle is too large to be brought aboard or the sea turtle cannot be brought aboard without causing further injury to the sea turtle, the vessel owner or operator must disentangle and remove the gear, or cut the line as close as possible to the hook or entanglement, to remove the maximum amount of the gear from the sea turtle.

(2) Sea turtles that can be brought aboard. In instances where a sea turtle is not too large to be brought aboard, or the sea turtle can be brought aboard without causing further injury to the turtle, the vessel owner or operator must take the following actions:

(i) Immediately bring the sea turtle aboard;

(ii) Handle the sea turtle in accordance with the procedures in paragraphs (b)(3) and (b)(4) of this section; and

(iii) Disentangle and remove the gear, or cut the line as close as possible to the hook or entanglement, to remove the maximum amount of the gear from the sea turtle.

(3) *Sea turtle resuscitation.* If a sea turtle appears dead or comatose, the following actions must be taken:

(i) Place the sea turtle on its belly (on the bottom shell or plastron) so that the sea turtle is right side up and its hindquarters elevated at least 6 inches (15.24 cm) for a period of no less than 4 hours and no more than 24 hours. The amount of the elevation varies with the size of the sea turtle; greater elevations are needed for larger sea turtles;

(ii) Administer a reflex test at least once every 3 hours. The test is to be performed by gently touching the eye and pinching the tail of a sea turtle to determine if the sea turtle is responsive;

(iii) Keep the sea turtle shaded and damp or moist (but under no circumstances place the sea turtle into a container holding water). A water-soaked towel placed over the eyes, carapace and flippers is the most effective method of keeping a sea turtle moist; and

(iv) Return to the sea any sea turtle that revives and becomes active in the manner described in paragraph (b)(4) of this section. Sea turtles that fail to revive within the 24-hour period must also be returned to the sea in the manner described in paragraph (b)(4) of this section.

(4) *Sea turtle release.* After handling a sea turtle in accordance with the requirements of paragraphs (b)(2) and (b)(3) of this section, the sea turtle must be returned to the ocean after identification unless NMFS requests the retention of a dead sea turtle for research. In releasing a sea turtle the vessel owner or operator must:

(i) Place the vessel engine in neutral gear so that the propeller is disengaged and the vessel is stopped, and release the sea turtle away from deployed gear; and

(ii) Observe that the turtle is safely away from the vessel before engaging the propeller and continuing operations.

(5) Other sea turtle requirements. No sea turtle, including a dead turtle, may be consumed or sold. A sea turtle may be landed, offloaded, transshipped or kept below deck only if NMFS requests the retention of a dead sea turtle for research.

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§665.813 Western Pacific longline fishing restrictions.

(a) [*Reserved*]

(b) Limits on sea turtle interactions. (1) Maximum annual limits are established on the number of physical interactions that occur each calendar year between leatherback and North Pacific loggerhead sea turtles and vessels registered for use under Hawaii longline limited access permits while shallow-set fishing. The annual limit for leatherback sea turtles (*Dermochelys coriacea*) is 26, and the annual limit for North Pacific loggerhead sea turtles (*Caretta caretta*) is 34.

(2) Upon determination by the Regional Administrator that, based on data from NMFS observers, the fishery has reached either of the two sea turtle interaction limits during a given calendar year:

(i) As soon as practicable, the Regional Administrator will file for publication at the Office of the Federal Register a notification that the fishery reached a sea turtle interaction limit. The notification will include an advisement that the shallow-set longline fishery shall be closed, and that shallow-set longline fishing north of the Equator by vessels registered for use under Hawaii longline limited access permits will be prohibited beginning at a specified date until the end of the calendar year in which the sea turtle interaction limit was reached. Coincidental with the filing of the notification, the Regional Administrator will also provide actual notice that the shallow-set longline fishery shall be closed, and that shallow-set longline fishing north of the Equator by vessels registered for use under Hawaii longline limited access permits will be prohibited beginning at a specified date, to all holders of Hawaii longline limited access permits via telephone, satellite telephone, radio, electronic mail, facsimile transmission, or post.

(ii) Beginning on the fishery closure date indicated by the Regional Administrator in the notification provided to vessel operators and permit holders and published in the FEDERAL REGISTER under paragraph (b)(2)(i) of this section, until the end of the calendar year in which the sea turtle interaction limit was reached, the Hawaii-based shallow-set longline fishery shall be closed.

(c) [*Reserved*]

(d) Vessels registered for use under a Hawaii longline limited access permit may not have on board at any time during a trip for which notification to NMFS under §665.803(a) indicated that deep-setting would be done any float lines less than 20 meters in length or light sticks. As used in this paragraph “float line” means a line used to suspend the main longline beneath a float and “light stick” means any type of light emitting device, including any fluorescent “glow bead,” chemical, or electrically powered light that is affixed underwater to the longline gear.

(e) [*Reserved*]

(f) Any owner or operator of a vessel registered for use under any longline permit issued under §665.801 must use only circle hooks sized 18/0 or larger, with an offset not to exceed 10 degrees, when shallow-setting north of the Equator (0° lat.). As used in this paragraph, an offset circle hook sized 18/0 or larger is one with an outer diameter at its widest point no smaller than 1.97 inches (50 mm) when measured with the eye of the hook on the vertical axis (y-axis) and perpendicular to the horizontal axis (x-axis). As used in this paragraph, the allowable offset is measured from the barbed end of the hook, and is relative to the parallel plane of the eyed-end, or shank, of the hook when laid on its side.

(g) Any owner or operator of a vessel registered for use under any longline permit issued under §665.801 must use only mackerel-type bait when shallow-setting north of the Equator (0° lat.). As used in this paragraph, mackerel-type bait means a whole fusiform fish with a predominantly blue, green or gray back and predominantly gray, silver or white lower sides and belly.

(h) Owners and operators of vessels registered for use under a Hawaii longline limited access permit may make sets only of the type (shallow-setting or deep-setting) indicated in the notification to NMFS pursuant to §665.803(a).

(i) Vessels registered for use under Hawaii longline limited access permits may not be used to engage in shallow-setting north of the Equator (0° lat.) any time during which the shallow-set component of the longline fishery is closed pursuant to paragraph (b)(2)(ii) of this section.

(j) *Swordfish limits.* When fishing north of the Equator (0° lat.), owners and operators of vessels registered for use under a Hawaii longline limited access permit, on a trip for which the permit holder notified NMFS under §665.803(a) that the vessel would deep-set, may possess or land no more than the following number of swordfish for such trip:

(1) If an observer is on board, there is no limit.

(2) If there is no observer on board, and if only circle hooks are used, the limit is 25.

(3) If there is no observer on board, and if any type of hook other than a circle hook is used, the limit is 10.

(k) When fishing south of the Equator (0° lat.) for western Pacific pelagic MUS, owners and operators of vessels longer than 40 ft (12.2 m) registered for use with any valid longline permit issued pursuant to §665.801 must use longline gear that is configured according to the requirements in paragraphs (k)(1) through (k)(5) of this section.

(1) Each float line must be at least 30 m long.

(2) At least 15 branch lines must be attached to the mainline between any two float lines attached to the mainline.

(3) Each branch line must be at least 10 meters long.

(4) No branch line may be attached to the mainline closer than 70 meters to any float line.

(5) No more than 10 swordfish may be possessed or landed during a single fishing trip.

[75 FR 2205, Jan. 14, 2010, as amended at 76 FR 13299, Mar. 11, 2011; 76 FR 52889, Aug. 24, 2011; 77 FR 43722, July 26, 2012; 77 FR 60649, Oct. 4, 2012]

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§665.814 Protected species workshop.

(a) Each year, both the owner and the operator of a vessel registered for use under any longline permit issued under §665.801 must attend and be certified for completion of a workshop conducted by NMFS on interaction mitigation techniques for sea turtles, seabirds and other protected species.

(b) A protected species workshop certificate will be issued by NMFS annually to any person who has completed the workshop.

(c) An owner of a vessel registered for use under any longline permit issued under §665.801 must have a valid protected species workshop certificate issued by NMFS to the owner of the vessel, in order to maintain or renew their vessel registration.

(d) An owner and an operator of a vessel registered for use under any longline permit issued under §665.801 must have on board the vessel a valid protected species workshop certificate issued by NMFS to the operator of the vessel, or a legible copy thereof.

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§665.815 Pelagic longline seabird mitigation measures.

(a) *Seabird mitigation techniques.* When deep-setting or shallow-setting north of 23° N. lat. or shallow-setting south of 23° N. lat., owners and operators of vessels registered for use under a Hawaii longline limited access permit, must either side-set according to paragraph (a)(1) of this section, or fish in accordance with paragraph (a)(2) of this section.

(1) Side-setting. Owners and operators of vessels opting to side-set under this section must fish according to the following specifications:

(i) The mainline must be deployed as far forward on the vessel as practicable, and at least 1 m (3.3 ft) forward from the stern of the vessel;

(ii) The mainline and branch lines must be set from the port or the starboard side of the vessel;

(iii) If a mainline shooter is used, the mainline shooter must be mounted as far forward on the vessel as practicable, and at least 1 m (3.3 ft) forward from the stern of the vessel;

(iv) Branch lines must have weights with a minimum weight of 45 g (1.6 oz);

(v) One weight must be connected to each branch line within 1 m (3.3 ft) of each hook;

(vi) When seabirds are present, the longline gear must be deployed so that baited hooks remain submerged and do not rise to the sea surface; and

(vii) A bird curtain must be deployed. Each bird curtain must consist of the following three components: a pole that is fixed to the side of the vessel aft of the line shooter and which is at least 3 m (9.8 ft) long; at least three main streamers that are attached at regular intervals to the upper 2 m (6.6 ft) of the pole and each of which has a minimum diameter of 20 mm (0.8 in); and branch streamers attached to each main streamer at the end opposite from the pole, each of which is long enough to drag on the sea surface in the absence of wind, and each of which has a minimum diameter 10 mm (0.4 in).

(2) Alternative to side-setting. Owners and operators of vessels that do not side-set must do the following:

(i) Discharge fish, fish parts (offal), or spent bait while setting or hauling longline gear, on the opposite side of the vessel from where the longline gear is being set or hauled, when seabirds are present;

(ii) Retain sufficient quantities of fish, fish parts, or spent bait between the setting of longline gear for the purpose of strategically discharging it in accordance with paragraph (a)(2)(i) of this section;

(iii) Remove all hooks from fish, fish parts, or spent bait prior to its discharge in accordance with paragraph (a)(2)(i) of this section;

(iv) Remove the bill and liver of any swordfish that is caught, sever its head from the trunk and cut it in half vertically and periodically discharge the butchered heads and livers in accordance with paragraph (a)(2)(i) of this section;

(v) When using basket-style longline gear north of 23° N. lat., ensure that the main longline is deployed slack to maximize its sink rate;

(vi) Use completely thawed bait that has been dyed blue to an intensity level specified by a color quality control card issued by NMFS;

(vii) Maintain a minimum of two cans (each sold as 0.45 kg or 1 lb size) containing blue dye on board the vessel; and

(viii) Follow the requirements in paragraphs (a)(3) and (a)(4) of this section, as applicable.

(3) Deep-setting requirements. The following additional requirements apply to vessels engaged in deep-setting using a monofilament main longline north of 23° N. lat. that do not side-set. Owners and operators of these vessels must do the following:

(i) Employ a line shooter; and

(ii) Attach a weight of at least 45 g (1.6 oz) to each branch line within 1 m (3.3 ft) of the hook.

(4) Shallow-setting requirement. In addition to the requirements set forth in paragraphs (a)(1) and (a)(2) of this section, owners and operators of vessels engaged in shallow-setting that do not side-set must begin the deployment of longline gear at least 1 hour after local sunset and complete the deployment no later than local sunrise, using only the minimum vessel lights to conform with navigation rules and best safety practices.

(b) Short-tailed albatross handling techniques. If a short-tailed albatross is hooked or entangled by a vessel registered for use under a Hawaii longline limited access permit, owners and operators must ensure that the following actions are taken:

(1) Stop the vessel to reduce the tension on the line and bring the bird on board the vessel using a dip net;

(2) Cover the bird with a towel to protect its feathers from oils or damage while being handled;

(3) Remove any entangled lines from the bird; and

(4) Determine if the bird is alive or dead.

(i) If dead, freeze the bird immediately with an identification tag attached directly to the specimen listing the species, location and date of mortality, and band number if the bird has a leg band. Attach a duplicate identification tag to the bag or container holding the bird. Any leg bands present must remain on the bird. Contact NMFS, the USCG, or the USFWS at the numbers listed on the Short-tailed Albatross Handling Placard distributed at the NMFS protected species workshop, inform them that you have a dead short-tailed albatross on board, and submit the bird to NMFS within 72 hours following completion of the fishing trip.

(ii) If alive, handle the bird in accordance with paragraphs (b)(5) through (11) of this section.

(5) Place the bird in a safe enclosed place;

(6) Immediately contact NMFS, the USCG, or the USFWS at the numbers listed on the Short-tailed Albatross Handling Placard distributed at the NMFS protected species workshop and request veterinary guidance;

(7) Follow the veterinary guidance regarding the handling and release of the bird;

(8) If the bird is externally hooked and no veterinary guidance is received within 24-48 hours, handle the bird in accordance with paragraphs (c)(4) and (c)(5) of this section, and release the bird only if it meets the following criteria:

(i) Able to hold its head erect and respond to noise and motion stimuli;

(ii) Able to breathe without noise;

(iii) Capable of flapping and retracting both wings to normal folded position on its back;

(iv) Able to stand on both feet with toes pointed forward; and

(v) Feathers are dry.

(9) Any seabird that is released in accordance with paragraph (b)(8) of this section or under the guidance of a veterinarian must be placed on the sea surface;

(10) If the hook has been ingested or is inaccessible, keep the bird in a safe, enclosed place and submit it to NMFS immediately upon the vessel's return to port. Do not give the bird food or water; and

(11) Complete the short-tailed albatross recovery data form issued by NMFS.

(c) Non-short-tailed albatross seabird handling techniques. If a seabird other than a short-tailed albatross is hooked or entangled by a vessel registered for use under a Hawaii longline limited access permit owners and operators must ensure that the following actions are taken:

(1) Stop the vessel to reduce the tension on the line and bring the seabird on board the vessel using a dip net;

(2) Cover the seabird with a towel to protect its feathers from oils or damage while being handled;

(3) Remove any entangled lines from the seabird;

(4) Remove any external hooks by cutting the line as close as possible to the hook, pushing the hook barb out point first, cutting off the hook barb using bolt cutters, and then removing the hook shank;

(5) Cut the fishing line as close as possible to ingested or inaccessible hooks;

(6) Leave the bird in a safe enclosed space to recover until its feathers are dry; and

(7) After recovered, release seabirds by placing them on the sea surface.

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§665.816 American Samoa longline limited entry program.

(a) *General.* Under §665.801(c), certain U.S. vessels are required to be registered for use under a valid American Samoa longline limited access permit. With the exception of reductions in permits in vessel size Class A under paragraph (c)(1) of this section, the maximum number of permits will be capped at the number of initial permits actually issued under paragraph (f) of this section.

(b) *Terminology.* For purposes of this section, the following terms have these meanings:

(1) Documented participation means participation proved by, but not necessarily limited to, a properly submitted NMFS or American Samoa logbook, an American Samoa creel survey record, a delivery or payment record from an American Samoa-based cannery, retailer or wholesaler, an American Samoa tax record, an individual wage record, ownership title, vessel registration, or other official documents showing:

(i) Ownership of a vessel that was used to fish in the EEZ around American Samoa, or

(ii) Evidence of work on a fishing trip during which longline gear was used to harvest western Pacific pelagic MUS in the EEZ around American Samoa. If the applicant does not possess the necessary documentation of evidence of work on a fishing trip based on records available only from NMFS or the Government of American Samoa (*e.g.,* creel survey record or logbook), the applicant may issue a request to PIRO to obtain such records from the appropriate agencies, if available. The applicant should provide sufficient information on the fishing trip to allow PIRO to retrieve the records.

(2) Family means those people related by blood, marriage, and formal or informal adoption.

(c) Vessel size classes. The Regional Administrator shall issue American Samoa longline limited access permits in the following size classes:

(1) Class A: Vessels less than or equal to 40 ft (12.2 m) LOA. The maximum number will be reduced as Class B-1, C-1, and D-1 permits are issued under paragraph (f)(5) of this section.

(2) Class B: Vessels over 40 ft (12.2 m) to 50 ft (15.2 m) LOA.

(3) Class B-1: Maximum number of 14 permits for vessels over 40 ft (12.2 m) to 50 ft (15.2 m) LOA, to be made available according to the following schedule:

(i) Four permits in the first calendar year after the Regional Administrator has issued all initial permits in Classes A, B, C, and D (initial issuance);

(ii) In the second calendar year after initial issuance, any unissued, relinquished, or revoked permits of the first four, plus four additional permits;

(iii) In the third calendar year after initial issuance, any unissued, relinquished, or revoked permits of the first eight, plus four additional permits; and

(iv) In the fourth calendar year after initial issuance, any unissued, relinquished, or revoked permits of the first 12, plus two additional permits.

(4) Class C: Vessels over 50 ft (15.2 m) to 70 ft (21.3 m) LOA.

(5) Class C-1: Maximum number of six permits for vessels over 50 ft (15.2) to 70 ft (21.3 m) LOA, to be made available according to the following schedule:

(i) Two permits in the first calendar year after initial issuance;

(ii) In the second calendar year after initial issuance, any unissued, relinquished, or revoked permits of the first two, plus two additional permits; and

(iii) In the third calendar year after initial issuance, any unissued, relinquished, or revoked permits of the first four, plus two additional permits.

(6) Class D: Vessels over 70 ft (21.3 m) LOA.

(7) Class D-1: Maximum number of 6 permits for vessels over 70 ft (21.3 m) LOA, to be made available according to the following schedule:

(i) Two permits in the first calendar year after initial issuance;

(ii) In the second calendar year after initial issuance, any unissued, relinquished, or revoked permits of the first two, plus two additional permits; and

(iii) In the third calendar year after initial issuance, any unissued, relinquished, or revoked permits of the first four, plus two additional permits.

(d) A vessel subject to this section may only be registered with an American Samoa longline limited access permit of a size class equal to or larger than the vessel's LOA.

(e) Initial permit qualification. Any U.S. national or U.S. citizen or company, partnership, or corporation qualifies for an initial American Samoa longline limited access permit if the person, company, partnership, or corporation, on or prior to March 21, 2002, owned a vessel that was used during the time of their ownership to harvest western Pacific pelagic MUS with longline gear in the EEZ around American Samoa, and that fish was landed in American Samoa:

(1) Prior to March 22, 2002; or

(2) Prior to June 28, 2002, provided that the person or business provided to NMFS or the Council, prior to March 22, 2002, a written notice of intent to participate in the pelagic longline fishery in the EEZ around American Samoa.

(f) Initial permit issuance.

(1) Any application for issuance of an initial permit must be submitted to PIRO no later than 120 days after the effective date of this final rule. The Regional Administrator shall publish a notice in the FEDERAL REGISTER, send notices to persons on the American Samoa pelagics mailing list, and use other means to notify prospective applicants of the availability of permits. Applications for initial permits must be made, and application fees paid, in accordance with §§665.13(c)(1), 665.13 (d), and 665.13 (f)(2). A complete application must include documented participation in the fishery in accordance with §665.816(b)(1). If the applicant is any entity other than a sole owner, the application must be accompanied by a supplementary information sheet obtained from the Regional Administrator, containing the names and mailing addresses of all owners, partners, and corporate officers.

(2) Only permits of Class A, B, C, and D will be made available for initial issuance. Permits of Class B-1, C-1, and D-1, will be made available in subsequent calendar years.

(3) Within 30 days of receipt of a completed application, the Assistant Regional Administrator for Sustainable Fisheries, PIRO, shall make a decision on whether the applicant qualifies for an initial permit and will notify the successful applicant by a dated letter. The successful applicant must register a vessel, of the equivalent size class or smaller to which the qualifying vessel would have belonged, to the permit within 120 days of the date of the letter of notification, and maintain this vessel registration to the permit for at least 120 days. The successful applicant must also submit a supplementary information sheet, obtained from the Regional Administrator, containing the name and mailing address of the owner of the vessel to which the permit is registered. If the registered vessel is owned by any entity other than a sole owner, the names and mailing addresses of all owners, partners, and corporate officers must be included.

(4) An appeal of a denial of an application for an initial permit shall be processed in accordance with §665.801(o) of this subpart.

(5) After all appeals on initial permits are concluded in any vessel size class, the maximum number of permits in that class shall be the number of permits issued during the initial issuance process (including appeals). The maximum number of permits will not change, except that the maximum number of Class A permits will be reduced if Class A permits are replaced by B-1, C-1, or D-1 permits under paragraph (h) of this section. Thereafter, if any Class A, B, C, or D permit becomes available, the Regional Administrator shall re-issue that permit according to the process set forth in paragraph (g) of this section.

(g) Additional permit issuance.

(1) If the number of permits issued in Class A, B, C, or D, falls below the maximum number of permits, the Regional Administrator shall publish a notice in the FEDERAL REGISTER, send notices to persons on the American Samoa pelagics mailing list, and use other means to notify prospective applicants of any available permit(s) in that class. Any application for issuance of an additional permit must be submitted to PIRO no later than 120 days after the date of publication of the notice on the availability of additional permits in the FEDERAL REGISTER. A complete application must include documented participation in the fishery in accordance with §665.816(b)(1). The Regional Administrator shall issue permits to persons according to the following priority standard:

(i) First priority accrues to the person with the earliest documented participation in the pelagic longline fishery in the EEZ around American Samoa on a Class A sized vessel.

(ii) The next priority accrues to the person with the earliest documented participation in the pelagic longline fishery in the EEZ around American Samoa on a Class B size, Class C size, or Class D size vessel, in that order.

(iii) In the event of a tie in the priority ranking between two or more applicants, the applicant whose second documented participation in the pelagic longline fishery in the EEZ around American Samoa is first in time will be ranked first in priority. If there is still a tie between two or more applicants, the Regional Administrator will select the successful applicant by an impartial lottery.

(2) Applications must be made, and application fees paid, in accordance with §§665.13(c)(1), 665.13(d), and 665.13(f)(2). If the applicant is any entity other than a sole owner, the application must be accompanied by a supplementary information sheet, obtained from the Regional Administrator, containing the names and mailing addresses of all owners, partners, and corporate officers that comprise ownership of the vessel for which the permit application is prepared.

(3) Within 30 days of receipt of a completed application, the Assistant Regional Administrator for Sustainable Fisheries shall make a decision on whether the applicant qualifies for a permit and will notify the successful applicant by a dated letter. The successful applicant must register a vessel of the equivalent vessel size or smaller to the permit within 120 days of the date of the letter of notification. The successful applicant must also submit a supplementary information sheet, obtained from the Regional Administrator, containing the name and mailing address of the owner of the vessel to which the permit is registered. If the registered vessel is owned by any entity other than a sole owner, the names and mailing addresses of all owners, partners, and corporate officers must be included. If the successful applicant fails to register a vessel to the permit within 120 days of the date of the letter of notification, the Assistant Regional Administrator for Sustainable Fisheries shall issue a letter of notification to the next person on the priority list or, in the event that there are no more prospective applicants on the priority list, re-start the issuance process pursuant to paragraph (g)(1) of this section. Any person who fails to register the permit to a vessel under this paragraph (g)(3) within 120 days shall not be eligible to apply for a permit for 6 months from the date those 120 days expired.

(4) An appeal of a denial of an application for a permit shall be processed in accordance with §665.801(o).

(h) Class B-1, C-1, and D-1 Permits.

(1) Permits of Class B-1, C-1, and D-1 will be initially issued only to persons who hold a Class A permit and who, prior to March 22, 2002, participated in the pelagic longline fishery around American Samoa.

(2) The Regional Administrator shall issue permits to persons for Class B-1, C-1, and D-1 permits based on each person's earliest documented participation, with the highest priority given to that person with the earliest date of documented participation.

(3) A permit holder who receives a Class B-1, C-1, or D-1 permit must relinquish his or her Class A permit and that permit will no longer be valid. The maximum number of Class A permits will be reduced accordingly.

(4) Within 30 days of receipt of a completed application for a Class B-1, C-1, and D-1 permit, the Regional Administrator shall make a decision on whether the applicant qualifies for a permit and will notify the successful applicant by a dated letter. The successful applicant must register a vessel of the equivalent vessel size or smaller to the permit within 120 days of the date of the letter of notification. The successful applicant must also submit a supplementary information sheet, obtained from the Regional Administrator, containing the name and mailing address of the owner of the vessel to which the permit is registered. If the registered vessel is owned by any entity other than a sole owner, the names and mailing addresses of all owners, partners, and corporate officers must be included.

(5) An appeal of a denial of an application for a Class B-1, C-1, or D-1 permit shall be processed in accordance with §665.801(o).

(6) If a Class B-1, C-1, or D-1 permit is relinquished, revoked, or not renewed pursuant to paragraph (j)(1) of this section, the Regional Administrator shall make that permit available according to the procedure described in paragraph (g) of this section.

(i) Permit transfer. The holder of an American Samoa longline limited access permit may transfer the permit to another individual, partnership, corporation, or other entity as described in this section. Applications for permit transfers must be submitted to the Regional Administrator within 30 days of the transfer date. If the applicant is any entity other than a sole owner, the application must be accompanied by a supplementary information sheet, obtained from the Regional Administrator, containing the names and mailing addresses of all owners, partners, and corporate officers. After such an application has been made, the permit is not valid for use by the new permit holder until the Regional Administrator has issued the permit in the new permit holder's name under §665.13(c).

(1) Permits of all size classes except Class A. An American Samoa longline limited access permit of any size class except Class A may be transferred (by sale, gift, bequest, intestate succession, barter, or trade) to the following persons only:

(i) A western Pacific community located in American Samoa that meets the criteria set forth in §305(I)(2) of the Magnuson-Stevens Act, 16 U.S.C. §1855(I)(2), and its implementing regulations, or

(ii) Any person with documented participation in the pelagic longline fishery in the EEZ around American Samoa.

(2) Class A Permits. An American Samoa longline limited access permit of Class A may be transferred (by sale, gift, bequest, intestate succession, barter, or trade) to the following persons only:

(i) A family member of the permit holder,

(ii) A western Pacific community located in American Samoa that meets the criteria set forth in §305(I)(2) of the Magnuson-Stevens Act, 16 U.S.C. 1855, and its implementing regulations, or

(iii) Any person with documented participation in the pelagic longline fishery on a Class A size vessel in the EEZ around American Samoa prior to March 22, 2002.

(3) Class B-1, C-1, and D-1 Permits. Class B-1, C-1, and D-1 permits may not be transferred to a different owner for 3 years from the date of initial issuance, except by bequest or intestate succession if the permit holder dies during those 3 years. After the initial 3 years, Class B-1, C-1, and D-1 permits may be transferred only in accordance with the restrictions in paragraph (i)(1) of this section.

(j) Permit renewal and registration of vessels.

(1) Use requirements. An American Samoa longline limited access permit will not be renewed following 3 consecutive calendar years (beginning with the year after the permit was issued in the name of the current permit holder) in which the vessel(s) to which it is registered landed less than:

(i) For permit size Classes A or B: a total of 1,000 lb (455 kg) of western Pacific pelagic MUS harvested in the EEZ around American Samoa using longline gear, or

(ii) For permit size Classes C or D: a total of 5,000 lb (2,273 kg) of western Pacific pelagic MUS harvested in the EEZ around American Samoa using longline gear.

(2) [Reserved]

(k) Concentration of ownership of permits. No more than 10 percent of the maximum number of permits, of all size classes combined, may be held by the same permit holder. Fractional interest will be counted as a full permit for the purpose of calculating whether the 10-percent standard has been reached.

(l) Three year review. Within 3 years of the effective date of this final rule, the Council shall consider appropriate revisions to the American Samoa limited entry program after reviewing the effectiveness of the program with respect to its biological and socioeconomic objectives, concerning gear conflict, overfishing, enforceability, compliance, and other issues.

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§665.817 [Reserved]

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§665.818 Exemptions for American Samoa large vessel prohibited areas.

(a) An exemption will be issued to a person who currently owns a large vessel to use that vessel to fish for western Pacific pelagic MUS in the American Samoa large vessel prohibited management areas, if the person seeking the exemption had been the owner of that vessel when it was registered for use with a Western Pacific general longline permit, and has made at least one landing of western Pacific pelagic MUS in American Samoa on or prior to November 13, 1997.

(b) A landing of western Pacific pelagic MUS for the purpose of this section must have been properly recorded on a NMFS Western Pacific Federal daily longline form that was submitted to NMFS, as required in §665.14.

(c) An exemption is valid only for a vessel that was registered for use with a Western Pacific general longline permit and landed western Pacific pelagic MUS in American Samoa on or prior to November 13, 1997, or for a replacement vessel of equal or smaller LOA than the vessel that was initially registered for use with a Western Pacific general longline permit on or prior to November 13, 1997.

(d) An exemption is valid only for the vessel for which it is registered. An exemption not registered for use with a particular vessel may not be used.

(e) An exemption may not be transferred to another person.

(f) If more than one person, *e.g.,* a partnership or corporation, owned a large vessel when it was registered for use with a Western Pacific general longline permit and made at least one landing of western Pacific pelagic MUS in American Samoa on or prior to November 13, 1997, an exemption issued under this section will be issued to only one person.

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§665.819 Territorial catch and fishing effort limits.

(a) *General.* (1) Notwithstanding §665.4, if the WCPFC agrees to a catch or fishing effort limit for a stock of western Pacific pelagic MUS that is applicable to a U.S. participating territory, the Regional Administrator may specify an annual or multi-year catch or fishing effort limit for a U.S. participating territory, as recommended by the Council, not to exceed the WCPFC adopted limit. The Regional Administrator may authorize such U.S. participating territory to allocate a portion, as recommended by the Council, of the specified catch or fishing effort limit to a fishing vessel or vessels holding a valid permit issued under §665.801 through a specified fishing agreement pursuant to paragraph (c) of this section.

(2) If the WCPFC does not agree to a catch or fishing effort limit for a stock of western Pacific pelagic MUS applicable to a U.S. participating territory, the Council may recommend that the Regional Administrator specify such a limit that is consistent with the Pelagics FEP, other provisions of the Magnuson-Stevens Act, and other applicable laws. The Council may also recommend that the Regional Administrator authorize a U.S. participating territory to allocate a portion of a specified catch or fishing effort limit to a fishing vessel or vessels holding valid permits issued under §665.801 through a specified fishing agreement pursuant to paragraph (c) of this section.

(3) The Council shall review any existing or proposed catch or fishing effort limit specification and portion available for allocation at least annually to ensure consistency with the Pelagics FEP, Magnuson-Stevens Act, WCPFC decisions, and other applicable laws. Based on this review, at least annually, the Council shall recommend to the Regional Administrator whether such catch or fishing effort limit specification or portion available for allocation should be approved for the next fishing year.

(4) The Regional Administrator shall review any Council recommendation pursuant to paragraph (a) of this section and, if determined to be consistent with the Pelagics FEP, Magnuson-Stevens Act, WCPFC decisions, and other applicable laws, shall approve such recommendation. If the Regional Administrator determines that a recommendation is inconsistent with the Pelagics FEP, Magnuson-Stevens Act, WCPFC decisions and other applicable laws, the Regional Administrator will disapprove the recommendation and provide the Council with a written explanation of the reasons for disapproval. If a catch or fishing effort limit specification or allocation limit is disapproved, or if the Council recommends and NMFS approves no catch or fishing effort limit specification or allocation limit, no specified fishing agreements as described in paragraph (c) of this section will be accepted for the fishing year covered by such action.

(b) *Procedures and timing.* (1) After receiving a Council recommendation for a catch or fishing effort limit specification, or portion available for allocation, the Regional Administrator will evaluate the recommendation for consistency with the Pelagics FEP, other provisions of the Magnuson-Stevens Act, and other applicable laws.

(2) The Regional Administrator will publish in the FEDERAL REGISTER a notice and request for public comment of the proposed catch or fishing effort limit specification and any portion of the limit that may be allocated to a fishing vessel or vessels holding a valid permit issued under §665.801.

(3) The Regional Administrator will publish in the FEDERAL REGISTER, a notice of the final catch or fishing effort limit specification and portion of the limit that may be allocated to a fishing vessel or vessels holding valid permits issued under §665.801. The final specification of a catch or fishing effort limit will also announce the deadline for submitting a specified fishing agreement for review as described in paragraph (c) of this section. The deadline will be no earlier than 30 days after the publication date of the FEDERAL REGISTER notice that specifies the final catch or fishing effort limit and the portion of the limit that may be allocated through a specified fishing agreement.

(c) *Specified fishing agreements.* A specified fishing agreement means an agreement between a U.S. participating territory and the owner or a designated representative of a fishing vessel or vessels holding a valid permit issued under §665.801 of this part. An agreement provides access to an identified portion of a catch or fishing effort limit and may not exceed the amount specified for the territory and made available for allocation pursuant to paragraph (a) of this section. The identified portion of a catch or fishing effort limit in an agreement must account for recent and anticipated harvest on the stock or stock complex or fishing effort, and any other valid agreements with the territory during the same year not to exceed the territory's catch or fishing effort limit or allocation limit.

(1) An authorized official or designated representative of a U.S. participating territory may submit a complete specified fishing agreement to the Council for review. A complete specified fishing agreement must meet the following requirements:

(i) Identify the vessel(s) to which the fishing agreement applies, along with documentation that such vessel(s) possesses a valid permit issued under §665.801;

(ii) Identify the amount (weight) of western Pacific pelagic MUS to which the fishing agreement applies, if applicable;

(iii) Identify the amount of fishing effort to which the fishing agreement applies, if applicable;

(iv) Be signed by an authorized official of the applicable U.S. participating territory, or designated representative;

(v) Be signed by each vessel owner or designated representative; and

(vi) Satisfy either paragraph (c)(1)(vi)(A) or (B) of this section:

(A) Require the identified vessels to land or offload catch in the ports of the U.S. participating territory to which the fishing agreement applies; or

(B) Specify the amount of monetary contributions that each vessel owner in the agreement, or his or her designated representative, will deposit into the Western Pacific Sustainable Fisheries Fund.

(vii) Be consistent with the Pelagics FEP and implementing regulations, the Magnuson-Stevens Act, and other applicable laws; and

(viii) Shall not confer any right of compensation to any party enforceable against the United States should action under such agreement be prohibited or limited by NMFS pursuant to its authority under Magnuson-Stevens Act, or other applicable laws.

(2) *Council review.* The Council, through its Executive Director, will review a submitted specified fishing agreement to ensure that it is consistent with paragraph (1) of this section. The Council will advise the authorized official or designated representative of the U.S. participating territory to which the agreement applies of any inconsistency and provide an opportunity to modify the agreement, as appropriate. The Council will transmit the complete specified fishing agreement to the Regional Administrator for review.

(3) *Agency review.* (i) Upon receipt of a specified fishing agreement from the Council, the Regional Administrator will consider such agreement for consistency with paragraph (c)(1) of this section, the Pelagics FEP and implementing regulations, the Magnuson-Stevens Act, and other applicable laws.

(ii) Within 30 calendar days of receipt of the fishing agreement from the Council, the Regional Administrator will provide the authorized official or designated representative of the U.S. participating territory to which the agreement applies and the signatory vessel owners or their designated representatives with written notice of whether the agreement meets the requirements of this section. The Regional Administrator will reject an agreement for any of the following reasons:

(A) The agreement fails to meet the criteria specified in this subpart;

(B) The applicant has failed to disclose material information;

(C) The applicant has made a material false statement related to the specified fishing agreement;

(D) The agreement is inconsistent with the Pelagics FEP, implementing regulations, the Magnuson-Stevens Act, or other applicable laws; or

(E) The agreement includes a vessel identified in another valid specified fishing agreement.

(iii) The Regional Administrator, in consultation with the Council, may recommend that specified fishing agreements include such additional terms and conditions as are necessary to ensure consistency with the Pelagics FEP and implementing regulations, the Magnuson-Stevens Act, and other applicable laws.

(iv) The U.S. participating territory must notify NMFS and the Council in writing of any changes in the identity of fishing vessels to which the specified fishing agreement applies within 72 hours of the change.

(v) Upon written notice that a specified fishing agreement fails to meet the requirements of this section, the Regional Administrator may provide the U.S. participating territory an opportunity to modify the fishing agreement within the time period prescribed in the notice. Such opportunity to modify the agreement may not exceed 30 days following the date of written notice. The U.S. participating territory may resubmit the agreement according to paragraph (c)(1) of this section.

(vi) The absence of the Regional Administrator's written notice within the time period specified in paragraph (c)(3)(ii) of this section or, if applicable, within the extended time period specified in paragraph (c)(3)(v) of this section shall operate as the Regional Administrator's finding that the fishing agreement meets the requirements of this section.

(4) *Transfer.* Specified fishing agreements authorized under this section are not transferable or assignable, except as allowed pursuant to paragraph (c)(3)(iv) of this section.

(5) A vessel shall not be identified in more than one valid specified fishing agreement at a time.

(6) *Revocation and suspension.* The Regional Administrator, in consultation with the Council, may at any time revoke or suspend attribution under a specified fishing agreement upon the determination that either: Operation under the agreement would violate the requirements of the Pelagics FEP or implementing regulations, the Magnuson-Stevens Act, or other applicable laws; or the U.S. participating territory fails to notify NMFS and the Council in writing of any changes in the identity of fishing vessels to which the specified fishing agreement applies within 72 hours of the change.

(7) *Cancellation.* The U.S. participating territory and the vessel owner(s), or designated representative(s), that are party to a specified fishing agreement must notify the Regional Administrator in writing within 72 hours after an agreement is cancelled or no longer valid. A valid notice of cancellation shall require the signatures of both parties to the agreement. All catch or fishing effort attributions under the agreement shall cease upon the written date of a valid notice of cancellation.

(8) *Appeals.* An authorized official or designated representative of a U.S. participating territory or signatory vessel owners or their designated representatives may appeal the granting, denial, conditioning, or suspension of a specified fishing agreement affecting their interests to the Regional Administrator in accordance with the permit appeals procedures set forth in §665.801(o) of this subpart.

(9) *Catch or fishing effort attribution procedures.* (i) For vessels identified in a valid specified fishing agreement that are subject to a U.S. limit and fishing restrictions set forth in 50 CFR part 300, subpart O, NMFS will attribute catch made by such vessels to the applicable U.S. participating territory starting seven days before the date NMFS projects the annual U.S. limit to be reached, or upon the effective date of the agreement, whichever is later.

(ii) For U.S. fishing vessels identified in a valid specified fishing agreement that are subject to catch or fishing effort limits and fishing restrictions set forth in this subpart, NMFS will attribute catch or fishing effort to the applicable U.S. participating territory starting seven days before the date NMFS projects the limit to be reached, or upon the effective date of the agreement, whichever is later.

(iii) If NMFS determines catch or fishing effort made by fishing vessels identified in a specified fishing agreement exceeds the allocated limit, NMFS will attribute any overage of the limit back to the U.S. or Pacific island fishery to which the vessel(s) is registered and permitted in accordance with the regulations set forth in 50 CFR part 300, subpart O and other applicable laws.

(d) *Accountability measures.* (1) NMFS will monitor catch and fishing effort with respect to any territorial catch or fishing effort limit, including the amount of a limit allocated to vessels identified in a valid specified fishing agreement, using data submitted in logbooks and other information. When NMFS projects a territorial catch or fishing effort limit or allocated limit to be reached, the Regional Administrator shall publish notification to that effect in the FEDERAL REGISTER at least seven days before the limit will be reached.

(2) The notice will include an advisement that fishing for the applicable pelagic MUS stock or stock complex, or fishing effort, will be restricted on a specific date. The restriction may include, but is not limited to, a prohibition on retention, closure of a fishery, closure of specific areas, or other catch or fishing effort restrictions. The restriction will remain in effect until the end of the fishing year.

(e) *Disbursement of contributions from the Sustainable Fisheries Fund.* (1) NMFS shall make available to the Western Pacific Fishery Management Council monetary contributions, made to the Fund pursuant to a specified fishing agreement, in the following order of priority:

(i) Project(s) identified in an approved Marine Conservation Plan (16 U.S.C. 1824) of a U.S. participating territory that is a party to a valid specified fishing agreement, pursuant to §665.819(c); and

(ii) In the case of two or more valid specified fishing agreements in a fishing year, the projects listed in an approved Marine Conservation Plan applicable to the territory with the earliest valid agreement will be funded first.

(2) At least seven calendar days prior to the disbursement of any funds, the Council shall provide in writing to NMFS a list identifying the order of priority of the projects in an approved Marine Conservation Plan that are to be funded. The Council may thereafter revise this list.

[79 FR 64111, Oct. 28, 2014]

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Subpart G—Marianas Trench Marine National Monument

SOURCE: 78 FR 33003, June 3, 2013, unless otherwise noted.

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§665.900 Scope and purpose.

The regulations in this subpart codify certain provisions of the Proclamation, and govern the administration of fishing in the Monument. Nothing in this subpart shall be deemed to diminish or enlarge the jurisdiction of the Territory of Guam or the Commonwealth of the Northern Mariana Islands.

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§665.901 Boundaries.

The Marianas Trench Marine National Monument includes the following:

(a) *Islands Unit.* The Islands Unit includes the waters and submerged lands of the three northernmost Mariana Islands (Farallon de Pajaros (Uracas), Maug, and Asuncion). The shoreward boundary of the Islands Unit is the mean low water line. The seaward boundary of Islands Unit is defined by straight lines connecting the following coordinates in the order listed:

ID	E. long.	N. lat.
1	144°1′22.97″	21°23′42.40″
2	145°33′25.20″	21°23′42.40″
3	145°44′31.14″	21°11′14.60″
4	146°18′36.75″	20°49′17.46″
5	146°18′36.75″	19°22′0.00″
6	145°3′12.22″	19°22′0.00″
7	144°1′22.97″	20°45′44.11″
1	144°1′22.97″	21°23′42.40″

(b) *Volcanic Unit.* The Volcanic Unit includes the submerged lands of designated volcanic sites. The boundaries of the Volcanic Unit are defined as circles of a one nautical mile radius centered on each of the following points:

ID	E. long.	N. lat.
Fukujin	143°27′30″	21°56′30″
Minami Kasuga #2	143°38′30″	21°36′36″
N.W. Eifuku	144°2′36″	21°29′15″
Minami Kasuga #3	143°38′0″	21°24′0″
Daikoku	144°11′39″	21°19′27″
Ahyi	145°1′45″	20°26′15″

Maug	145°13′18″	20°1′15″
Alice Springs	144°30′0″	18°12′0″
Central trough	144°45′0″	18°1′0″
Zealandia	145°51′4″	16°52′57″
E. Diamante	145°40′47″	15°56′31″
Ruby	145°34′24″	15°36′15″
Esmeralda	145°14′45″	14°57′30″
N.W. Rota #1	144°46′30″	14°36′0″
W. Rota	144°50′0″	14°19′30″
Forecast	143°55′12″	13°23′30″
Seamount X	144°1′0″	13°14′48″
South Backarc	143°37′8″	12°57′12″
Archaean site	143°37′55″	12°56′23″
Pika site	143°38′55″	12°55′7″
Toto	143°31′42″	12°42′48″

(c) *Trench Unit.* The Trench Unit includes the submerged lands of the Marianas Trench. The boundary of the Trench Unit extends from the northern limit of the EEZ around the Commonwealth of the Northern Mariana Islands to the southern limit of the EEZ around Guam as defined by straight lines connecting the following coordinates in the order listed:

ID	E. long.	N. lat.
1	145°5′46″	23°53′35″
2	145°52′27.10″	23°45′50.54″
3	146°36′18.91″	23°29′18.33″
4	147°5′16.84″	23°11′43.92″

5	147°22′31.43″	20°38′41.35″
6	147°40′48.31″	19°59′23.30″
7	147°39′59.51″	19°27′2.96″
8	147°48′51.61″	19°8′18.74″
9	148°21′47.20″	18°56′6.46″
10	148°42′50.50″	17°58′2.20″
11	148°34′47.12″	16°40′53.86″
12	148°5′39.95″	15°25′51.09″
13	146°23′24.38″	12°21′38.38″
14	145°28′33.28″	11°34′7.64″
15	143°3′9″	10°57′30″
16	142°19′54.93″	11°47′24.83″
17	144°42′31.24″	12°21′24.65″
18	145°17′59.93″	12°33′5.35″
19	147°29′32.24″	15°49′25.53″
20	147°27′32.35″	17°57′52.76″
21	147°20′16.96″	19°9′19.41″
22	146°57′55.31″	20°23′58.80″
23	145°44′31.14″	21°11′14.60″
24	144°5′27.55″	23°2′28.67″
1	145°5′46″	23°53′35″

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§665.902 Definitions.

The following definitions are used in this subpart:

Management unit species or MUS means the Mariana Archipelago management unit species as defined in §§665.401, 665.421, 665.441, and 665.461, and the pelagic management unit species as defined in §665.800.

Monument means the submerged lands and, where applicable, waters of the Marianas Trench Marine National Monument as defined in §665.901.

Proclamation means Presidential Proclamation 8335 of January 6, 2009, "Establishment of the Marianas Trench Marine National Monument."

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§665.903 Prohibitions.

In addition to the general prohibitions specified in §600.725 of this chapter, and §665.15 and subpart D of this part, the following activities are prohibited in the Islands Unit and, thus, unlawful for a person to conduct or cause to be conducted.

(a) Commercial fishing in violation of §665.904(a).

(b) Non-commercial fishing, except as authorized under permit and pursuant to the procedures and criteria established in §665.905.

(c) Transferring a permit in violation of §665.905(d).

(d) Commercial fishing outside the Islands Unit and non-commercial fishing within the Islands Unit on the same trip in violation of §665.904(c).

[78 FR 33003, June 3, 2013, as amended at 78 FR 39583, July 2, 2013]

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§665.904 Regulated activities.

(a) Commercial fishing is prohibited in the Islands Unit.

(b) Non-commercial fishing is prohibited in the Islands Unit, except as authorized under permit and pursuant to the procedures and criteria established in §665.905.

(c) Commercial fishing outside the Islands Unit and non-commercial fishing within the Islands Unit during the same trip is prohibited.

[78 FR 33003, June 3, 2013, as amended at 78 FR 39583, July 2, 2013]

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§665.905 Fishing permit procedures and criteria.

(a) *Marianas Trench Monument Islands Unit non-commercial permit*—(1) *Applicability.* Both the owner and operator of a vessel used to non-commercially fish for, take, retain, or possess MUS in the Islands Unit must have a permit issued under this section, and the permit must be registered for use with that vessel.

(2) *Eligibility criteria.* A permit issued under this section may be issued only to a community resident of Guam or the CNMI.

(3) *Terms and conditions.* (i) Customary exchange of fish harvested within the Islands Unit under a non-commercial permit is allowed, except that customary exchange by fishermen engaged in recreational fishing is prohibited.

(ii) Monetary reimbursement under customary exchange shall not exceed actual fishing trip expenses, including but not limited to ice, bait, fuel, or food.

(b) *Marianas Trench Monument Islands Unit recreational charter permit*—(1) *Applicability.* Both the owner and operator of a vessel chartered to recreationally fish for, take, retain, or possess MUS in the Islands Unit must have a permit issued under this section, and the permit must be registered for use with that vessel. Charter boat customers are not required to obtain a permit.

(2) *Eligibility criteria.* To be eligible for a permit issued under this section, a charter business must be established legally under the laws of Guam or the CNMI.

(3) *Terms and conditions.* (i) The sale or exchange through barter or trade of fish caught in the Monument by a charter boat is prohibited.

(ii) No MUS harvested under a recreational charter fishing permit may be used for the purposes of customary exchange.

(c) *Application.* An application for a permit required under this section must be submitted to PIRO as described in §665.13.

(d) *Transfer.* A permit issued under this section is not transferrable.

(e) *Reporting and recordkeeping.* The operator of a vessel subject to the requirements of this section must comply with the terms and conditions described in §665.14.

[78 FR 33003, June 3, 2013, as amended at 78 FR 39583, July 2, 2013]

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§665.906 International law.

The regulations in this subpart shall be applied in accordance with international law. No restrictions shall apply to or be enforced against a person who is not a citizen, national, or resident alien of the United States (including foreign flag vessels) unless in accordance with international law.

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Subpart H—Pacific Remote Islands Marine National Monument

SOURCE: 78 FR 33003, June 3, 2013, unless otherwise noted.

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§665.930 Scope and purpose.

The regulations in this subpart codify certain provisions of the Proclamations, and govern the administration of fishing in the Monument.

[80 FR 15695, Mar. 25, 2015]

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§665.931 Boundaries.

The Monument, including the waters and submerged and emergent lands of Wake, Baker, Howland, and Jarvis Islands, Johnston Atoll, Kingman Reef, and Palmyra Atoll, is defined as follows:

(a) *Wake Island.* The Wake Island unit of the Monument includes the waters and submerged and emergent lands around Wake Island to the seaward limit of the U.S. EEZ.

(b) *Howland and Baker Islands.* The Howland and Baker Islands units of the Monument include the waters and submerged and emergent lands around Howland and Baker Islands within an area defined by straight lines connecting the following coordinates in the order listed:

ID	W. long.	Lat.
1	177°27′7″	1°39′15″ N.
2	175°38′32″	1°39′15″ N.
3	175°38′32″	0°38′33″ S.
4	177°27′7″	0°38′33″ S.
1	177°27′7″	1°39′15″ N.

(c) *Jarvis Island.* The Jarvis Island unit of the Monument includes the waters and submerged and emergent lands around Jarvis Island to the seaward limit of the U.S. EEZ.

(d) *Johnston Atoll.* The Johnston Atoll unit of the Monument includes the waters and submerged and emergent lands around Johnston Atoll to the seaward limit of the U.S. EEZ.

(e) *Kingman Reef and Palmyra Atoll.* The Kingman Reef and Palmyra Atoll units of the Monument include the waters and submerged and emergent lands around Kingman Reef and Palmyra Atoll within an area defined by straight lines connecting the following coordinates in the order listed:

ID	W. long.	N. lat.
1	163°11′16″	7°14′38″

2	161°12′3″	7°14′38″
3	161°12′3″	5°20′23″
4	161°25′22″	5°1′34″
5	163°11′16″	5°1′34″
1	163°11′16″	7°14′38″

[78 FR 33003, June 3, 2013, as amended at 80 FR 15695, Mar. 25, 2015]

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§665.932 Definitions.

The following definitions are used in this subpart:

Management unit species or MUS means the Pacific Remote Island Areas management unit species as defined in §§665.601, 665.621, 665.641, and 665.661, and the pelagic management unit species as defined in §665.800.

Monument means the waters and submerged and emergent lands of the Pacific Remote Islands Marine National Monument and the Pacific Remote Islands Marine National Monument Expansion, as defined in §665.931.

Proclamations means Presidential Proclamation 8336 of January 6, 2009, "Establishment of the Pacific Remote Islands Marine National Monument," and Presidential Proclamation 9173 of September 29, 2014, "Pacific Remote Islands Marine National Monument Expansion."

[78 FR 33003, June 3, 2013, as amended at 80 FR 15695, Mar. 25, 2015]

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§665.933 Prohibitions.

In addition to the general prohibitions specified in §600.725 of this chapter, and §665.15 and subparts E and F of this part, the following activities are prohibited in the Monument and, thus, unlawful for a person to conduct or cause to be conducted.

(a) Commercial fishing in the Monument.

(b) Non-commercial fishing in the Monument, except as authorized under permit and pursuant to the procedures and criteria established in §665.935.

(c) Transferring a permit in violation of §665.935(d).

(d) Commercial fishing outside the Monument and non-commercial fishing within the Monument on the same trip in violation of §665.934(c).

(e) Non-commercial fishing within 12 nm of emergent land within the Monument, unless authorized by the U.S. Fish & Wildlife Service, in consultation with NMFS and the Council, in violation of §665.934(d). For the purposes of this subsection, consultation means that the U.S. Fish & Wildlife Service will consult with NMFS, which in turn will consult with the Council.

[78 FR 33003, June 3, 2013, as amended at 78 FR 39583, July 2, 2013]

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§665.934 Regulated activities.

(a) Commercial fishing is prohibited in the Monument.

(b) Non-commercial fishing is prohibited in the Monument, except under permit and pursuant to the procedures and criteria established in §665.935 or pursuant to §665.934(d).

(c) Commercial fishing outside the Monument and non-commercial fishing within the Monument during the same trip is prohibited.

(d) Non-commercial fishing is prohibited within 12 nm of emergent land within the Monument, unless authorized by the U.S. Fish & Wildlife Service, in consultation with NMFS and the Council. For the purposes of this subsection, consultation means that the U.S. Fish & Wildlife Service will consult with NMFS, which in turn will consult with the Council.

[78 FR 33003, June 3, 2013, as amended at 78 FR 39583, July 2, 2013]

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§665.935 Fishing permit procedures and criteria.

(a) *Non-commercial fishing*—(1) *Applicability.* Except as provided in section 665.934(d), a vessel that is used to non-commercially fish for, take, retain, or possess MUS in the Monument must be registered for use with a permit issued pursuant to §§665.603, 665.624, 665.642, 665.662, 665.801(f), or 665.801(g).

(2) *Terms and conditions.* Customary exchange of fish harvested in the Monument is prohibited.

(b) *Pacific Remote Islands Monument recreational charter permit*—(1) *Applicability.* Except as provided in §665.934(d), both the owner and operator of a vessel that is chartered to recreationally fish for, take, retain, or possess MUS in the Monument must have a permit issued under this section, and the permit must be registered for use with that vessel. Charter boat customers are not required to obtain a permit.

(2) *Terms and conditions.* (i) The sale or exchange through barter or trade of fish caught by a charter boat fishing in the Monument is prohibited.

(ii) Customary exchange of fish harvested under a Monument recreational charter permit is prohibited.

(c) *Application.* An application for a permit required under this section must be submitted to PIRO as described in §665.13.

(d) *Transfer.* A permit issued under this section is not transferrable.

(e) *Reporting and recordkeeping.* The operator of a vessel subject to the requirements of this section must comply with the terms and conditions described in §665.14.

[78 FR 33003, June 3, 2013, as amended at 78 FR 39583, July 2, 2013]

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§665.936 International law.

The regulations in this subpart shall be applied in accordance with international law. No restrictions shall apply to or be enforced against a person who is not a citizen, national, or resident alien of the United States (including foreign flag vessels) unless in accordance with international law.

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Subpart I—Rose Atoll Marine National Monument

SOURCE: 78 FR 33003, June 3, 2013, unless otherwise noted.

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§665.960 Scope and purpose.

The regulations in this subpart codify certain provisions of the Proclamation, and govern the administration of fishing within the Monument. Nothing in this subpart shall be deemed to diminish or enlarge the jurisdiction of the Territory of American Samoa.

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§665.961 Boundaries.

The Monument consists of emergent and submerged lands and waters extending seaward approximately 50 nm from Rose Atoll. The boundary is defined by straight lines connecting the following coordinates in the order listed:

ID	W. long.	S. lat.
1	169°0′42″	13°41′54″
2	167°17′0″	13°41′54″
3	167°17′0″	15°23′10″
4	169°0′42″	15°23′10″
1	169°0′42″	13°41′54″

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§665.962 Definitions.

The following definitions are used in this subpart:

Management Unit Species or MUS means the American Samoa management unit species as defined in §§665.401, 665.421, 665.441, and 665.461, and the pelagic management unit species as defined in §665.800.

Monument means the waters and emergent and submerged lands of the Rose Atoll Marine National Monument, as defined in §665.961.

Proclamation means Presidential Proclamation 8337 of January 6, 2009, "Establishment of the Rose Atoll Marine National Monument."

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§665.963 Prohibitions.

In addition to the general prohibitions specified in §600.725 of this chapter, and §665.15 and subpart B of this part, the following activities are prohibited in the Monument and, thus, unlawful for a person to conduct or cause to be conducted.

(a) Commercial fishing in the Monument.

(b) Non-commercial fishing in the Monument, except as authorized under permit and pursuant to the procedures and criteria established in §665.965.

(c) Transferring a permit in violation of §665.965(d).

(d) Commercial fishing outside the Monument and non-commercial fishing within the Monument on the same trip in violation of §665.964(c).

(e) Fishing within 12 nm of emergent land within the Monument in violation of §665.964(d).

[78 FR 33003, June 3, 2013, as amended at 78 FR 39583, July 2, 2013]

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§665.964 Regulated activities.

(a) Commercial fishing is prohibited in the Monument.

(b) Non-commercial fishing is prohibited in the Monument, except as authorized under permit and pursuant to the procedures and criteria established in §665.965.

(c) Commercial fishing outside the Monument and non-commercial fishing within the Monument during the same trip is prohibited.

(d) All fishing is prohibited within 12 nm of emergent land within the Monument.

[78 FR 33003, June 3, 2013, as amended at 78 FR 39583, July 2, 2013]

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§665.965 Fishing permit procedures and criteria.

(a) *Rose Atoll Monument non-commercial fishing permit*—(1) *Applicability.* Both the owner and operator of a vessel used to non-commercially fish for, take, retain, or possess MUS in the Monument must have a permit issued under this section, and the permit must be registered for use with that vessel.

(2) *Eligibility criteria.* A permit issued under this section may be issued only to a community resident of American Samoa.

(3) *Terms and conditions.* (i) Customary exchange of fish harvested under a non-commercial permit within the Monument is allowed, except that customary exchange by fishermen engaged in recreational fishing is prohibited.

(ii) Monetary reimbursement under customary exchange shall not exceed actual fishing trip expenses, including but not limited to ice, bait, fuel, or food.

(b) *Rose Atoll Monument recreational charter permit* — (1) *Applicability.* Both the owner and operator of a vessel that is chartered to fish recreationally for, take, retain, or possess MUS in the Monument must have a permit issued under this section, and the permit must be registered for use with that vessel. Charter boat customers are not required to obtain a permit.

(2) *Permit eligibility criteria.* To be eligible for a permit issued under this section, a charter business must be established legally under the laws of American Samoa.

(3) *Terms and conditions.* (i) The sale or exchange through barter or trade of fish caught by a charter boat fishing in the Monument is prohibited.

(ii) No MUS harvested under a recreational charter fishing permit may be used for the purposes of customary exchange.

(c) *Application.* An application for a permit required under this section must be submitted to PIRO as described in §665.13.

(d) *Transfer.* A permit issued under this section is not transferrable.

(e) *Reporting and recordkeeping.* The operator of a vessel subject to the requirements of this section must comply with the terms and conditions described in §665.14.

[78 FR 33003, June 3, 2013, as amended at 78 FR 39583, July 2, 2013]

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§665.966 International law.

The regulations in this subpart shall be applied in accordance with international law. No restrictions shall apply to or be enforced against a person who is not a citizen, national, or resident alien of the United States (including foreign flag vessels) unless in accordance with international law.

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Figure 1 to Part 665—Carapace Length of Lobsters

FIGURE 1 TO PART 665. CARAPACE LENGTH OF LOBSTERS

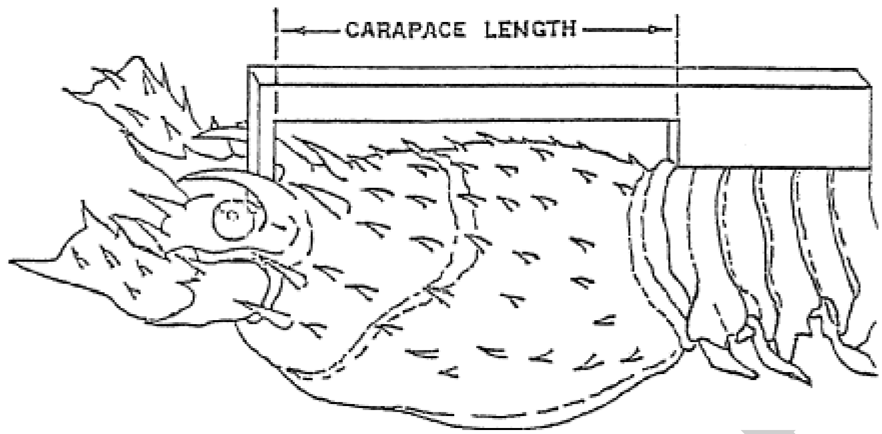

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Figure 2 to Part 665—Length of Fishing Vessels

FIGURE 2 TO PART 665. LENGTH OF FISHING VESSELS

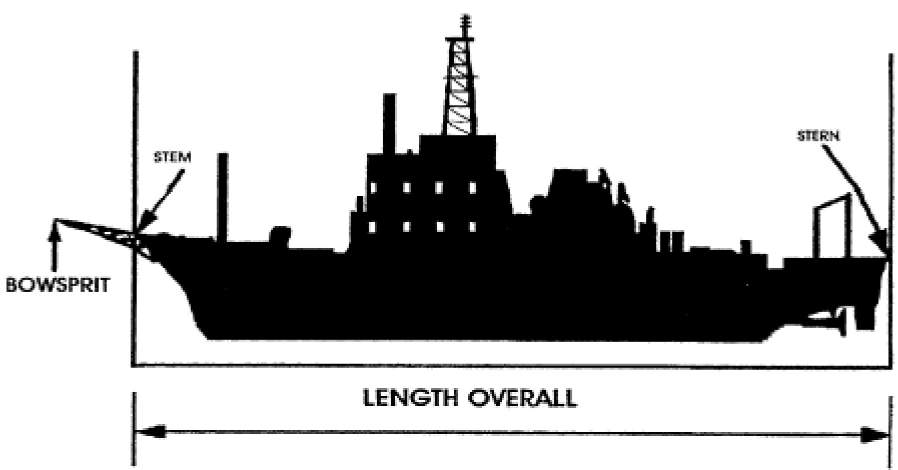

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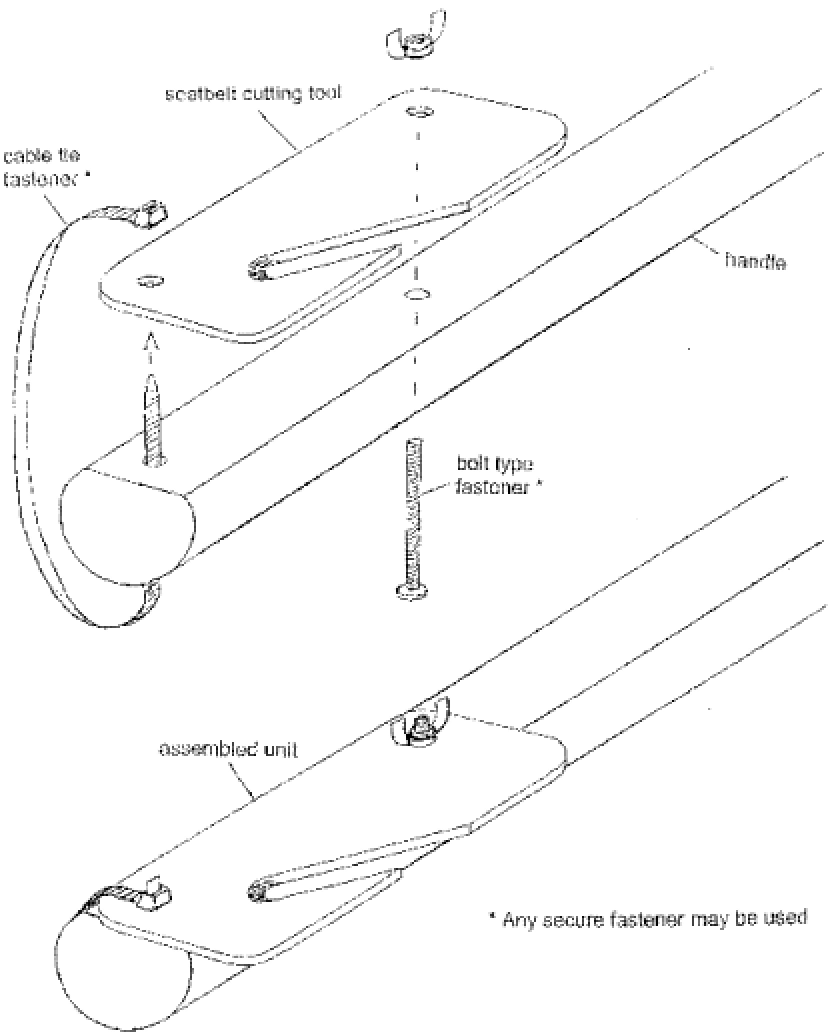
Figure 3 to Part 665—Sample Fabricated Arceneaux Line Clipper

FIGURE 3 TO PART 665. SAMPLE FABRICATED ARCENEAUX LINE CLIPPER



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Appendix D: Summary of Fishery Management Plan and Fishery Ecosystem Plan Amendments

1. Fishery Management Plan Amendments

FMP for Precious Corals of the Western Pacific Region

The fishery management plan (FMP) for Precious Coral Fisheries of the Western Pacific Region was implemented in September 1983 (48 FR 39229, September 29, 1983) and established the plan's management unit species, management areas and classified several known precious coral beds. Since 1983, the FMP has been amended seven times with each amendment summarized in **Table** 1.

Table 1. Amendments to the Precious Coral FMP

No.	Effective Date/Federal Register Notice	Action
7	8/13/08 73 FR 47098	Designated the Auau Channel bed as an established bed with a harvest quota for black coral of 5,000 kg every two years for Federal and state waters combined. Implemented a five year gold harvest moratorium for the entire region.
6	9/12/06 71 FR 53605	Included Federal waters around CNMI and the Pacific Remote Island Areas within the FMP's management area. Extended existing requirements for Federal permits and logbooks to include all harvests of precious corals in EEZ waters in these areas.
5	2/24/04 69 FR 8336	Prepared in parallel with the Coral Reef FMP. Prohibits the harvest of Precious Coral Management Unit Species in the no-take marine protected areas established under the Coral Reef FMP, including areas around Rose Atoll in American Samoa, Kingman Reef, Jarvis Island, Howland Island, and Baker Island.
4	4/19/99 64 FR 19067 8/5/03 56 FR 14866	Addressed new requirements under the 1996 Sustainable Fisheries Act (SFA). Portions of the amendment that were immediately approved included designations of essential fish habitat, definitions of overfishing and descriptions of bycatch and of some fishing communities. Those provisions became effective on February 3, 1999. Remaining provisions regarding Hawaii fishing communities became effective August 5, 2003.
3	10/19/98 63 FR 55809	Established a framework procedure for adjusting management measures in the fishery.
2	1/28/91 56 FR 3072	Defined overfishing for Established beds as: an Established bed shall be deemed overfished with respect to recruitment when the total spawning biomass (all species combined) has been reduced to 20% of its unfished condition. This definition applies to all species of precious corals and is based on cohort analysis of the pink coral, *Corallium secundum*.
1	7/21/88	Applied the management measures of the FMP to the Pacific

No.	Effective Date/Federal Register Notice	Action
	50 FR 27519	Remote Island Areas by incorporating them into a single Exploratory Permit Area, expanded the management unit species to include all species of the genus *Corallium*, and outlined provisions for the issuance of experimental fishing permits designed to stimulate the domestic fishery

In addition to FMP amendments, the management program for precious coral fisheries has been modified through several regulatory amendments and framework actions as described below.

Regulatory Amendment 1: Removed an exemption allowing fishermen who reported black coral harvest to the State of Hawaii within five years prior to April 17, 2002 to harvest black coral at a minimum base diameter of 3/4 inch. All harvest of black corals must be done at a minimum of 1 inch base diameter or 48 inch minimum height (72 FR 59259, October 15, 2007).

Framework Action 1: Revised the definitions of "live coral" and "dead coral," suspended the harvest of gold coral at Makapu'u Bed, applied minimum size restrictions only to live precious corals, prohibited the harvest of black coral with a stem diameter of less than one inch or a height of less than 48 inches (with certain exceptions), prohibited the use of non-selective fishing gear to harvest precious corals, and applied the minimum size restrictions for pink coral to all permit areas (67 FR 11941, April 17, 2002).

FMP for Crustacean Fisheries of the Western Pacific Region

The FMP for Crustacean Fisheries of the Western Pacific Region was approved in 1983. Initial provisions of the FMP, which was initially named "Spiny Lobster Fisheries of the Western Pacific Region," went into effect March 9, 1983 (48 FR 5560, 7 February 1983). The FMP implemented the following management measures for the Northwestern Hawaiian Islands (NWHI) management area: federal permit requirements, a minimum size limit for spiny lobsters, gear restrictions, a ban on the harvest of egg-bearing female spiny lobsters, the closure of waters within 20 nm of Laysan Island, all NWHI waters shallower than 10 fm, and all NWHI lagoons, to fishing for spiny lobsters, a mandatory logbook program, and a requirement to carry a fishery observer if directed by the National Marine Fisheries Service. The FMP also implemented permit, data reporting, and observer requirements within EEZ waters around the Main Hawaiian Islands (MHI), American Samoa, and Guam. Since 1983, the Crustacean FMP has been amended 13 times with each amendment summarized in **Table** 2.

Table 2. Amendments to the Crustaceans FMP

No.	Effective Date/Federal Register Notice	Action
13	11/21/08 73 FR 70603	Included the deepwater shrimp genus *Heterocarpus* as Management Unit Species (MUS) within the Crustaceans FMP. Required Federal permits and reporting for deepwater shrimp fishing in all Federal waters of the Western Pacific Region.

No.	Effective Date/Federal Register Notice	Action
12	10/26/06 71 FR 53605	Included federal waters around CNMI and the Pacific Remote Island Areas in the Crustaceans FMP and implemented federal permit and reporting requirements (71 FR 231) for vessels targeting crustacean MUS in these areas.
11	2/24/04 69 FR 8336	Prepared in parallel with the Coral Reef Ecosystems FMP. This amendment prohibits the harvest of Crustacean MUS in the no-take marine protected areas established under the Coral Reef Ecosystems FMP, including Rose Atoll in American Samoa, Kingman Reef, Jarvis Island, Howland Island, and Baker Island. The final rule implementing the Coral Reef Ecosystem FMP (including Amendment 11 to the Crustaceans FMP) became effective 3/25/04.
10	4/19/99 64 FR 19067 8/5/03 68 FR 46112	Addressed new requirements under the 1996 Sustainable Fisheries Act. Portions of the amendment that were immediately approved included designations of essential fish habitat, and descriptions of bycatch and of some fishing communities. Those provisions became effective on February 3, 1999. Remaining portions approved on August 5, 2003, included provisions regarding Hawaii fishing communities, overfishing definitions, and bycatch.
9	7/5/96 61 FR 35145	Established a system by which the annual harvest guideline would be set based on a constant percent of the population (i.e., proportional to the estimated exploitable population size) based on a specified acceptable risk of overfishing. Amendment 9 set this risk level at 10% and specified that annual harvest guidelines be published by NMFS no later than February 28 of each year. Earlier in-season adjustment procedures were eliminated. Earlier minimum size limits and prohibitions on harvesting of egg bearing females were eliminated and a mechanism was provided for certain regulatory adjustments to be made through framework procedures of the FMP.
8	11/10/94 59 FR 56004	Eliminated the NWHI minimum landings requirements for permit renewal, allowed the catch per unit effort target that is used to set the harvest guideline to be changed through the framework process, and modified reporting requirements
7	3/26/92 57 FR 10437	Established a NWHI limited access program, an adjustable fleet-wide NWHI annual harvest guideline, and a closed season (January through June) in the NWHI fishery. Participation was limited to 15 permits (and vessels). Other measures include a maximum limit on the number of traps per vessel (1,100), revisions to reporting requirements, and other provisions
6	1/28/91 56 FR 3071	Defined recruitment overfishing for lobster stocks in terms of reference points expressed in terms of the spawning potential ratio (SPR). The minimum SPR threshold, below which the stock would be considered recruitment overfished, is 20%.

No.	Effective Date/Federal Register Notice	Action
5	1987	Implemented a minimum size for slipper lobster (5.6 cm tail width), required the release of egg-bearing female slipper lobsters, required escape vents in all lobster traps, and revised some of the permit application and reporting requirements. It also changed the name of the FMP from “Spiny Lobster Fisheries” to “Crustaceans Fisheries.”
4	1986	Applied existing NWHI closed areas to slipper lobsters.
3	1985	Revised the minimum spiny lobster size specifications for the NWHI management area to a limit on tail width (5.0 cm).
2	1983	Modified the allowable trap opening dimensions with the intent of minimizing the risk of harm to the Hawaiian monk seal while allowing sufficient flexibility in trap design.
1	1983	Adopted the State of Hawaii’s lobster fishing regulations for the federal waters around the MHI.

In addition to FMP amendments, the management program for crustacean fisheries has been modified through several regulatory amendments described below.

Regulatory Amendment 1: Implemented VMS for the crustacean fishery in the NWHI (64 FR 36820, July 8, 1999).

Regulatory Amendment 2: Allocated 1998 NWHI lobster harvest among three individual banks and a fourth combined area (63 FR 40337, June 29, 1998).

Regulatory Amendment 3: Divided the NWHI into four fishing grounds across which harvest is allocated and allowed fishing vessels with NMFS-certified VMS to transit through fishing grounds during a closure (64 FR 36820, July 8, 1999).

FMP for Bottomfish and Seamount Groundfish of the Western Pacific Region

The FMP for Bottomfish and Seamount Groundfish Fisheries of the Western Pacific Region became effective on August 27, 1986 (51 FR 27413). Initial bottomfish fishery management measures prohibited certain destructive fishing techniques, including explosives, poisons, trawl nets, and bottom-set gillnets; established a moratorium on the commercial harvest of seamount groundfish stocks at the Hancock Seamounts, and implemented a permit system for fishing for bottomfish in the waters of the Exclusive Economic Zone (EEZ) around the Northwestern Hawaiian Islands (NWHI). The plan also established a management framework that provided for regulatory adjustments to be made, such as catch limits, size limits, area or seasonal closures, fishing effort limitations, fishing gear restrictions, access limitations, permit and/or catch reporting requirements, as well as a rules-related notice system. Since 1986, the Bottomfish and Seamount Groudfish FMP has been amended multiple times with each amendment summarized in **Tabl**e 3.

Table 3. Amendments to the Bottomfish and Seamount Groundfish FMP.

No.	Effective Date/Federal Register Notice	Action
14	4/04/08 73 FR 18450	Addressed bottomfish overfishing in the Hawaiian Archipelago by implementing a total allowable catch limit (TAC), federal non-commercial permits and reporting requirements, non-commercial bag limits and a closed season for fishing for Deep 7 species in the Main Hawaiian Islands. It also defined the Main Hawaiian Islands bottomfish fishing year as September 1-August 31, and became effective April 1, 2008 (73 FR 18450) with the permit and reporting requirements effective as of August 18, 2008 (73 FR 41296).
11-13		Amendments 11-13 were intended to address various issues which have now become moot due to changing circumstances.
10	12/12/08 73 FR 75615	Prohibited commercial fishing for bottomfish from vessels greater than 40' long in waters 0-10 miles around the Southern Islands of CNMI and 0-10 miles around the Northern Island of Alamagan. Commercial bottomfishing vessels over 40' long must carry active VMS units owned, installed, and maintained by NMFS. Also, the operators of all vessels commercially fishing for bottomfish in EEZ waters around CNMI must obtain federal permits and complete federal logbooks.
9	11/02/06 71 FR 67774	Prohibited vessels greater than 50' long from targeting Bottomfish species within 50 miles of Guam and required these vessels to obtain federal permits and to submit federal logbooks effective December 4, 2006 (71 FR 69496).
8	9/12/06 71 FR 53605	Included federal waters around CNMI and the Pacific Remote Island Areas in the Bottomfish FMP. Implemented federal permitting and reporting requirements for bottomfish fishing in the PRIA effective 1/2/07 (71 FR 69496).
7	2/24/04 69 FR 8336	Developed in parallel with the Coral Reef Ecosystems FMP. Prohibited harvest of Bottomfish and Seamount Groundfish Management Unit Species (MUS) in the no-take marine protected areas established under the Coral Reef Ecosystems FMP. The Coral Reef Ecosystems established such areas around Rose Atoll in American Samoa, Kingman Reef, Jarvis Island, Howland Island, and Baker Island. The final rule implementing the Coral Reef Ecosystem FMP (including Amendment 7 to the Bottomfish FMP) became effective 3/25/04.
6	4/19/99 64 FR19067 8/5/03 68 FR 46112	Addressed new requirements under the 1996 Sustainable Fisheries Act. Portions of the amendment that were immediately approved included designations of essential fish habitat, and descriptions of bycatch and of some fishing communities. Those provisions became effective on 2/3/99. Remaining portions approved on 8/5/03, included provisions regarding Hawaii fishing communities, overfishing definitions, and bycatch.
5	4/28/99	Established a limited entry program for the Mau Zone in the NWHI

No.	Effective Date/Federal Register Notice	Action
	64 FR 22810	with non-transferable permits and landing requirements for permit renewal. Included in requirements was attendance by the primary vessel operator at a protected species workshop. Also reserved 20% of Mau Zone permits a Western Pacific Community Development Program (CDP), as well as instituting a maximum vessel length of 60' for replacement vessels in the Hoomalu or Mau Zones
4	5/30/91 56 FR 24351	Implemented a requirement for vessel owners or operators to notify NMFS at least 72 hours before leaving port if they intend to fish in a “protected species study zone” that extends 50 nautical miles (nm) around the NWHI to allow federal observers to be placed on board bottomfish vessels to record interactions with protected species if this action is deemed necessary
3	1/16/91 56 FR 2503	Defined recruitment overfishing as a condition in which the ratio of the spawning stock biomass per recruit at the current level of fishing to the spawning stock biomass per recruit that would occur in the absence of fishing is equal to or less than 20%. Amendment 3 also delineated a process by which overfishing would be monitored and evaluated.
2	9/6/88 53 FR 29907	Divided the EEZ around the NWHI into the Hoomalu and Mau zones. A vessel limited access system was established for the Ho’omalu Zone, with non-transferable permits and landing requirements for permit renewal and for new entry into the fishery. Access to the Mau Zone was left unrestricted, except for vessels permitted to fish in the Hoomalu Zone.
1	11/11/87 52 FR 38102	Established a system to allow implementation of limited access systems for bottomfish fisheries in EEZ waters around American Samoa and Guam within the framework measures of the FMP.

FMP for Pelagic Fisheries of the Western Pacific Region

The FMP for Pelagic Fisheries of the Western Pacific Region became effective on March 23, 1987 (52 FR 5987). The Pelagic Management Unit Species (PMUS) at that time were billfish, wahoo, mahimahi, and oceanic sharks. The FMP’s first measures prohibited drift gillnet fishing within the region’s waters of the U.S. EEZ and prohibited foreign longline fishing within certain areas of the EEZ. Since 1987, the Pelagic FMP has been amended multiple times with each amendment summarized in **Table** 4.

Table 4. Amendments to the Pelagic FMP.

No.	Effective Date/Federal Register Notice	Action

No.	Effective Date/Federal Register Notice	Action
18	12/10/09 74 FR 65460	Removed 2,120 set limit for Hawaii-based shallow-set longline fishery. Implemented a new loggerhead sea turtle hard cap of 46 annual interactions.
16-17		Was intended to address issues which have now become moot due to changing circumstances.
15	11/21/08 73 FR 70600	Added the following pelagic squid species to the FMP: *Ommastrephes bartramii*, *Thysanoteuthis rhombus*, and *Sthenoteuthis oualaniensis*. Also, required owners of U.S. vessels greater than 50 ft in length overall that fish for pelagic squid in U.S. EEZ of the western Pacific to obtain Federal permits under the Pelagics Fishery Management Plan, to carry Federal observers if requested by NMFS, and to report any Pacific pelagic squid catch and effort either in Federal logbooks or via existing local reporting systems.
14	6/18/07 72 FR 33442	Partially approved by NMFS. This amendment contained recommendations regarding international and domestic management, including a mechanism by which the Council could participate in international negotiations regarding these stocks. Amendment 14 contained measures to implement control dates for Hawaii's non-longline commercial pelagic vessels (70 FR 47781) and purse seine and longline vessels (70 FR 47782), as well as requirements for federal permits and reporting for Hawaii-based non-longline commercial pelagic vessels. NMFS disapproved the Amendment's international measures as premature. NMFS disapproved the domestic permit and reporting requirements as duplicative of existing State requirements. NMFS noted that Amendment 14 met the requirements of the Magnuson-Act regarding overfishing.
12-13		Was intended to address issues which have now become moot due to changing circumstances.
11	5/24/05 70 FR 29646	Effective August 1, 2005, Amendment 11 established a limited access system for pelagic longlining in EEZ waters around American Samoa. Longline vessel operators were required to obtain federal permits, to complete federal logbooks, to carry and use vessel monitoring systems installed, owned and operated by NFMS on vessels greater than 40 ft in length, to carry federal observers if requested by NMFS, and to follow sea turtle handling and resuscitation requirements.
10	2/24/04 69 FR 8336	Amendment 10 prohibits the harvest of Pelagic Management Unit Species in the no-take marine protected areas established under the Coral Reef Ecosystems FMP. The Coral Reef FMP establishes such areas around Rose Atoll in American Samoa, Kingman Reef, Jarvis Island, Howland Island, and Baker Island. The final rule implementing the Coral Reef Ecosystem FMP includes Amendment

No.	Effective Date/Federal Register Notice	Action
		10 to the Pelagics FMP.
9		Was intended to address issues which have now become moot due to changing circumstances.
8	4/19/99 64 FR 19067 8/5/03 68 FR 46112	Addressed new requirements under the 1996 Sustainable Fisheries Act. Portions of the amendment that were immediately approved (4/19/99) included designations of essential fish habitat and descriptions of some fishing communities. Remaining portions were provisions regarding Hawaii fishing communities, overfishing definitions, and bycatch (approved 8/5/03).
7	5/24/94 59 FR 26979	Replaced Amendment 4 moratorium with a limited entry program for Hawaii-based domestic longline fishery with transferable permits, a limit of 164 vessels, and a maximum vessel size of 101' in length overall. It also established a framework procedure for use with implementation of certain new regulations.
6	11/2/92 57 FR 36637	Specified that all tuna species are designated as fish under U.S. management authority and included tunas and related species as Pelagic Management Unit Species under the FMP. It also applied the longline exclusion zones of 50 nm around the island of Guam and the 25-75 nm zone around the MHI to foreign vessels.
5	3/2/92 57 FR 7661	Created a domestic longline vessel exclusion zone around the Main Hawaiian Islands (MHI) ranging from 50 to 75 nm, and a similar 50 nm exclusion zone around Guam and its offshore banks. A seasonal reduction in the size of the closure was implemented in October 1992; between October and January longline fishing is prohibited within 25 nm of the windward shores of all Main Hawaiian Islands except Oahu, where it is prohibited within 50 nm from the shore.
4	10/14/91 56 FR 52214	Created a 50 nm longline exclusion zone around the NWHI to protect endangered Hawaiian monk seals. It also implemented framework provisions for establishing a mandatory observer program to collect information on interactions between longline fishing and sea turtles.
3	10/14/91 56 FR 52214	Created a 50 nm longline exclusion zone around the NWHI to protect endangered Hawaiian monk seals. It also implemented framework provisions for establishing a mandatory observer program to collect information on interactions between longline fishing and sea turtles.
2	5/26/91 56 FR 24731	Implemented requirements for domestic pelagic longline fishing and transhipment vessel operators to have Federal permits, maintain Federal fishing logbooks, and, if fishing within 50 nm of the Northwestern Hawaiian Islands, to have observers on board if directed by NMFS. It required longline gear to be marked with the official number of the permitted vessel, and incorporated waters of the EEZ around CNMI into the area managed under the FMP.

No.	Effective Date/Federal Register Notice	Action
1	3/1/91 56 FR 9686	Defined recruitment overfishing for each PMUS. Defined the optimum yield for PMUS.

In addition to FMP amendments, the management program for pelagic fisheries has been modified through several regulatory amendments and framework actions described below.

Regulatory Amendment 1: Incorporated reasonable and prudent alternative of the March 2001 Biological Opinion issued by NMFS. This amendment prohibited shallow set pelagic longlining north of the equator and closed waters between 0° and 15° N from April-May annually to longline fishing. It instituted sea turtle handling requirements for all vessels using hooks to target pelagic species in the region's EEZ waters and extended the protected species workshop requirement to include the operators of vessels registered to longline general permits (67 FR 40232, July 12, 2002**)**.

Regulatory Amendment 2: Established Federal permit and reporting requirements for any vessel using troll or handline gear to catch PMUS in EEZ waters around the Pacific Remote Island Areas of Kingman Reef, Howland, Baker, Jarvis, Johnston and Wake Islands, and Palmyra and Midway Atolls (67 FR 59813, October 24, 2002-comment period end)

Regulatory Amendment 3: Implemented measures for the longline fisheries to achieve optimum yield while not jeopardizing the long term existence of sea turtles and other listed species. The amendment established a limited Hawaii-based shallow-set swordfish fishery using circle hooks with mackerel bait. Fishing effort in the shallow-set swordfish fishery was limited to 50% of the 1994-1999 annual average number of sets (just over 2,100 sets) allocated between fishermen applying to participate in the fishery. A 'hard' limit on the number of leatherback (16) and loggerhead (17) turtle interactions that could occur in the swordfish fishery was implemented; the fishery closed for the remainder of the calendar year if either limit was reached. The amendment re-implemented earlier sea turtle handling and resuscitation requirements and included conservation projects to protect sea turtles in their nesting and coastal habitats. This rule implemented the requirement for night setting imposed by the USFWS Biological Opinion on Hawaii-based longline vessels targeting swordfish north of 23 degrees north latitude (69 FR 17329, April 2, 2004**)**.

Regulatory Amendment 4: Included measures to minimize turtle interactions by non-Hawaii based domestic longline vessels operating in the Western Pacific under general longline permits. Vessels with longline general permits making shallow sets north of the equator were required to use 18/0 circle hooks with mackerel-type bait and dehookers to release any accidentally caught turtles. The amendment required vessel operators and owners with general longline permits to annually attend protected species training workshops. Operators of vessels with general longline permits were required to carry and use specific mitigation gear to aid release of sea turtles accidentally hooked or entangled by longlines. This amendment required operators of non-longline pelagic vessels (e.g. trollers and handliners) to follow handling guidelines and remove trailing gear wherever they fish (70 FR 69282, December 15, 2005).

Regulatory Amendment 5: Allowed operators of Hawaii-based longline vessels fishing north of 23 degrees north latitude, as well as those targeting swordfish south of 23 degrees north, to utilize side-setting to reduce seabird interactions in lieu of the seabird mitigation measures required by Framework Measure 1 (70 FR 75075, January 18,, 2005).

Regulatory Amendment 6: Removed the seven day delay in effectiveness when closing the Hawaii based shallow-set longline fishery as a result of reaching interaction limits for sea turtles, allowing instead for an immediate closure of the fishery (72 FR 8289, February 26, 2007).

Regulatory Amendment 7: Provided pelagic fishery participants the option of using NMFS approved electronic logbooks in lieu of paper logbooks (72 FR 19123, April 16, 2007)

Framework Amendment 1: Prohibited fishing for pelagic species by vessels greater than 50 ft in length overall within EEZ waters 0-50 nm around the islands of American Samoa. Exception: vessels that landed PMUS in American Samoa under a Federal longline general permit prior to November 13, 1997 (67 FR 4369, January 30, 2002)

Framework Amendment 2: Incorporated terms and conditions developed by the Council and contained in the November 28, 2000 USFWS seabird Biological Opinion requiring Hawaii-based pelagic longline vessel operators to use blue-dyed bait, strategic offal discards, and line shooters with weighted branch lines when fishing north of 23° N. Also included requirement that all Hawaii-based longline vessel owners and operators annually attend a protected species workshop conducted by NMFS (67 FR 34408, June 13,, 2002)

FMP for Coral Reef Ecosystem Fisheries of the Western Pacific Region

The FMP for Coral Reef Ecosystems of the Western Pacific Region was partially approved on June 14, 2002. NMFS disapproved a portion of the plan that governs fishing in the Northwestern Hawaiian Islands (NWHI) west of 160°50' W. long. because it would be inconsistent with or duplicate certain provisions of Executive Orders 13178 and 13196, which together established the NWHI Coral Reef Ecosystem Reserve. A final rule implementing the Coral Reef Ecosystem FMP was published on February 24, 2004 (69 FR 8336). The FMP is the nation's first ecosystem-based plan for fisheries and includes specific measures to promote sustainable fisheries while providing for substantial protection of coral reef ecosystem resources and habitats throughout the Council's jurisdiction. The management measures of the Coral Reef Ecosystems FMP:

- Established a network of marine protected areas (MPA) in the Pacific Remote Island Areas (PRIA). Howland, Baker, Jarvis Islands, Rose Atoll, and Kingman Reef have been designated as no-take MPAs. Palmyra and Johnston Atolls, and Wake Islands are designated as low-use MPAs where fishing is allowed under special fishing permits. Both no-take and low-use MPAs were proposed for the NWHI in the FMP, but were disapproved by NMFS;
- Requires a special permit and federal reporting system for controlling and monitoring the harvest of certain coral reef ecosystem management unit species (MUS) for which there is little or no information. Special permits are also required to fish in all areas designated as low-use MPAs. The FMP also uses data collected under existing local reporting systems to monitor the harvest of currently fished coral reef ecosystem MUS;
- Prohibits the use of destructive and non-selective fishing gears;

- Prohibits harvesting of coral and live rock, but allow limited take under the special permit system for collection of seed stock by aquaculture operations, and religious/cultural use by indigenous peoples;
- Incorporates an adaptive management approach using a framework process for rapid regulatory modifications in the event of major changes within coral reef ecosystems or coral reef fisheries;
- Considers and take into account in management, the historical and cultural dependence of coral reef resources by indigenous people and;
- Identifies and prioritize coral reef related research needs for each island area, including socio-economic and cultural research for future potential allocation of resources.

Since its implementation in 2004, the Coral Reef FMP has not been amended.

2. Fishery Ecosystem Plan Amendments

Omnibus Amendment: Community Development Program Process, 9/3/10
The Council amended all FEPs to establish eligibility requirements and procedures for reviewing and approving community development plans. The intent is to promote participation of island communities in fisheries that they traditionally depend on, but may not have the capabilities to support continued and substantial participation. A second final rule was published 11/05/10 in which OMB approved the collection-of-information requirements (75 FR 68199).

Omnibus Amendment: Establish a Western Pacific Region Process for Specifying Annual Catch Limits and Accountability Measures, 6/27/11
The Council amended all FEPs to establish the mechanism the Council will use to specify ACLs and AMs for each FEP fishery. Specifically, the proposed action described in this document consists of three components that would: 1) in each FEP, establish a mechanism the Council will use to determine ACLs and AMs , including a process for setting acceptable biological catch limits (ABCs); 2) adopt the ecosystem component (EC) species classification described in the NMFS advisory guidelines for National Standard 1 (NS1) so the Council can develop specific criteria for identifying EC species in subsequent amendments to the FEPs; and 3) identify pelagic management unit species that have statutory exceptions to the ACL and AM requirements.

Amendment to the Pacific Pelagic, American Samoa, Mariana, and Pacific Remote Island Area FEPs: Fishery Management in the Marianas Trench, Pacific Remote Islands, and Rose Atoll Marine National Monuments,

The Council amended the Pacific Pelagics, American Samoa, Pacific Remote Island Areas, and the Mariana Islands FEPs, to establish certain provisions relating to non-commercial fishing practices. Consistent with the monument Proclamations, the amendments:

- Codified the boundaries of the Monuments and their various management units.
- Implemented the prohibition on commercial fishing at Rose Atoll and PRI Monuments, and in the Islands Unit of the Marianas Trench Monument.

- Established management measures for non-commercial and recreational fishing in the Monuments including, but not limited to:
  - Requiring Federal permits and reporting for non-commercial and recreational charter fishing to aid in the monitoring of fishing activities.
  - Limiting fishing permit eligibility to residents and businesses of local fishing communities in the Rose Atoll Monument and Marianas Trench Monument, Islands Unit.
  - Allowing customary exchange in non-commercial fishing in the Marianas Trench Islands Unit and Rose Atoll Monuments to help preserve traditional indigenous and cultural fishing practices.
  - Defining customary exchange as the non-market exchange of marine resources between fishermen and community residents for goods, services, and/or social support for cultural, social or religious reasons, and may include cost recovery through monetary reimbursements and other means for actual trip expenses (ice, bait, food, or fuel) that may be necessary to participate in fisheries in the western Pacific. Customary exchange of fish harvested in the Monuments includes family and friends of residents of the fishing communities.
  - Prohibiting all fishing within 12 nautical miles (nm) of the Pacific Remote Islands, subject to USFWS's authority to allow non-commercial fishing, in consultation with NMFS and the Council.
  - Prohibit all fishing within 12 nm around Rose Atoll.
- Prohibited the conduct of commercial fishing outside of a monument, and noncommercial fishing within a monument, on the same trip.

Amendment 2 to the Pacific Pelagic FEP: Establishment of Longline Prohibited Areas in the Mariana Archipelago, 3/4/2011

The Council amended the Pacific Pelagic FEP to establish a 30 mile longline fishing prohibited areas in the CNMI to promote sustained participation in fishing by Guam and CNMI fishing communities.

Amendment 5 to the Pacific Pelagic FEP: Measures to Reduce Interactions between the American Samoa Longline Fishery and Green Sea Turtles, 8/24/11

The American Samoa longline fishery has been observed to interact with (hook or entangle) with green sea turtles (Chelonia mydas) which are listed as threatened under the Endangered Species Act. To address this issue, the Council amended the Pelagics FEP to provide for the longterm survival, recovery, and sustainability of the sea turtles by reducing the number of sea turtle interactions with the fishery.

Amendment 7 to the Pacific Pelagic FEP: Use and Assignment of Catch and Effort Limits of Pelagic Management Unit Species by the U.S. Pacific Island Territories. 3/28/14

Amendment 7 establishes a management framework and process for specifying fishing catch and effort limits and accountability measures for pelagic fisheries in the U.S. Pacific territories (American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands). The framework authorizes the government of each territory to allocate a portion of its specified catch or effort limit to a U.S. fishing vessel or vessels through a specified fishing agreement, and establish criteria, which a specified fishing agreement must satisfy. The framework also includes measures to ensure accountability for adhering to fishing catch and effort limits.

Table 5. Amendments to the Fishery Ecosystem Plans (post-2009).

FEP	No.	Effective Date/Federal Register Notice	Action
AS	1	6/27/11 76 FR 37285	Omnibus amendment. Establishes eligibility requirements and procedures for reviewing and approving community development plans. The intent is to promote participation of island communities in fisheries that they traditionally depend on, but may not have the capabilities to support continued and substantial participation. . A second final rule was published 11/05/10 in which OMB approved the collection-of-information requirements (75 FR 68199).
AS	2	09/03/10 75 FR 54044	Omnibus amendment that establishes a mechanism for specifying annual catch limits.
HI	1	09/03/10 75 FR 54044	Omnibus amendment. Establishes eligibility requirements and procedures for reviewing and approving community development plans. The intent is to promote participation of island communities in fisheries that they traditionally depend on, but may not have the capabilities to support continued and substantial participation. A second final rule was published 11/05/10 in which OMB approved the collection-of-information requirements (75 FR 68199).
HI	2	11/10/10 75 FR 69015	Establishes the Hancock Seamounts Ecosystem Management Area as well as continues the moratorium on armorhead and other seamount groundfish until the armorhead stock is rebuilt.
HI	3	6/27/11 76 FR 37285	Omnibus amendment that establishes a mechanism for specifying annual catch limits
MA	1	09/03/10 75 FR 54044	Omnibus amendment. Establishes eligibility requirements and procedures for reviewing and approving community development plans. The intent is to promote participation of island communities in fisheries that they traditionally depend on, but may not have the capabilities to support continued and substantial participation. A second final rule was published 11/05/10 in which OMB approved the collection-of-information requirements (75 FR 68199).
MA	2	6/27/11 76 FR 37285	Omnibus amendment that establishes a mechanism for specifying Annual Catch Limits.
PRIA	1	6/27/11	Omnibus amendment that establishes a mechanism for

FEP	No.	Effective Date/Federal Register Notice	Action
		76 FR 37285	specifying annual catch limits.
PRIA	2	6/03/13 78 FR 32996	Establishes management measures for non-commercial and recreational fishing within the Pacific Remote Islands Marine National Monument; prohibits commercial fishing within monument
PEL	1	09/03/10 75 FR 54044	Eligibility requirements and procedures for reviewing and approving community development plans. The intent is to promote participation of island communities in fisheries that they traditionally depend on, but may not have the capabilities to support continued and substantial participation.
PEL	2	Disapproval: 7/11/11 76 FR 40764	Establishes a purse seine area closure in American Samoa. The purse seine area closure was disapproved.
PEL	3	6/27/11 76 FR 37287	Establishes a purse seine area closure and longline area closure in CNMI. The final rule only approved the longline closure.
PEL	4	6/27/11 76 FR 37285	Omnibus amendment that establishes a mechanism for specifying annual catch limits.
PEL	5	8/24/11 76 FR 52888	American Samoa longline gear configuration modifications to reduce sea turtle interactions.
PEL	6		
PEL	7		Catch and effort limits for the US Participating Territories; Specification of annual bigeye tuna catch limits for the US Participating Territories.

Appendix E: MSY Control Rule & Stock Status Determination Criteria

MSY Control Rule and Stock Status Determination Criteria

A MSY control rule is a control rule that specifies the relationship of F to B or other indicator of productive capacity under an MSY harvest policy. Because fisheries must be managed to achieve optimum yield, not MSY, the MSY control rule is a benchmark control rule rather than an operational one. However, the MSY control rule is useful for specifying the “objective and measurable criteria for identifying when the fishery to which the plan applies is overfished” that are required under the MSA. The National Standard Guidelines (74 FR 3178) refer to these criteria as “status determination criteria” and state that they must include two limit reference points, or thresholds: one for F that identifies when overfishing is occurring and a second for B or its proxy that indicates when the stock is overfished (See Table 1).

Table 1. Overfishing Threshold Specifications for Pelagic Stocks

MFMT	MSST	B_{FLAG}
$F(B) = \frac{F_{MSY} B}{c\, B_{MSY}}$ for $B \leq c\, B_{MSY}$ $F(B) = F_{MSY}$ for $B > c\, B_{MSY}$	$c\, B_{MSY}$	B_{MSY}
where $c = \max(1\text{-}M, 0.5)$		

The status determination criterion for F is the maximum fishing mortality threshold (MFMT). Minimum stock size threshold (MSST) is the criterion for B. If fishing mortality exceeds the MFMT for a period of one year or more, overfishing is occurring. A stock or stock complex is considered overfished when its biomass has declined below a level that jeopardizes the capacity of the stock to produce MSY on a continuing basis (i.e., the biomass falls below MSST). A Council must take remedial action in the form of a new FMP, an FMP amendment, or proposed regulations within two years following notification by the Secretary of Commerce that overfishing is occurring, a stock or stock complex is overfished or approaching an overfished condition[1] or existing remedial action to end previously identified overfishing or to rebuild an overfished stock has not resulted in adequate progress.

The National Standard Guidelines state that the MFMT may be expressed as a single number or as a function of some measure of the stock’s productive capacity. Guidance in Restrepo et al. (1998:17) regarding specification of the MFMT is based on the premise that the MSY control rule constitutes the MFMT. In the example in Figure 1 the MSY control rule sets the MFMT constant at F_{MSY} for values of B greater than the MSST and decreases the MFMT linearly with biomass for values of B less than the MSST. This is the default MSY control rule recommended in Restrepo et al. (1998). Again, if F is greater than the MFMT for a period of one year or more, overfishing is occurring.

[1] A stock or stock complex is approaching an overfished condition when it is projected that there is more than a 50 percent chance that the biomass of the stock or stock complex will decline below MSST within two years (74 FR 3178).

The National Standard Guidelines state that to the extent possible, the MSST should equal whichever of the following is greater: One-half the MSY stock size, or the minimum stock size at which rebuilding to the MSY level would be expected to occur within 10 years if the stock or stock complex were exploited at the MFMT. The MSST is indicated in Figure 1 by a vertical line at a biomass level somewhat less than B_{MSY}. A specification of MSST below B_{MSY} would allow for some natural fluctuation of biomass above and below B_{MSY}, which would be expected under, for example, an MSY harvest policy. Again, if B falls below MSST the stock is overfished.

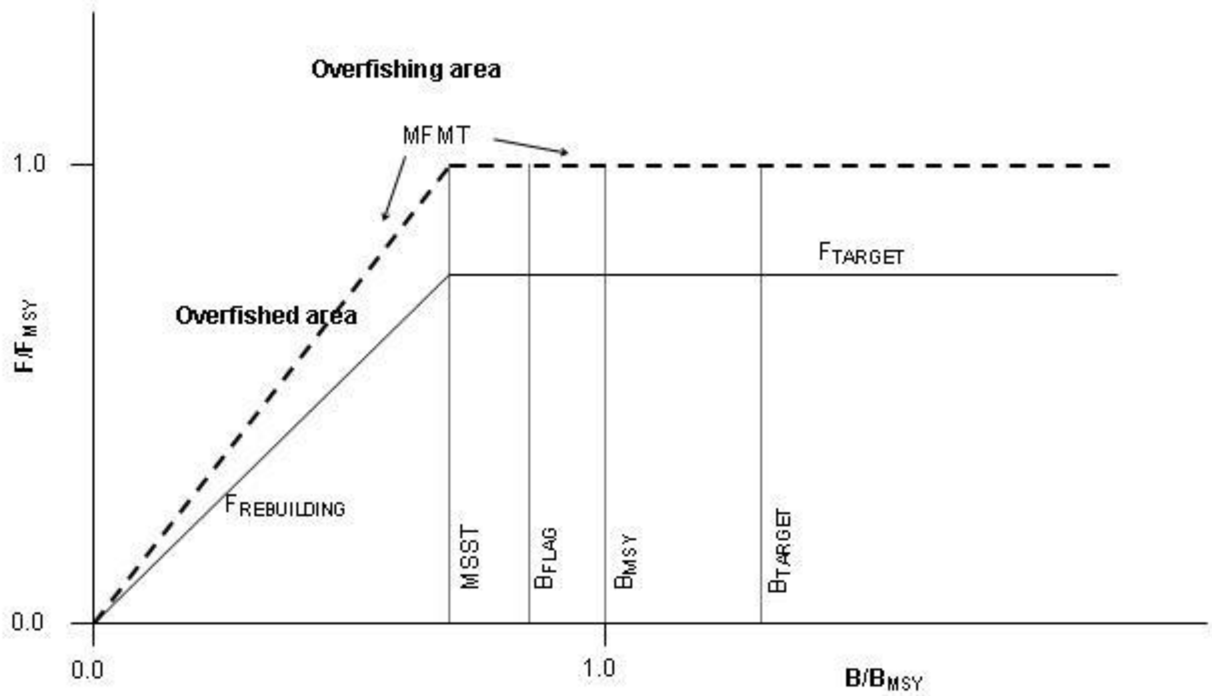

Figure 1. Example of MSY, Target and Rebuilding Control Rules
Source: Restrepo et al. 1998

Warning reference points comprise a category of reference points that will be considered in this FEP together with the required thresholds. Although not required under the MSA, warning reference points could be specified in order to provide warning in advance of B or F approaching or reaching their respective thresholds. Considered in this FEP is a stock biomass flag (B_{FLAG}) that would be specified at some point above MSST, as indicated in Figure 1. The control rule would not call for any change in F as a result of breaching B_{FLAG} – it would merely serve as a trigger for consideration of action or perhaps preparatory steps towards such action. Intermediate reference points set above the thresholds could also be specified in order to trigger changes in F – in other words, the MFMT could have additional inflection points.

In addition, according to the Pelagic FEP, a stock becomes overfished when its biomass (B) has declined below the minimum stock size threshold (MSST), the level that jeopardizes the capacity of the stock to produce MSY on a continuing basis (B_{MSY}). The current FEP states that B_{MSST} = (1-M) B_{MSY}, where M is the natural mortality rate of the stock, or one-half of B_{MSY}, whichever is greater. For example, if the natural mortality rate of a stock is 0.35, $B_{MSST} = 0.65*B_{MSY}$. Thus, if the B/B_{MSY} ratio falls below 0.65, the stock is overfished. If a stock has a natural mortality rate of 0.6, MSST is set at the default of $0.5*B_{MSY}$ (because 1- 0.6 = 0.4, and 0.5 is greater than 0.4). For such a stock, the stock is overfished when the B/B_{MSY} ratio falls below 0.5.

M is the most critical factor in determining whether a stock is overfished, and the values of M for Pacific pelagic stocks are derived primarily from stock assessments conducted by the WCPFC science providers and the IATTC. The most recent estimates of M and the status of Pelagic MUS are shown in Table 2. This table is taken from the Pelagic Fisheries of the Western Pacific Region Annual Report, and is updated when new stock assessments are conducted

Measures to Prevent Overfishing and Overfished Stocks
The control rules specify how fishing mortality will be controlled in response to observed changes in stock biomass or its proxies. Implicitly associated with those control rules are management actions that would be taken in order to manipulate fishing mortality according to the rules. In the case of a fishery which has been determined to be "approaching an overfished condition or is overfished," MSA §303(a)(10) requires that the FMP "contain conservation and management measures to prevent overfishing or end overfishing and rebuild the fishery."

Use of National Standard 1 Guidelines in FEPs
This FEP carries forward the provisions pertaining to compliance with the Sustainable Fisheries Act which were recommended by the Council and subsequently approved by NMFS (68 FR 16754, April 7, 2003). Because biological and fishery data are limited for all species managed by this FEP, MSY-based control rules and overfishing thresholds are specified for multi-species stock complexes.

Table . Estimates of stock status in relation to overfishing and overfished reference points for WPRFMC PMUS.

Stock	Overfishing reference point	Is overfishing occurring?	Approaching Overfishing (2 yr)	Overfished reference point	Is the stock overfished?	Approaching Overfished (2 yr)	Assessment results	Natural mortality[1]	MSST
Skipjack Tuna (WCPO)	F/FMSY=0.62	No	No	SB_{2011}/SB_{MSY}=1.81, $SB_{2011}/SB_{F=0}$=0.48	No	No	Harley et al. 2014	>0.5 yr^{-1}	0.5 B_{MSY}
				B_{2011}/B_{MSY}=1.75					
Yellowfin Tuna (WCPO)	F/FMSY=0.72	No	No	SB_{2012}/SB_{MSY}=1.24, $SB_{2012}/SB_{F=0}$=0.42	No	No	Davies et al. 2014	0.8-1.6 yr^{-1}	0.5 B_{MSY}
				B_{2011}/B_{MSY}=1.25					
Albacore Tuna (S. Pacific)	F/FMSY=0.21	No	No	$SB_{2007-2010}/SB_{MSY}$=2.56, $SB_{2007-2010}/SB_{F=0}$=0.63	No	No	Hoyle et al. 2012	0.4 yr^{-1}	0.7 SB_{MSY}
Albacore Tuna (N. Pacific)	72% of F_{ATHL}	No	No		No	No	ISC 2011	0.4 yr^{-1}	0.6 B_{MSY}
Bigeye Tuna (WCPO)	F/FMSY=1.57	Yes	Not applicable	SB_{2012}/SB_{MSY}=0.77, $SB_{2012}/SB_{F=0}$=0.16	No	No	Rice et al. 2014	0.4 yr^{-1}	0.6 B_{MSY}
				B_{2011}/B_{MSY}=0.96					
Pacific Bluefin Tuna	F/FMSY=	Yes	Not applicable		Yes	Not applicable	ISC 2014	0.25-1.6 yr^{-1}	~0.72 B_{MSY}
Blue Marlin (Pacific)	F/FMSY=0.81	No	Unknown	SB/SB_{MSY}=1.28	No	Unknown	ISC 2013	0.22-0.42 yr^{-1}	~0.7 B_{MSY}
Swordfish (WC N. Pacific)	F/FMSY=0.58	No	Unknown	SB/SB_{MSY}=1.20	No	Unknown	ISC 2014	0.3 yr^{-1}	0.7 B_{MSY}
Striped Marlin WC (N. Pacific)	F/FMSY=1.37	Yes	Not applicable	SB/SB_{MSY}=0.35	Yes	Not applicable	ISC 2012	0.4 yr^{-1}	0.6 SB_{MSY}
Blue Shark (N. Pacific)[2]	F/FMSY=0.34	No	Unknown	SB_{2011}/SB_{MSY}=1.62	No	Unknown	Rice et al. 2014	0.2 yr^{-1}	0.8 B_{MSY}
Oceanic white-tip shark (WCPO)	F/FMSY=6.69	Yes	Not applicable	SB/SB_{MSY}=0.15	Yes	Not applicable	Rice and Harley 2012	0.18 yr^{-1}	0.82 B_{MSY}
Silky shark (WCPO)	F/FMSY=4.32	Yes	Not applicable	SB/SB_{MSY}=0.72	Yes	Not applicable	Rice and Harley 2013	0.18 yr^{-1}	0.82 B_{MSY}
Other Billfishes		Unknown		Unknown				Unknown	
Other Pelagic Sharks		Unknown		Unknown				Unknown	
Other PMUS		Unknown		Unknown				Unknown	

Appendix F: Hawaii Longline Bycatch

COMMON NAME	SCIENTIFIC NAME	BYCATCH (lb)
Hawaii-Based Deep-Set Pelagic Longline Fishery for Tuna		
Albacore - North Pacific	*Thunnus alalunga*	40,077.60
Bigeye thresher	*Alopias superciliosus*	770,878.86
Bigeye tuna - Pacific	*Thunnus obesus*	159,617.39
Bignose shark	*Carcharhinus altimus*	0.00
Billfishes	Istiophoridae	10,434.98
Black mackerel	*Scombrolabrax heterolepis*	158.94
Black marlin	*Istiompax indica*	0.00
Blacktip shark	*Carcharhinus limbatus*	0.00
Blue marlin - Pacific	*Makaira nigricans*	38,223.88
Blue shark - Pacific	*Prionace glauca*	4,826,418.82
Bony fishes (other)	Osteichthyes	86.03
Bony fishes (unidentified)	Osteichthyes	954.25
Brama pomfrets (unidentified)	Bramidae	2,158.49
Brilliant pomfret	*Eumegistus illustris*	258.03
Cookiecutter shark	*Isistius brasiliensis*	14.33
Cottonmouth jacks (unidentified)	*Uraspis*	29.52
Crestfish	*Lophotus lacepede*	2,017.11
Crocodile shark	*Pseudocarcharias kamoharai*	8,434.81
Dolphinfish - Pacific	*Coryphaena hippurus*	77,889.38
Driftfishes	*Cubiceps*	13.23
Escolar	*Lepidocybium flavobrunneum*	27,295.00
Galapagos shark	*Carcharhinus galapagensis*	2,332.77
Great barracuda	*Sphyraena barracuda*	3,225.54
Grey reef shark	*Carcharhinus amblyrhynchos*	0.00
Hammerhead sharks	*Sphyrna*	1,486.40
Hammerjaw	*Omosudis lowii*	348.33
Kawakawa	*Euthynnus affinis*	0.00
King-of-salmon	*Trachipterus altivelis*	0.00
Knifetail pomfret	*Taractes rubescens*	17,070.07
Longfin mako	*Isurus paucus*	16,268.13
Longnose lancetfish	*Alepisaurus ferox*	1,239,805.68
Louvar	*Luvarus imperialis*	0.00
Makos	*Isurus*	5,949.18
Manta	*Manta birostris*	8,113.01

COMMON NAME	**SCIENTIFIC NAME**	**BYCATCH (lb)**
Manta and/or mobula (unidentified)	*Mobulidae*	1,719.61
Ocean sunfish	*Mola mola*	33,284.50
Oceanic whitetip shark	*Carcharhinus longimanus*	43,887.43
Oilfish	*Ruvettus pretiosus*	4,193.85
Opah - Pacific	*Lampris guttatus*	47,214.83
Pacific bluefin tuna - Pacific	*Thunnus orientalis*	0.00
Pacific bonito	*Sarda chiliensis*	0.00
Pelagic puffer	*Lagocephalus lagocephalus*	883.35
Pelagic stingray	*Pteroplatytrygon violacea*	29,159.21
Pelagic thresher	*Alopias pelagicus*	6,083.46
Pompano dolphinfish	*Coryphaena equiselis*	1,102.18
Rainbow runner	*Elagatis bipinnulata*	0.00
Rays (unidentified)	*Rajiformes*	39.68
Razorback scabbardfish	*Assurger anzac*	1,387.86
Roudi escolar	*Promethichthys prometheus*	2,606.98
Rough pomfret	*Taractes asper*	1,210.87
Rough triggerfish	*Canthidermis maculata*	30.86
Sailfish	*Istiophorus platypterus*	2,524.58
Salmon shark	*Lamna ditropis*	1,614.64
Sandbar shark	*Carcharhinus plumbeus*	7,003.64
Scalloped hammerhead	*Sphyrna lewini*	301.57
Scalloped ribbonfish	*Zu cristatus*	108.86
Sharks (unidentified)	*Chondrichthyes*	47,811.21
Sharptail mola	*Masturus lanceolatus*	10,317.63
Shortbill spearfish - Pacific	*Tetrapturus angustirostris*	19,335.72
Shortfin mako	*Isurus oxyrinchus*	195,329.87
Sickle pomfret	*Taractichthys steindachneri*	6,190.58
Silky shark	*Carcharhinus falciformis*	35,751.69
Skipjack tuna - Central Western Pacific	*Katsuwonus pelamis*	40,594.51
Slender mola	*Ranzania laevis*	26,609.79
Smooth hammerhead	*Sphyrna zygaena*	3,173.91
Snake mackerel	*Gempylus serpens*	177,363.46
Striped marlin - Central Western Pacific	*Kajikia audax*	3,306.53
Swordfish - North Pacific	*Xiphias gladius*	23,979.88
Tapertail ribbonfish	*Trachipterus fukuzakii*	3,644.50
Thresher shark	*Alopias vulpinus*	204.58
Thresher sharks (unidentified)	*Alopiidae*	31,627.25
Tiger shark	*Galeocerdo cuvier*	6,135.46
Tunas	*Scombridae*	11,520.53
Velvet dogfish	*Scymnodon squamulosus*	1,840.95

COMMON NAME	SCIENTIFIC NAME	BYCATCH (lb)
Wahoo - Pacific	*Acanthocybium solandri*	10,642.09
White shark	*Carcharodon carcharias*	0.00
Yellowfin tuna - Central Western Pacific	*Thunnus albacares*	8,408.37
TOTAL FISHERY BYCATCH		8,107,706.23
TOTAL FISHERY LANDINGS		20,085,934.23
TOTAL CATCH (Bycatch + Landings)		28,193,640.46
FISHERY BYCATCH RATIO (Bycatch/Total Catch)		0.29
Hawaii-Based Shallow-Set Pelagic Longline Fishery for Swordfish		
Albacore - North Pacific	*Thunnus alalunga*	16,065.65
Bigeye thresher	*Alopias superciliosus*	7,313.10
Bigeye tuna - Pacific	*Thunnus obesus*	3,508.32
Billfishes	*Istiophoridae*	406.06
Black marlin	*Istiompax indica*	0.00
Blue marlin - Pacific	*Makaira nigricans*	1,405.34
Blue shark - Pacific	*Prionace glauca*	666,311.06
Bony fishes (other)	*Osteichthyes*	7.30
Bony fishes (unidentified)	*Osteichthyes*	66.75
Brama pomfrets (unidentified)	*Bramidae*	58.28
Brilliant pomfret	*Eumegistus illustris*	2.73
Cookiecutter shark	*Isistius brasiliensis*	2.67
Crestfish	*Lophotus lacepede*	10.79
Crocodile shark	*Pseudocarcharias kamoharai*	43.03
Dolphinfish - Pacific	*Coryphaena hippurus*	1,458.98
Escolar	*Lepidocybium flavobrunneum*	8,543.94
Galapagos shark	*Carcharhinus galapagensis*	0.00
Knifetail pomfret	*Taractes rubescens*	31.89
Longfin mako	*Isurus paucus*	330.88
Longnose lancetfish	*Alepisaurus ferox*	14,761.51
Louvar	*Luvarus imperialis*	0.00
Makos	*Isurus*	252.84
Manta	*Manta birostris*	396.83
Manta and/or mobula (unidentified)	*Mobulidae*	881.85
Ocean sunfish	*Mola mola*	28,836.46
Oceanic whitetip shark	*Carcharhinus longimanus*	3,665.70
Oilfish	*Ruvettus pretiosus*	5,744.52
Opah - Pacific	*Lampris guttatus*	4,596.85
Pacific bluefin tuna - Pacific	*Thunnus orientalis*	0.00
Pelagic puffer	*Lagocephalus lagocephalus*	94.71

COMMON NAME	SCIENTIFIC NAME	BYCATCH (lb)
Pelagic stingray	*Pteroplatytrygon violacea*	1,753.34
Pelagic thresher	*Alopias pelagicus*	182.96
Razorback scabbardfish	*Assurger anzac*	0.00
Rough pomfret	*Taractes asper*	2.92
Salmon shark	*Lamna ditropis*	1,614.64
Sandbar shark	*Carcharhinus plumbeus*	242.51
Sharks (unidentified)	*Chondrichthyes*	12,706.73
Sharptail mola	*Masturus lanceolatus*	661.39
Shortbill spearfish - Pacific	*Tetrapturus angustirostris*	213.88
Shortfin mako	*Isurus oxyrinchus*	43,614.19
Sickle pomfret	*Taractichthys steindachneri*	41.67
Silky shark	*Carcharhinus falciformis*	1,472.28
Skipjack tuna - Central Western Pacific	*Katsuwonus pelamis*	53.39
Slender mola	*Ranzania laevis*	11.02
Smooth hammerhead	*Sphyrna zygaena*	0.00
Snake mackerel	*Gempylus serpens*	2,595.84
Striped marlin - Central Western Pacific	*Kajikia audax*	839.36
Swordfish - North Pacific	*Xiphias gladius*	40,186.51
Tapertail ribbonfish	*Trachipterus fukuzakii*	84.96
Thresher shark	*Alopias vulpinus*	273.59
Thresher sharks (unidentified)	*Alopiidae*	1,499.75
Tiger shark	*Galeocerdo cuvier*	2,231.08
Tunas	*Scombridae*	43.83
Wahoo - Pacific	*Acanthocybium solandri*	20.00
Yellowfin tuna - Central Western Pacific	*Thunnus albacares*	176.85
TOTAL FISHERY BYCATCH		875,320.73
TOTAL FISHERY LANDINGS		3,622,334.17
TOTAL CATCH (Bycatch + Landings)		4,497,654.90
FISHERY BYCATCH RATIO (Bycatch/Total Catch)		0.19

Appendix G: EFH Species Descriptions

WESTERN
PACIFIC
REGIONAL
FISHERY
MANAGEMENT
COUNCIL

Essential Fish Habitat Species Descriptions for Pacific Pelagic Fishery Ecosystem Plan Management Unit Species

Western Pacific Regional Fishery Management Council

1164 Bishop Street, Suite 1400

Honolulu, Hawaii 96813

December 21, 2015

Essential Fish Habitat Descriptions for Western Pacific Pelagic Fishery Ecosystem Plan Pelagic Management Unit Species

TABLE OF CONTENTS

1 Introduction

The most important fish (economically, culturally and socially) in the Pacific are oceanic and pelagic, meaning they live in the near-surface waters of the ocean, often far from shore. Tuna, billfish and other large pelagic species are among the world's most popular fish sought for food and sport. These fish are noteworthy for their rapid growth and, for the tunas, high rates of reproduction, as well as their remarkable swimming speed and stamina. Unlike nearshore pelagic species or bottom-dwelling fish that spend most of their lives near islands, pelagic fish move freely in the oceanic environment. Variations in the distribution and abundance of these nomadic species are often related to differences between their life history profiles, migration patterns and habits that are affected by ever-changing environmental influences, such as water temperatures, current patterns and the availability of food.

2 Pelagic Habitat

Species of oceanic pelagic fish live in tropical and temperate waters throughout the world's oceans, including the Pacific. They are capable of long migrations that reflect complex relationships to oceanic environmental conditions. These relationships are different for larval, juvenile and adult stages of life. The larvae and juveniles of most species are more abundant in tropical waters, whereas the adults are more widely distributed. Geographic distribution varies with seasonal changes in ocean temperature. In both the northern and southern hemispheres, there is seasonal movement of tunas and related species toward the pole in the warmer seasons and a return toward the equator in the colder seasons. In the western Pacific, adults of pelagic fish range from as far north as Japan and as far south as New Zealand. Albacore, striped marlin and swordfish can be found in even cooler waters at latitudes as far north as 50°N and as far south as 50°S. As a result, fishing for these species is conducted year-round in tropical waters and seasonally in temperate waters.

Migration patterns of pelagic fish stocks in the Pacific Ocean are not easily understood or categorized, despite extensive tag-and-release projects for many of the species. This is particularly evident for the more tropical tuna species (yellowfin, skipjack, bigeye) which appear to roam extensively within a broad expanse of the Pacific centered on the equator. In other words, their migrations appear to be mainly restricted by water temperature and continental land masses and are often linked to large-scale water movements that physically transport fish from one area to another within a favorable temperature range. Although tagging and genetic studies have shown that some interchange does occur, it appears that short life spans and rapid growth rates restrict large-scale interchange and genetic mixing of eastern, central and far-western Pacific stocks of yellowfin and skipjack tuna. Morphometric studies of yellowfin tuna also support the hypothesis that populations from the eastern and western Pacific derive from relatively distinct sub-stocks in the Pacific. The stock structure of bigeye in the Pacific is poorly understood, but a single, Pacific-wide population is assumed.

The movement of the cooler-water tuna (bluefin, albacore) is more predictable and defined, with tagging studies documenting regular and well-defined seasonal movement patterns relating to specific feeding and spawning grounds. The oceanic migrations of billfish are poorly understood, but the results of limited tagging work conclude that most billfish species are capable of transoceanic movement, and some seasonal regularity has been noted.

Large pelagic fish are closely associated with their physical and chemical environment. Tuna tend to be most concentrated where food is abundant, commonly near islands and seamounts that create divergences and convergences, near upwelling zones along ocean current boundaries and along gradients in temperature, oxygen and salinity. Swordfish tend to concentrate along food-rich temperature fronts between cold, upwelled water and warmer oceanic water masses.

Gradients in temperature, oxygen or salinity determine whether or not the surrounding water mass is suitable for pelagic fish. Fishermen sometimes use satellite images to help locate these thermal fronts. Oceanic pelagic fish such as skipjack and yellowfin tuna and blue marlin prefer warm surface layers, where the water is well mixed by waves and is relatively uniform in temperature. Other fish such as albacore, bigeye tuna, striped marlin and swordfish, prefer cooler, more temperate waters, often meaning higher latitudes or greater depths. Preferred water temperature often varies with the size of the fish. Adult pelagic fish usually have a wide temperature tolerance, and during spawning they generally move to warmer waters that are preferred by larval and juvenile stages. Large-scale oceanographic events (such as the El Niño – Southern Oscillation) change the characteristics of water temperature and productivity across the Pacific, and these events have a significant effect on the habitat range and movements of pelagic species.

Tuna movements are related to oceanographic characteristics, particularly water temperature and oxygen concentration. In the ocean, light penetration and water temperature diminish rapidly with increasing depth and, once below the thermocline, the water temperature is only a few degrees above freezing. Many pelagic fish make vertical migrations through the water column. They tend to inhabit surface waters at night and deeper waters during the day, but several species make extensive vertical migrations between surface and deeper waters throughout the day. Certain species, such as swordfish and bigeye tuna, are more vulnerable to fishing when they are concentrated near the surface at night. Bigeye tuna may visit the surface during the night, but generally, longline catches of this fish are highest when hooks are set in deeper, cooler waters just above the thermocline (275–550 m or 150–300 fm). Surface concentrations of juvenile albacore are largely concentrated where the warm mixed layer of the ocean is shallow (above 90 m or 50 fm), but adults are caught mostly in deeper water (90–275 m or 50–150 fm). Swordfish are usually caught near the ocean surface but are known to venture into deeper waters.

3 Pelagics Yield

Tuna, billfish, dolphinfish and wahoo are caught collectively by a variety of fishing gear types. At the latitudes of the US Pacific islands, tuna and billfish are generally caught by fishermen during predictable seasons. Their actual abundance in any particular year, however, is difficult or impossible to predict and is subject to countless factors in the oceanic environment. This variability is probably related to annual fluctuations in standing stock size and oceanographic characteristics.

The rates at which pelagic fish grow vary greatly among species and to a large degree determine the level of fishing pressure a species can withstand. For instance, skipjack tuna that grow and mature quickly can be safely harvested at very high levels, while slower growing bluefin tuna are easily overfished.

Yellowfin Tuna—Semi-independent stocks may exist in the western and central Pacific, which are considered relatively distinct from eastern Pacific yellowfin, but the maximum sustainable yield (MSY) of these stocks is still not well known despite considerable scientific research. Estimates based on surface fisheries (purse seine) and sub-surface fisheries (longline) provide different perspectives The western and central Pacific regional catch has reached 375,000 mt per year (of which, less than 1% comes from domestic landings in the US Pacific islands region). It appears that western Pacific yellowfin stocks are not yet fully utilized, but fishing effort and catch are expected to steadily increase in coming years.

Bigeye Tuna—A single ocean-wide stock of bigeye tuna is assumed. The Pacific-wide catch has reached 152,000 mt per year (of which, about 1% comes from domestic landings in the US Pacific islands region). This is close to the estimated MSY, and the stock is considered fully utilized. Because juvenile bigeye are known to associate strongly with flotsam, increasing purse seine catches around flotsam and fish aggregating buoys raises concern about potential overfishing.

Skipjack Tuna—Tagging results indicate considerable movement of skipjack tuna in the Pacific. Even so, complete mixing of the population does not occur across the whole region within one generation of fish. Contradictory results of genetic studies suggest uncertainty about stock structure. The total annual catch from the central and western Pacific is approaching 800,000 mt (of which, less than 1% is produced by domestic fisheries of the US Pacific islands). Although the current level of catch and fishing effort is at a record high, fishing mortality accounts for only a small fraction of stock attrition because of the skipjack tuna's high rates of reproduction, growth and mortality. Thus, while MSY has yet to be determined, the stocks appears to be underutilized and is expected to easily sustain expanded fishing pressure by expanding fisheries.

Albacore—Discrete spawning areas and larval distributions are apparent for North and South Pacific albacore stocks. Low catches of adults in equatorial waters suggest that the fish is limited between hemispheres. Domestic fisheries from the US Pacific islands produce less than 1% of the 59,000 mt annual Pacific-wide catch. MSY estimate for albacore in the North and South Pacific appeared to give reasonable stock assessments before the development of the high seas drift gillnet fishery. With the rapid development and cessation of the driftnet fishery, however, there are now uncertainties about the reliability of those earlier stock assessments. Adult fish in the South Pacific stock are considered fully or overexploited. Expansion of surface fisheries targeting juvenile fish could have a detrimental impact on the abundance of adult albacore in the South Pacific. In the North Pacific, some assessments conclude that the stock is overexploited, but other research concludes that the adult stock remains stable.

Striped Marlin—Separate North and South Pacific sub-stocks are hypothesized on the basis of a north-south separation of spawning grounds, except in the equatorial eastern and western Pacific. These fish spawn in the western Pacific, are recruited into the Mexican fishery of the eastern Pacific and move westward as they mature. In the North Pacific, semi-independent sub-populations are thought to blend over time. Domestic fisheries from the US Pacific islands contribute about 4% of the annual regional catch of 10,000 mt. MSY is unknown, but the stock is considered underutilized because there has been no decline in yield under increased levels of fishing pressure.

Blue Marlin—Pacific blue marlin are thought to belong to a single, ocean-wide stock due to an observed homogeneous distribution of larval and adult fish. The current stock status is unclear. The total annual Pacific catch in recent years is estimated to be around 20,000 mt (domestic landings from the US Pacific islands comprise less than 5% of the total). A recent MSY estimate of 20,000 mt/yr was 2,000 mt/yr less than previous estimates. During the 1970s the stock may have been over-utilized, but as longline fleets have changed fishing methods to target deeper-swimming bigeye tuna, the incidental catch of blue marlin has decreased. There may have been some recovery of the stock, evidenced by an increase in the average weight of blue marlin taken by the Japanese longline fishery since 1975.

Swordfish—The stock structure of swordfish in the western, central and South Pacific is unclear. Domestic landings from the US Pacific islands (mainly the Hawaii longline fishery) produce more than 20% of the 18,000 mt of swordfish caught in the northwest and eastern central Pacific, and about 15% of the Pacific-wide catch. The distribution of catches the possibility of, at least, North and South Pacific stocks. Changes in the longline fisheries have cast doubt on the way previous MSY estimates were calculated, and current catch levels have exceeded the two previous Pacific MSY estimates. To date, however, no indication of decreasing swordfish size has been found in the Hawaii fishery and stocks do not appear to have been exploited on a Pacific-wide basis to the extent that would cause a declining trend in catch rates.

Dolphinfish and Wahoo—North and South Pacific stocks of dolphin fish are apparently separate. Little is known of the stock structure of wahoo. No estimates of MSY are available for either species. The risk of overfishing dolphinfish is probably slight due to the apparent high natural turnover (with a maximum life span of four years). Too little is known about wahoo to estimate MSY.

4 Biological Information

Tuna and billfish have many physiological adaptations for life in the open ocean. Tuna and tuna-like species are the fastest fish in the world. Bursts of speed exceeding 12–20 kph (20–30 mph) are not unusual. Tuna have streamlined bodies that are specifically adapted for efficient swimming. They have large white muscle masses useful for swimming long distances and red muscle masses for short bursts of speed when chasing prey or escaping predators. Tuna also have circulatory heat exchangers that can raise or lower their body temperatures in response to heating up when vigorously feeding or swimming or cooling down when entering subsurface waters. Unlike most fishes, the circulatory system of tuna can maintain their body temperatures above that of the water in which they live, effectively making them a "warm blooded" animal. This adaptation may allow tuna to utilize their energy reserves quickly, which can translate to a rapid burst of speed and increased efficiency of the brain and eyes, so necessary to hunting prey in cold, deep water.

The tuna's circulatory and respiratory systems are unique in the fish world. Fish are cold-blooded, and, for most, the temperature difference between shallow and deep layers of the ocean is a physical barrier to vertical migrations. Tuna, however, have evolved the necessary physiological adaptations to accomplish this activity. The ability to make vertical

migrations between cold, deep ocean waters and warm surface waters increases the tuna's available habitat for feeding and ability to maintain a relatively constant body temperature. Some tunas move into deeper water to dissipate excess heat produced by feeding in warmer surface waters. Other tuna exhibit the reverse behavior. The tuna's circulatory system is also designed to conserve heat when the fish is relatively inactive and to dissipate heat when activity increases.

Billfish have a large white muscle mass but a smaller mass of red muscle than tunas. Thus, billfish must rely on different defenses against the deleterious effects of changes in water temperature. For example, swordfish have heater organs that warm the brain and eyes to help to protect the central nervous system from rapid temperature changes. The bill of a billfish may also be a special adaptation to reduce drag and increase speed, as well as a weapon for killing prey and for defense.

To orient and guide themselves on their extensive migrations across the open ocean, tuna and billfish are thought to rely somehow on small particles of magnetite, a magnetic material found near nerve endings in the skulls of these fish. Combined with other environmental cues, the fish may use magnetite to navigate using a "biological compass" attuned to the earth's magnetic field.

For most species of tuna and billfish it is reasonable to assume a single, ocean-wide stock in the Pacific where a mingling of fish takes place gradually through the fish's whole life-span. The exchange of fish among areas is difficult to determine because these fish move seasonally between feeding and spawning areas, toward the poles and back. Sub-stocks may exist, with some studies supporting the idea of stock discrimination between the eastern and western Pacific. Results from genetic and tagging studies, however, indicate that some degree of mixing does occur. For albacore and striped marlin, there is evidence of distinct North and South Pacific sub-stocks.

Most of the oceanic pelagic fish form schools (wahoo less commonly so). Schools are most compact when the fish are spawning or attracted to a common food source near features such as a seamounts, flotsam or man-made fish aggregation buoys. Marlin are often seen in pairs or in groups of several males with a single female.

Direct interactions among tuna, billfish dolphinfish and wahoo species are not known, although they compete at the top of the food chain for the same prey. Tuna schools that are associated with dolphins are common in the eastern tropical Pacific, but are rare m the western and central Pacific. The distribution of surface skipjack and juvenile yellowfin tuna schools (as well as dolphinfish and wahoo) are frequently associated with logs, other flotsam and fish aggregation devices. Fishermen also search for flocks of seabirds, which help to reveal tuna schools feeding on baitfish at the surface. Although skipjack, small yellowfin and small bigeye tunas are sometimes caught together, they maintain discrete schools and their co-occurrence around flotsam is probably the result of mutual attraction to food. In the western Pacific, in addition to floating objects, yellowfin and skipjack tuna are sometimes associated with the presence of whales and whale sharks.

5 Life History

5.1 Eggs and larval stages

Pelagics eggs are tiny (about 1 mm diameter); they float with the help of an enclosed oil droplet. Billfish eggs are somewhat larger than those of tuna.

5.2 Juvenile

Although these pelagic fish begin life at only a few millimeters in length, they can reach large sizes. All species grow rapidly during the early years of life with a gradual slowing of growth thereafter. A young tuna may add 2–4 cm (0.8–1.6 in) per month to its body length during the first two years of life and 0.5–2 cm (0.2–0.8 in) per month thereafter. Growth rates vary considerably depending on ocean conditions and food availability. The relationship between age and size in billfish is not as well understood.

5.3 Adults

As subadults, male and female pelagic fish grow at approximately the same rate. After reaching sexual maturity, however, female tuna grow more slowly than male tuna, apparently in response to the higher energy requirements for egg maturation and spawning. In contrast, female marlin and swordfish grow faster than males after maturation and female marlin reach much larger sizes than the males. Dolphinfish males tend to be heavier than females of the same length after 68 cm (27 in) due to differences in body morphology, i.e., the large head of male dolphinfish.

5.4 Forage and prey

The energy demands of swimming are great, and tuna and other pelagic fish have voracious appetites. Some species consume as much as 25% of their own body weight every day. Most oceanic pelagic fish are opportunistic carnivores with variable diets. The major prey items can vary substantially during different stages of life, in different regions of the Pacific and in different seasons. Adults feed on a variety of small fish, shrimp and squid, while juveniles are more opportunistic, feeding on pelagic invertebrates such as crab larvae, isopods and copepods. Some species have very specific and well-known predator-prey relationships, such as dolphinfish preying on flying fish, swordfish on squid, and blue marlin on skipjack tuna. Larval and juvenile tuna are, in turn, prey for fish, seabirds, porpoises and other animals. Adult tuna are often cannibalistic, feeding on the young of their own species. The presence of tuna larvae in tuna stomach samples is common enough that this occurrence has been used to identify areas of recent tuna-spawning activity. Only humans, marine mammals and sharks are known to prey on adult tuna and billfish

5.5 Reproductive biology

Most oceanic pelagic fish spawn over vast areas of the Pacific in warm surface waters. Spawning generally occurs through out the year in the tropics, and more seasonally at higher latitudes when sea surface temperatures (SST) are over 24°C (75°F). Individual females may spawn many times during the season at short intervals. All tuna and tuna-like species have high reproductive rates, producing millions of eggs per year to compensate for the large percentage of eggs that do not survive to adults. A spawning female tuna or billfish may release about 100,000 eggs per kilogram of her body weight.

Species such as skipjack tuna and dolphinfish have short lives (4–5 years) and reach sexual maturity in their first year of life. Some billfish and larger tunas may live 10–20 years and do not reproduce until they are 3–5 years old. Swordfish may first reproduce at 5–6 years old.

6 Life Histories and Habitat Descriptions for Pelagic Species

6.1 Habitat description for *Coryphaena hippurus* and *C. equiselis* (dolphinfish, mahimahi)

Management Plan and Area

American Samoa, Guam, MHI, NWHI, Northern Mariana Islands, Johnston Atoll, Kingman Reff, Palmyra Atoll, Jarvis Island, Midway Island, Howland and Baker Islands and Wake Island.

Life History and General Description

There are two species of dolphinfish, or, as it is known in Hawaii, mahimahi: *Coryphaena hippurus*—by far the most common—and *C. equiselis* (the "pompano dolphin"), which is infrequent in inshore areas. Boggs and Ito (1993) describe the Hawaii fishery only in terms of *C. hippurus*. According to Kojima (1966), there are two sub-populations of *C. hippurus*—one in the Northern Hemisphere and one in the Southern—but this assertion is based on differing seasonal migration patterns.

The dolphinfish is a fast swimming primarily oceanic fish distributed throughout the tropics and sub-tropics of the world's oceans. According to Shcherbachev (1973) *C. hippurus* is widely distributed in the Pacific: longitudinally between 46ºN and 38ºS, in the central Pacific from the Hawaiian Islands in the north and the Tuamotu archipelago in the south and in the eastern part from Oregon to Peru. Although primarily an ocean fish, it may occasionally be caught in estuaries and harbors (Palko and Beardsley et al. 1982). *C. equisetis* is a more exclusively oceanic fish and is rarely caught in coastal waters. Schherbachev (1973) notes a more restricted range, 38ºN–28ºS in the western Pacific and in the east from California to around 17º20′S. Palko and Beardsley et al. (1982) state that *C. hippurus* is restricted by the 20ºC isotherm, although Shcherbachev (1967) notes that a specimen was caught in 12.4ºC in the Sea of Oshtok. Habitat conditions for *C. equisetis* are not well known but a minimum of 24ºC is suggested by Palko and Beardsly et al (1982). They also state that this species is common in Hawaiian waters. Insufficient information is available to describe the hypothetical habitat of dolphinfish beyond these temperature limits in the 20º–24º range with occasional intrusions into much cooler waters.

According to Palko and Beardsly et al. (1982) there is little information about migrations of either species. Kojima (1965) argued that dolphinfish in the Sea of Japan make a northward migration in the warmer months until September and then return south. This is evidenced in Hawaii by seasonal variations in the catch rate. In Hawaii the peak fishing season is March–April and October–November. In American Samoa peak months are July–October while in the Marianas and Guam fish landings are highest January–April. This reflects a migration pattern away from the equator during the warmer months in both hemispheres.

Dolphinfish also segregate into schools by sex and size. Females and young may be more closely associated with floating objects (see below). According to Palko and Beardsly et al. (1982) seasonal variation may also be caused by ecological differences between adult spawning schools and young feeding schools.

Beardsly (1967), based on work in the Atlantic, notes that dolphinfish are closely associated with floating objects and that aggregations are common below windrows of floating *Sargassum* seaweed. He also reports that in the Atlantic a large school of dolphinfish was seen to follow a floating *Sargassum* mat northward some 260 km off the coast of Florida. It is apparent that dolphinefish are strongly attracted to floating objects, probably because of the availability of prey, and this may influence their movements also.

C. hippurus grow rapidly and have a short life span of about four years; no information is available on *C. equiselis* longevity. Lengths at age given by Kojima (1966) for Pacific specimens are first year: 38 cm FL; second year: 68 cm FL; third year: 90 cm FL; and fourth year: 108 cm FL.

Dolphinfish are heterosexual and sexually dimorphic: males have a steeper head profile in both species. Males are also heavier than females for any given length, and this difference increases with length (Beardsly 1967). Within schools significant variations in sex ratio occur; this is probably due to differential schooling of small and large fish and size related sexual dimorphism (Palko and Beardsley et al. 1982).

Dolphinfish have an extended spawning season: year round in the tropics and in the warmer months in sub-tropical areas (Palko and Beardsley et al. 1982). Ditty and Shaw et al. (1994) discuss larval distribution of dolphinfish in the Gulf of Mexico (see below). If larval abundance correlates with spawning activity then water temperatures of 24ºC and higher and salinities of 33 ppt and higher are preferred. Larvae were also more common offshore, particularly for *C. equisetis*. Shcherbachev (1973) notes that eggs of *C. hippurus* were found in Japanese waters during summer months when water temperatures were 21–29ºC.

Region-wide dolphinfish is not a major fishery, but it is important locally in recreational, subsistence and commercial fisheries. Fish aggregating devices are particularly effective for catching dolphinfish. In Japan a coastal “shiira-zuke” fishery targets fish with aggregating devices made from materials such as bundles of bamboo reeds.

	Longline	**Handline and Troll**	**Total**
American Samoa	5,761	7,194	12,955
Guam	NA	NA	303,957

Hawaii	230,000	475,000	700,000
Northern Mariana Islands	NA	NA	28,524
Total			1,045,436

In Hawaii dolphinfish are an important component of both the longline and troll fishery. Table 1 shows landing information from the Council's most recent *Annual Report for the Pelagics Fishery*.

Egg and Larval Distribution

The ova of *C. hippurus* are buoyant, colorless and spherical, measuring 1.2–1.6 mm diameter, with a single yellow oil globule (Mito 1960). Hatching occurs within 60 h after fertilization at 24–25ºC. At 26ºC larvae hatched within 40 h (Ditty and Shaw et al. 1994).

Ditty and Shaw et al. (1994) describe larval development and distribution in the Gulf of Mexico. In the Pacific, Mito (1960) describes larval development. Palko and Beardsley et al. (1982) state that dolphin gradually metamorphose from larvae into adults without clear breaks between phases. They describe juveniles as being between 9 to 200 mm in length. Ditty and Shaw et al. (1994) were able to distinguish between larvae of the two species as small as 3.5 mm SL based on morphometrics and pigmentation.

Palko and Beardsley et al. (1982) describe larval development. Descriptions indicate that the transition from larval to juvenile phase occurs between 15–30 days. During this period larvae grow at about 1 mm per day. (A 15-day-old larva is described as 15 mm in length; a 30-day-old larva/juvenile is described as 30 mm in length.)

Some information can be obtained on diet from rearing experiments. Hendrix (1983) found that "*C. hippurus* indicate a tendency for larvae to select for *Euterpina* copepods from fist feeding through day 7 when presented a diet of both rotifers and copepods". Larvae were also fed rotifers (*Brachionus plicatilis*), *Artemia salina* nauplii and dolphinfish yolk sac larvae. Shcherbachev (1973) reports that larvae feed mainly on crustaceans and especially Copepoda of the family Pontellidae.

Shcherbachev (1973) describes distribution based on plankton tows (see Figures 4–6 in that publication). In the Pacific they are widely if sporadically distributed. This could be an artifact of non-random collection. Occurrence is most frequent in the western Pacific between 10ºN and 30ºS and in the Panama Gulf in the east. Since dolphinfish are reported to spawn in summer months off of Japan (Palko and Beardsley et al. 1982) it is likely that eggs and larvae have a similar seasonal range expansion. From this data it is not possible to specify larval distribution beyond the known range for adults.

Ditty and Shaw et al. (1994) state that "distribution of larvae, juveniles and adults is apparently limited by the 20ºC isotherm". Spawning occurs in oceanic waters beyond the continental shelf, even in the Gulf of Mexico. Larvae were collected at highest densities at 24ºC and above and 33 ppt salinity and above. This may adequately describe a hypothetical habitat.

No information is given on habitat features affecting the abundance of eggs and larvae, but given adults' preference for floating objects, earlier life stages may be more common near objects as well.

Juvenile

The onset of the juvenile stage is not clearly distinguished, as described above. Broadly, juveniles range in size between 15 mm and 55 cm FL. This corresponds to ages between about two weeks and one year.

No information is available on juvenile feeding habits; it is likely that at later stages food preference does not differ markedly from that of adults (see below).

Neither the hypothetical habitat for juveniles or particular features affecting abundance can be specified beyond that described above for adults.

Adult

Beardsly (1967) reports that males are heavier than females and that this difference increased with length. Maximum age is estimated at four years and the largest specimen examined by Beardsly (1967) weighed 35 kg, a sports-fishing record at the time. His data suggest that female dolphin become mature at sizes as small as 35 cm FL; most are mature by 55 cm FL.

Palko and Beardsley et al. (1982) summarize various studies on food preferences. The diet is varied; 32 species of fish from 19 families and one species of crab were reported in one study. Other studies suggest that flying fish are a common prey and that cephalopods are also consumed.

The habitat and particular features affecting abundance does not differ markedly for adults from that described earlier for the species as a whole.

<u>Essential Fish Habitat</u>: Tropical species complex

Dolphinfish are a wide-ranging pelagic species found throughout the tropics and sub-tropics. EFH can only be described based on its known range, temperature requirements and perhaps salinity preferences. Shcherbachev (1973) produced distribution maps (point data based on occurrence in research tows) for larvae and adults, which are reproduced in Palko and Beardsly et al. (1982).

There are no stable features that could be used to identify Habitat Areas of Particular Concern. Dolphinfish are known for their strong association with floating objects.

Habitat description for *Coryphaena hippurus* and *C. equiselis* (dolphinfish, mahimahi)

	Egg	**Larvae**	**Juvenile**
Duration	36 hrs	about 3 weeks	to 1 year
Diet	NA	zooplankton, larval fish	(see adult)
Distribution: General and Seasonal	Year around spawning in tropics, summer range expansion limited by 20º isotherm, preferred habitat 24º C and 33 ppt	same as eggs	same as adult
Location	open ocean	open ocean	not known to be different from adult
Water Column	epipelagic	pelagic, upper mixed layer	pelagic, mixed layer
Bottom Type	NA	NA	NA
Oceanic Features	not known beyond adult preferences	not known beyond adult preferences	not known beyond adult preferences

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6.2 Habitat description for wahoo (*Acanthocybium solandri*)

Management Plan and Area

American Samoa, Guam, MHI, NWHI, Northern Mariana Islands, Johnston Atoll, Kingman Reff, Palmyra Atoll, Jarvis Island, Midway Island, Howland and Baker Islands and Wake Island.

Life History and General Description

Wahoo (*Acanthocybium solandri*) is a member of the Scombrid family. Although a popular game fish, wahoo are not a target species in fisheries and are thus relatively little studied.

Wahoo are found worldwide in tropical and warm-temperate seas. In the Pacific their distribution is restricted to coastal America and westward from Hawaii in a band between about 20ºN and 5ºS in the central Pacific to the eastern Australia coast and north to southern Japan (Collete and Nauen 1985). Nothing is known about their population structure in the Pacific.

Adult wahoo are surface oriented and are usually associated with banks, pinnacles and islands and are also found around flotsam in the open ocean. Nakano et al. (1997) studied catch rates of longlines at different depths; wahoo were commonly caught at shallow depths, on hooks between

60–160 m, based on measurements of maximum hook depths of shallow gear. Iversen and Yoshida (1957) state that wahoo are rarely caught by longline gear fishing below 200 ft and surface trolling catch rates are much higher close to land. Amesbury and Babin (1990) report elevated catches around Guam in the winter months and describe this as the period when the surface mixed layer is deepest. The hypothetical habitat may thus be described as warm epipelagic and surface neritic waters (above 20ºC) in the tropics to the sub-tropics with a preference for areas of higher productivity including coastal shelves, banks and oceanic fronts.

Iversen and Yoshida (1957) state that wahoo are not found in large compact schools. Instead they travel in small groups of two to 20 fish. They appear to seasonably migratory, moving away from the equator in summer months (Iversen and Yoshida 1957). Hogarth (1976) reports one source stating that "wahoo traveled in a huge circle from Australia and New Zealand back to Ecuador and Costa Rica, and on to Baja, California" but no support is given for this assertion.

As noted above, coastal waters, particularly at the edge of steep drop-offs or reef faces are preferred habitat. Like many other fish, wahoo are attracted to floating objects. This is probably due to the micro-community that typically develops around and under such objects. Floating objects may also concentrate at oceanic fronts. These areas, along with banks and other shallow submerged features are areas of higher productivity, probably the basic reason for these habitat preferences.

According to Hogarth (1976) wahoo are short-lived. He reports the following average lengths based on a sample of 126 fish caught of Cape Hatteras, North Carolina: 1 year old—112 cm; 2 years old—128 cm; 3 years old—141 cm; 4 years old—153 cm. Four years old may be close to a maximum age, which would accord with a reported annual mortality rate of 38% reported by Hogarth (1976).

No special sexual characteristics are mentioned in the literature. Females are extremely fecund; Hogarth (1976) estimated that ovaries held between 0.56 and 45.3 million eggs. Iversen and Yoshida (1957) estimated the number as 6.1 million.

Wahoo are said to spawn year round in the tropics and seasonably in subtropical waters. Hogarth (1976) estimates that spawning occurs in the Gulf Stream off North Carolina from June to August.

In the Western Pacific Region, there are no commercial fisheries that target wahoo (Collete and Nauen 1985). They are a minor component of longline catches and are more frequently caught by surface trolling and are sought by recreational fishermen throughout the region. Wahoo are a popular food fish in Hawaii and are frequently served in restaurants.

In 1996, the most recent data available (WPRFMC 1997), the Hawaii-based longline fleet caught 130,000 lb of wahoo, about 2% of landings. Total commercial landings of wahoo were 500,000 lb, about 1.5% of total landings. Other reported landings for 1996 were 10,858 lb in American Samoa; 142,062 lb in Guam; and 8,626 lb in the Northern Mariana Islands—for a total of 161,546 lb.

Egg and Larval Distribution

Matsumoto (1966) describes a 23.7 mm individual as juvenile; smaller specimens are considered larvae. Chiu and Young (1995) also describes larvae from collections in Taiwan coastal waters.

No information is available on larval food preferences.

Based on collections in the central Pacific, Matsumoto (1966) concludes that larvae are not more abundant near land even though adults are more commonly caught inshore. He collected larvae in the tropical and subtropical Pacific between 30ºN and 25ºS and between 175º and 115ºW but notes that they were scarce in the equatorial countercurrent even though adults are caught there. The longitudinal extent reflects limits of sample stations. Chiu and Chen (1995) also found larvae in offshore areas of Taiwan in Kuroshio current regions. Occurrence of the larvae were seasonal, caught mainly from May to August in these waters. None of these authors provide information on depth distribution. Hogarth, (1976) cites research in the Atlantic demonstrating a larval preference for water depths greater than 100 m.

Seasonal reproduction and larval occurrence in the subtropics indicates a requirement for warmer water temperatures than the limits of adult tolerance. Unlike adults, larvae have no describable habitat features (i.e., proximity to land and/or shallow depths) affecting abundance and density (Matsumoto 1966).

Juvenile

There is no information on differential characteristics of juveniles. As noted, Matsumoto, (1966) described a 23.7 mm specimen as juvenile. Hogarth (1976) states that wahoo reach sexual maturity and spawn in their first year. Males are mature at 86 cm TL and females at 101 cm TL. Given average lengths for age groups this would correspond to maturity at 9–12 months.

Adult

There are no special habitat characteristics to differentiate adults from other life stages beyond the general theoretical habitat description give above in Section 2.1.

Both Iversen and Yoshida (1957) and Hogarth (1976) examined the stomach contents of adult wahoo. A high percentage of stomachs were empty, ascribed to regurgitation during capture. Iversen and Yoshida (1957) found mackerel scad (*Decapturus* sp.) and skipjack tuna the main prey items. Other identifiable items included squid, pomfret, puffer, flying fish, lantern fish and sunfish. Hogarth (1976), researching in subtropical Atlantic waters, found mackerels to be the most common prey item, followed by Stromateids (butterfishes). Other families included herrings, Carangids and flying fishes.

Essential Fish Habitat: Tropical species complex

Although wahoo are distributed throughout tropical and subtropical waters, coastal and/or shallow depth areas represent important habitat features that can be used in identifying EFH. Collete and Nauen (1985) include a map (at very small scale) showing the worldwide distribution of wahoo. Habitat features that can be used in identifying Areas of Particular Concern include reef faces and steep drop-offs as these are preferred trolling areas.

Habitat description for wahoo (*Acanthocybium solandri*)

	Egg	**Larvae**	**Juvenile**
Duration	unknown, probably days	unknown, probably weeks to less than a month	unknown
Diet	NA	unknown	unknown
Distribution: General and Seasonal	tropical and seasonal (summer) in subtropical areas	same as eggs	unknown, unlikely to be different from adults
Location	open ocean	open ocean	unknown, unlikely to be different from adult
Water Column	epipelagic	epipelagic	unknown, unlikely to be different from adult
Bottom Type	NA	NA	unknown, unlikely to be different form adult
Oceanic Features	unknown, does not occur near land	unknown	unknown

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6.3 Habitat description for Indo-Pacific blue marlin (*Makaira mazara*)

Management Plan Area

American Samoa, Guam, MHI, NWHI, Northern Mariana Islands, Johnston Atoll, Kingman Reef, Palmyra Atoll, Jarvis Island, Midway Island, Howland and Baker Islands and Wake Islands.

Life History and General Description

Blue marlin (*Makaira nigricans*) is the most tropical of all marlins. It has been variously described as a single pan-tropical species (Rivas 1974) or two distinct species, *Makaira nigricans* in the Atlantic and *Makaira mazara* in the Pacific (Nakamura 1983). Recent analysis of mitochondrial DNA (Finnerty and Block 1992) suggests that billfish (Istiophoridae and Xiphiidae) should be separated from the suborder Scombroidei—also containing mackerel and tuna—to which they have traditionally been assigned. Other researchers, using similar techniques, found that "[t]he lack of significant genetic differentiation between Atlantic and Indo-Pacific samples of blue marlin and sailfish does not support…recognition of distinct Atlantic and Indo-Pacific species" (Graves and McDowell 1995).

Catches of blue marlin in the Pacific have been reported by about 10 countries with Japan and Korea taking the largest catch (Nakamura 1985). Important fishing areas include the northwest Pacific (FAO Fishing Area 61) and the central Pacific (FAO Fishing Areas 71 and 77) (Nakamura 1985). The majority are caught in the longline fishery. The Japanese have the largest fleet, fishing Pacific wide, with smaller fleets operating from Taiwan and Korea. Since the 1980s the Japanese have increasingly targeted the deeper swimming bigeye tuna (*Thunnus obesus*) resulting in declining catch of surface swimming billfish (Ueyanagi, Shomura et al. 1990). Substantial numbers of billfish were also caught in the high seas drift-net fishery until it was suspended.

Total 1996 landings in the WPRFMC management area amounted to about 911 mt (2,004,966 lb). The vast majority (about 95%) was landed in Hawaii (see Table 1). Of these Hawaii landings a little over half (1.05 million lb) were caught by longline vessels.

Entity	Landings (lb.)
American Samoa	37,682
Guam	60,500
Hawaii	1,900,00
Northern Mariana Islands	6,784

Entity	Landings (lb.)
Total	2,004,966

Blue marlin is caught incidentally by longline vessels and commands a relatively low ex-vessel price (WPRFMC 1997). In Japan marlin are consumed as sashimi (Ueyanagi 1974). Marlin is consumed similarly in Hawaii (WPRFMC 1997). Blue marlin is also an important sport fish, and Kona, Hawaii, is a world renowned center for big gamefishing. In Guam and the Northern Mariana Islands marlin are caught by recreational small-boat trollers and charter boats. American Samoa has both troll and longline fisheries, although these are small in comparison to Hawaii.

Because blue marlin is a wide-ranging pelagic species, fishing effort is offshore. Trollers on small, recreational boats and charter vessels make day trips and are thus restricted in their range to tens of miles offshore. Longliners, in contrast, make multi-day trips and may fish outside of the EEZ.

Egg and Larval Distribution

Based on a long-term study of reproductive condition of blue marlin caught in Hawaii billfish tournaments, Hopper (1990) argues that these fish congregate around the Hawaiian Islands during summer months in order to spawn. They migrate from more southerly latitudes, and "Hawaii may be a focus for blue marlin spawning in the northern central Pacific because oceanographic conditions are favorable to survival of marlin larvae and juveniles," Hopper contends. Other researchers (Nishikawa, Honma et al. 1985) note that areas where larvae occur more frequently correspond to the richest summer fishing grounds. It has also been suggested that marlin spawn year-round in tropical waters (see below), but there may be a preference for summer spawning in higher latitudes both north and south of the equator.

Nakamura (1985) states that "ripe eggs in the ovary are transparent with a yellow oil globule, and measure about 0.8 to 0.9 mm in diameter." Post-larvae and young are found most abundantly in the western Pacific, especially around the Caroline and Marshall Islands (Howard and Ueyanagi 1965). These authors also state "[f]rom occurrence of larvae, condition of gonads, and sex ratio, spawning of this species is assumed to take place in the low latitudinal area (between about 20ºN to 10ºS) throughout the year; and in higher latitudinal areas (bounded by 30ºN and 30ºS) during summer seasons." Matsumoto and Kazama (1974) subsequently found blue marlin larvae heavily distributed around the Hawaiian Islands and westward between 7ºN and 24ºN in the North Pacific and south of the equator to 24ºS from Vanuatu in the west to the Tuamotu archipelago in the east. At its western end this ties in with the distribution described by the earlier authors; however, "[t]he intervening area (lat. 5º–10ºN and long. 140ºW–180º) appears to be devoid of blue marlin larvae, but this could be due to inadequate sampling; only a few surface day tows were made there" (Matsumoto and Kazama 1974).

In sum, blue marlin may spawn throughout the year in two tropical/subtropical bands north and south of the equator. These bands expand away from the equator during summer seasons, roughly corresponding to the 24º–25ºC isotherms (Matsumoto and Kazama 1974). Rivas (1974) indicates that larval stage growth is up to at least 52 mm, with a gap in description from that size to about 194 mm.

Juvenile

Because methods of age determination have not been developed for this species, age at which sexual maturity is reached cannot be determined. However, more recently developed techniques may allow age determination (Wilson, 1984). A relation can be developed between otolith weight and age based on saggitae annuli (Wilson and Dean et al. 1991). Based on smallest captures of sexually mature fish Rivas (1974) suggests that males under 35 kg and females under 47 kg are sexually immature. The species exhibits marked sexual dimorphism in size. Females can exceed 540 kg while males usually do not exceed 160 kg (Rivas 1974). As noted above, smaller fish may be more abundant in the western Pacific. There is some evidence of an eastern migration with age; at least the size distribution of captured fish tends to increase to the east. However, this could be explained by differential north-south migration (Howard and Ueyanagi 1965).

Adult

Tracking experiments (Holland and Brill et al. 1990, Block and Booth et al. 1992) show that blue marlin in Hawaiian waters spend most of their time within 10 m of the surface but make frequent and regular dives to deeper depths. This indicated a preference for water temperatures in the 22–27ºC range found in the near surface mixed layer. When near the surface they swim very slowly (<25ms^{-1}). The highest sustained speed directly measured by Block and Booth et al. (1992) was around 100 m s^{-1}, much slower than estimates. Dives are to relatively shallow depths; Block and Booth et al. (1992) recorded a maximum dive depth of 209 m. from the six marlin tracked. It was during dives that short speed bursts of up to 200 m s^{-1} were typically recorded. The authors suggest that there may be a slight preference for surface waters during daylight hours but considerable variation exists among individuals. Based on course data they conclude that "these fish are itinerant visitors [to the Hawaiian Islands] and are not part of a resident population." This conclusion is supported by genetic studies that suggest a single Pacific-wide cytochrome b DNA haplotype (Finnerty and Block 1992).

Au (1991) found that billfish were caught in about 9% of purse-seine sets in the eastern Pacific with somewhat higher catch rates for sets around logs. Out of all billfish caught, blue and striped marlin accounted for 68.6% of the total. He states that billfish "probably follow tuna both as parasitic foragers and predators; they share many prey species with tunas and also eat tunas, especially the smaller specimens."

Region wide distrbution of blue marlin are given by Howard and Ueyanagi (1965) as follows:

	West of 180°	East of 180°
10–30°N	High density from May-October with a tendency for season of highest density to progress from west to east starting in June until September	
0–10°N	High density almost year round except in December and January.	High density in May and June 180°–170°W and shifts eastward to 130°W until October.
0–10°S	Density becoming low in July through to September.	Density low from June-September.
South of 10°S	High density November–March with much greater concentration east of 160°W	

As indicated in the table, there is a north-south seasonal migration of fish that corresponds to warmer waters. These migrations may be more northwesterly and southeasterly so that northward moving groups pass the equator around 150ºE–180º and southward migrants pass the equator between 160ºE–180º (Au 1991). Genetic uniformity, mentioned above, may mean that there is a single Pacific-wide stock that migrates seasonally as increasing water temperature expands habitat away from the equator. This would suggest a clockwise radial pattern of migration.

According to trolling information, marlin feed in the morning between 1000 and 1100 hours and again in the afternoon between 1300 and 1600 hours; they apparently do not feed at night (Rivas 1974). This behavior correlates with the weakly exhibited diel depth pattern detected by Block and Booth et al. (1992). There has been much discussion of whether the marlin's bill is used in feeding. A few cases of billfish impaling marine turtles have been documented, but incidents such as these are considered accidental and the bill is not considered essential to feeding (Rivas 1974, Frazier and Fierstine et al. 1994). Using the stomach content of marlin caught in the Hawaiian International Billfish Tournament (HIBT) as a sample source, Brock (1984) found the marlin diet to be composed, in general, largely of Scrombrids but also significantly of juvenile inshore fish. However, he notes that this analysis "may be a reflection of where and when these predators were captured. The majority of the marlin caught in the HIBT are taken within 8 km of land. Moreover, the tournament is held during the summer, when many Hawaiian inshore juvenile fish recruit from the plankton to the adult habitat." Squid are another food source. Although Brock considers them relatively unimportant in Hawaiian waters, Rivas (1974) notes that they are an important part of the diet in the Philippine Sea. The size range of food is relatively large; a 340 kg blue marlin was found with a 29 kg bigeye tuna in its stomach (Rivas, 1974). Conversely, Brock (1984) notes that "adult blue marlin are capable of feeding on very small prey," and small prey in the 5–60 mm range were commonly found in his study.

Habitat description for Indo-Pacific blue marlin (*Makaira mazara*)

	Egg	**Larvae**	**Juvenile**
Duration	24 hr.?	to at least 52 mm (about 3 weeks?)	to 35 kg for males and 47 kg for females
Diet	NA	zooplankton, small fish	Scombrids, cephalopods, juvenile inshore fish
Distribution: General and Seasonal	year around in tropics, seasonally in waters above 24-25º C.	year around in tropics, seasonally in waters above 24–25ºC.	year around in tropics, seasonally in waters above 24–25ºC.
Location	offshore waters	offshore waters	offshore waters
Water Column	epipelagic	epipelagic	pelagic, upper mixed layer
Bottom Type	NA	NA	NA
Oceanic Features	eddies, upwelling, oceanic fronts and other areas of high productivity	eddies, upwelling, oceanic fronts and other areas of high productivity	eddies, upwelling, oceanic fronts and other areas of high productivity

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6.4 Habitat description for black marlin (*Makaira indica*)

Management Plan and Area

American Samoa, Guam, MHI, NWHI, Northern Mariana Islands, Johnston Atoll, Kingman Reef, Palmyra Atoll, Jarvis Island, Midway Island, Howland and Baker Islands and Wake Islands.

Life History and General Description

This summary is based on Nakamura (1975) and Nakamura (1985). Little has been published on the black marlin since those synopses.

Makaira are teleost fish of the order Perciformes (suborder Xiphiidae) and family Istiophoroidae. Two other *Makaira* species are recognized: the Indo-Pacific blue marlin *(M. mazara*) and the Atlantic blue marlin (*M. nigricans*). However, the separation of these populations into distinct species has recently been questioned based on genetic analysis (Graves and McDowell 1995). Howard and Ueyanagi (1965) argue that there must be two separate stocks of black marlin in the

Pacific based on their widely separated centers of abundance in the eastern and western Pacific. Their sparse distribution across the oceanic Pacific may represent individuals moving out from these centers of abundance.

Howard and Ueyanagi (1965) state that the distribution of black marlin is "characterized by the greatest density of occurrence being on the periphery of distribution of the family in the Pacific.…In open sea areas, distribution is sparse. In tropical open seas areas, distribution is very scattered but continuous, whereas in temperate open sea areas, there is almost no occurrence of this species." Nakamura (1985) gives the range for black marlin as 35º–40ºN to 45ºS in the western Pacific and 30–35ºS in the eastern Pacific. Specifically mentioned areas of concentration are along continental margins and in Indo-Pacific archipelagic waters from Southeast Asia to Australia. Based on longline CPUE data alone, the area of greatest abundance would be in the waters north of Australia to New Guinea and the Indonesian archipelago. A second center of abundance lies of off Central America, centered on Panama. Merrett (1971) reports, based on data from the western Indian Ocean, that the highest catch rate is in water depths between 250–500 fathoms (457.2–914.4 m). No fish are reported landed it waters deeper than 2,000 fathoms (3657.6 m). Black marlin usually occur nearer the surface than most other billfish (Nakamura 1985). The reported range in SST for this species is relatively wide, 15º–30ºC, although optimum temperatures for a harpoon fishery in the East China Sea were reported as between 23º–25ºC (Morita 1952). Squire and Nielsen (1983) report an optimal temperature, based on longline CPUE off of northeast Australia, as 26.7ºC.

In terms of migration, Howard and Ueyanagi (1965) note a seasonal movement away from the equator during summer months in the respective hemispheres. Squire and Nielsen (1983) provide a hypothetical description of migration based on tag returns from sport-caught fish off of northeast Australia. Black marlin are theorized to move south and southeast towards southeast Australia and New Zealand in late (austral) summer, northeast to Kirabati waters and northeast of Papua New Guinea in winter, and back to spawning grounds in the Coral Sea in spring and early summer.

Koto and Kodama (1962, cited in Nakamura 1975) estimated growth rates at 50 cm per year for black marlin 150–200 cm, 30 cm for lengths 200–230 cm and 20 cm for lengths 230–250 cm. Estimates could not be made for sizes above and below this range. No information is provided on age and longevity.

Black marlin are heterosexual. Nakamura (1975) reports sex ratios from a number of studies; females tend to dominate in the samples listed, in most cases comprising 80%–95%. The overall ratio for these samples as reported by Nakamura is "53/514 male throughout a size range of 20 to 200 kg in body weight" for the waters around Taiwan. Although this statement is somewhat ambiguous it may mean that the male-female sex ratio is 1:9.7. He also states that females grow larger than males. Merrett (1971) suggests size at sexual maturity (based on a very few specimens) as 170–180 cm or 58.97–79.38 kg. De Sylva and Breder (1997) examined gonad histology of Atlantic specimens. Four adult males were examined; none of the females were yet adult. They state that "maturation of the oocytes must thus occur when female black marlin have reached a much larger size"; unfortunately they don't report the sizes of their specimens.

Reported spawning grounds are in the South China Sea in May or June and the Coral Sea between October and November. Given their sparse distribution in the oceanic Pacific it may be that spawning is confined to western Pacific continental margin/shelf areas.

Major fishing grounds are all on the western Pacific continental margin: around Taiwan, the East China Sea, the Coral Sea and northwest Australian waters. In these areas black marlin is caught by harpooners and trollers. A major charter-boat sports-fishery captures black marlin in northeast Australian waters. Black marlin is also caught as bycatch by tuna longliners in these areas and across the Pacific. Statistics show that highest landings are in FAO Area 61, the northwest Pacific above 20ºN and west of 175ºW (FAO 1997) . Fewer fish are caught in the area of reported high abundance north of Australia (Area 71). Total landings in 1995 were 2,077 mt, substantially less than the 1991 high of 6,342 mt. In comparison to other billfish (much less the important tuna species) black marlin catches are minor. Taiwan, Japan and Korea are the main countries landing black marlin. Black marlin are not reported separately in the NMFS Hawaii longline logbook, nor are they reported from the other areas in the western Pacific region in the most recent WPRFMC annual report. It is thus difficult to quantify landings in the region, but they are apparently very minor.

Egg and larval distribution

No information was available on egg and larval stages beyond what is reported in Nakamura (1975). He only reports on morphological descriptions of larvae. Another paper describing the larval stage (Nishikawa and Ueyanagi 1992) is in Japanese. The abstract notes that the "larvae of *M. indica* are mainly distributed in the neighboring waters of reef areas. It is assumed that the peculiarly formed rigid pectoral fins of larvae may have functions as 'stabilizer' in their habitats where the water moves violently compared with offshore areas." The researchers' collections were from the East China Sea, and it seems likely that significant concentrations of eggs and larvae are confined to the spawning areas mentioned above.

Juvenile

No information is available on juvenile distribution.

Adult

Little is known about the feeding habits of adult black marlin. The few published studies (reviewed in Nakamura 1975) indicate that Scombrids (mackerel and tuna), Gempylids, dolphinfish (*Coryphaena spp*.) and other billfish are important parts of the diet. Decapod molluscs and the larvae of Decapods, Isopods and Crustacea are also reported in other studies.

Adult habitat and distribution cannot be specified with any more precision than the very general description provided above for the species as a whole.

<u>Essential Fish Habitat</u>: Tropical species complex

Black marlin, although present, occurs in relatively low abundance in the Council's management area waters. This species apparently does not spawn in these waters.

Habitat description for black marlin (*Makaira indica*)

	Egg	**Larvae**	**Juvenile**
Duration	unknown, days	unknown, days to weeks	unknown, to 170-180 cm
Diet	NA	no information available	unknown
Distribution: General and Seasonal	East China Sea and Coral Sea (based on spawning areas)?	as with eggs	unknown
Location	continental shelf areas	continental shelf areas	unknown, probably shelf areas
Water Column	epipelagic	epipelagic	epipelagic
Bottom Type	NA	NA	NA
Oceanic Features	unknown	unknown	unknown

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6.5 Habitat description for striped marlin (*Tetrapturus audax*)

Management Plan and Area

American Samoa, Guam, MHI, NWHI, Northern Mariana Islands, Johnston Atoll, Kingman Reef, Palmyra Atoll, Jarvis Island, Midway Island, Howland and Baker Islands and Wake Islands.

Life History and General Description

In the Pacific the striped marlin (*Tetrapturus audax*) is distributed in two supra-equatorial bands that join at the eastern tropical margin. This has lead some researchers to divide the population into two separate stocks, at least for management purposes (Shomura 1975). Genetic analysis (of mitochondrial DNA) suggests a corresponding spatial partitioning in genotypes (Graves and McDowell 1994), confirming the belief in distinct stocks. This contrasts sharply with tuna species, which are comparatively uniform in their genetic composition. The authors suggest that this differentiation may be due to spawning site fidelity. Genetic divergence between striped marlin and white marlin (*T. albidus*), which occurs in the Atlantic Ocean, is apparently not much greater than variation within the Pacific striped marlin population (Graves and McDowell 1995). This suggests that striped and white marlin are not in fact be separate species (Graves and McDowell 1995). In addition, recent analysis of mitochondrial DNA (Finnerty and Block 1995) suggests that billfish (Istiophoridae and Xiphiidae) should be separated from the suborder

Scombroidae—also containing mackerel and tuna—to which they have traditionally been assigned.

There is no significant sexual dimorphism in this species, in contrast to the blue marlin.

Region-wide major catches of striped marlin are made by Japan and Korea. Important fishing areas include FAO Fishing Area 61 (northwest Pacific) where about 50% of the catch is made. Most of the catch is made by surface longlining that targets tunas (Nakamura 1985).

In the management plan area striped marlin are only landed in appreciable numbers in Hawaii. About 453.5 mt (1.0 million lb) were landed in Hawaii in 1996 and 544 mt (1.2 million lb) in 1996 (WPRFMC 1997). Almost 90% of commercial billfish landings were made by the longline fleet (WPRFMC 1997). No landings were reported from other areas in either year.

Egg and Larval Distribution

Distribution of eggs is unknown. Larvae are reportedly found between 10º–30ºN and 10º–30ºS. Peak abundance is in May-June in the northwestern Pacific (Ueyanagi and Wares 1975). This corresponds to the spawning ground described by Squire and Suzuki (1990). Thus spawning is probably seasonal and confined to the early summer months in both hemispheres. As noted, there is probably a separate spawning ground in the southwest Pacific. This would seem to be supported by genotype variability based on mitochondrial DNA analysis mentioned earlier (Graves and McDowell 1994). Description of larvae is based on specimens 2.9–21.2 mm in length (Ueyanagi and Wares 1975). Like other billfish, striped marlin are generally confined to pelagic surface waters; larvae may make diurnal vertical migrations in the top 50 m of the water column. Little is known about time of first feeding or food preferences. Striped marlin larvae may consume copepods up to about 13 mm (observed in Atlantic sailfish larvae) and other fish larvae after reaching a size of about 7 mm (Ueyanagi and Wares 1975).

Juvenile

Since marlin cannot yet be accurately aged, the age and duration of different life stages cannot be determined. Females are reported to reach first maturity at 50–80 lb; it is not possible to determine onset of sexual maturity in males because change in the size of testes is slight. As noted above, striped marlin spawn in the northwest Pacific and migrate eastward as juveniles (Squire and Suzuki 1990). This would account for the abundance of smaller fish in Hawaiian waters.

Adult

Tracking of adult striped marlin in Hawaiian waters using ultrasonic telemetry (Brill and Holts et al. 1993) indicate that they spend a significant amount of time in the upper 10 m of the water column. The tracked fish spent about 40% of their time between 51–90 m. The authors conclude that depth preference is governed by temperature stratification, with striped marlin preferring to remain in the mixed layer above the thermocline; the fish they tracked spend spent the vast majority of time in waters within 2ºC of the mixed layer temperature and never ventured into waters 8ºC colder than the mixed layer temperature. Thus these fish spent about 80% of their time in waters between 25.1º and 27ºC and never ventured into waters below 18ºC. This generally corresponds to the upper mixed layer for Hawaiian waters. There was no discernible diurnal pattern in horizontal movement. Striped marlin are also reported to swim very slowly at the surface with strong wind and high waves (Nakamura 1985).

Au (1991) found that billfish were caught in about 9% of purse-seine sets in the eastern Pacific with somewhat higher catch rates for sets around logs. Out of all billfish caught, blue and striped marlin accounted for 68.6% of the total. He states that billfish "probably follow tuna both as parasitic foragers and predators; they share many prey species with tunas and also east tunas, especially the smaller specimens."

As noted, striped marlin are distributed in a horseshoe pattern with the base of the U in the eastern Pacific. Generally, distribution corresponds to the 20º and 25ºC isotherms (Howard and Ueyanagi 1965). These authors distinguish a Northern Pacific Group found west of 140ºW and north of 15ºN, an Eastern Pacific Group east of 120ºW and west of 120ºW and south of 15ºS. These authors and others (Squire and Suzuki 1990) indicate that striped marlin occur in the equatorial region (the center of the U) but in very low densities. El Niño-related warming of waters along the American coast apparently leads to a northerly shift in striped marlin range (Squire 1987).

Striped marlin are found in greater numbers in the North Pacific with higher catch rates found in the north central, northeast and southeast Pacific (Shomura 1975).

Squire and Suzuki (1990) argue that striped marlin make long-term migrations between spawning and feeding areas. The spawning areas are in the northwest and to a lesser extent the southwest Pacific. Young fish migrate eastward to feeding areas off the Central American coast and the return westward as adults.

Seasonal patterns generally conform to water temperature related changes in range. In Hawaiian waters striped marlin are more common in the winter months (Ueyanagi and Wares

1975). Howard and Ueyanagi (1965) give the following seasonal distribution for the North Pacific Group for waters of the central Pacific:

From the above table it can be seen that Hawaii benefits from the southern migration during winter months. Size distribution of catch is bimodal. The smaller fish appear in catches in the winter season, and they grow to 50–60 lb in May and June while in this area. They disappear from these waters during the summer. This indicates the fish migrate to northern waters during this time. There the fish stay several months and grow. Then they migrate back to Hawaiian waters where they become part of larger fish in the next year (Howard and Ueyanagi 1965)

Adult marlin feed on a variety of pelagic species. Nakamura (1985) states that striped marlin "tends to feed more on epipelagic organisms and less on mesopelagic ones that the swordfish and the oceanic tunas." Common food items are squid, scombrids and gempylids (Nakamura 1985, Ueyanagi and Wares 1975). In California food species included *Cololabis saira*, *Engraulis mordax*, *Sardinops caeruleas* and *Trachurus symmetricus* (Nakamura 1985, Ueyanagi and Wares 1975).

Habitat description for striped marlin (*Tetrapturus audax*)

	Egg	**Larvae**	**Juvenile**
Duration	24 hr.?	to 22 mm (2–3 weeks)?	to 25–35 kg
Diet	NA	zooplankton, fish larvae	cephalopods, scombrids, gempylids
Distribution: General and Seasonal	seasonal, early summer months in both hemispheres	seasonal, early summer months in both hemispheres	migrating eastward from spawning area in western Pacific?
Location	offshore waters	offshore waters	offshore waters
Water Column	epipelagic	epipelagic	pelagic, upper mixed layer
Bottom Type	NA	NA	NA
Oceanic Features	depends on adult distribution	depends on adult distribution	eddies, upwelling, oceanic fronts and other areas of high productivity

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[WPRFMC] Western Pacific Regional Fishery Management Council. 1997. Pelagic Fisheries of the Western Pacific Region, 1996 Annual Report. Honolulu: Western Pacific Regional Fishery Management Council.

6.6 Habitat description for shortbill spearfish (*Tetrapturus angustirostris*

Management Plan and Area

American Samoa, Guam, MHI, NWHI, Northern Mariana Islands, Johnston Atoll, Kingman Reef, Palmyra Atoll, Jarvis Island, Midway Island, Howland and Baker Islands and Wake Islands.

Life History and General Description

The shortbill spearfish is an Istiophorid billfish and shares the genus with five other species. Penrith (1964) identified a cline in pectoral fin length, increasing eastward in the Pacific. This was believed to be a result of geographic variation. No other information is available to suggest possible sub-populations.

Kikawa (1975), summarizing various works, describes the total distribution as sporadic between 10ºN and 10ºS with possible range extent to 30ºN and 30ºS, based on longline catch data. Nakamura (1985) gives a range of 40ºN to 35ºS for the Pacific. While dispersed throughout the tropics, density is always low. Nakamura further states that the shortbill spearfish "is an oceanic pelagic fish which does not generally occur in coastal or enclosed waters but is found well offshore. Longline fisheries in the equatorial Indian Ocean take relatively few individuals in the upper water layers (0–200 m) over depths shallower than 914 m (500 fm) while the highest catch rates are obtained above the 915 m to 1,830 m (501 to 1000 fm) isobaths." Boggs (1992), conducting research on longline capture depth, obtained different results. On a 1989 expeditions the highest catch rates were obtained at 120-360 m with a few fish caught as deep as 280–360 m. In 1990 the highest catch rates were shallow, 40–80 m with no catch below 200 m. This distribution is described as "into the middle of the thermocline" (Boggs 1992) that begins at 120 m and 20ºC. Nakano et al. (1997), analyzing catch depth data from research cruises in the mid-Pacific, classes shortbill spearfish among fish for which catch rate declines with depth. The hypothetical habitat for this fish may be described as open ocean epipelagic or mesopelagic waters (200–1000 m.) in the tropics and subtropics. No precise data can be given on limiting environmental parameter for this habitat.

No information was found in the literature about migration patterns or seasonal changes in abundance for this species. The species is distributed sparsely and no specific habitat features affecting abundance can be identified.

No information on age is available. In his review, Kikawa (1975) gives maximum sizes; fish over 20 kg are rare and the largest reported specimen was about 52 kg.

Spearfish are heterosexual and no sexual dimorphism is reported.

Shortbill spearfish apparently spawn in winter months in tropical and subtropical waters between 25ºN and 25ºS. Kikawa (1975) notes that unlike other billfish spawning does not "take place in large groups over a very short period of time, but probably is continuous over a long period and over a broad areas of the sea." As individual females become ripe the male fish follows the female.

There is no special fishery for spearfish; they are caught incidentally by longliners and rarely by surface troll. Nakamura (1985) states that catch statistics in Japanese longline fishery typically lump sailfish (*Istiophorus platypterus*) with the shortbill spearfish but the latter may be differentiated as those caught offshore. The spearfish proportion of the total is considered negligible.

In the western Pacific region spearfish are not differentiated in longline logbook reporting (WPRFMC 1997). Guam reported landings of 967 lb in 1996 based on its creel census. Obviously, this fish is a minor constituent of commercial fisheries and caught with extreme rarity, if at all, in recreational fisheries.

Egg and Larval Distribution

Merrett (1971) provides two estimates of fecundity: 6.2 and 2.1 million eggs for females 1.39 m long (from center of orbit to shortest caudal ray). Egg diameters range from 1.3 to 1.6 mm.

No upper limit is given for larval size although Kikawa (1975) reports a juvenile specimen as 514 mm SL. He also provides a description of larval development.

Uotani and Ueyanagi (1997) found that the *Corycaeus* copepod, *Evadne* and fish larvae were major food items for larval spearfish. (Although this paper is in Japanese, Table 1 (p 109) gives the frequency of occurrence for food items in roman text.) Fish larvae increase from 0% of the diet at 5.0 mm TL to about 40% at 15.0 mm TL.

No information is available for larval distribution beyond the presumed extent of spawning described above. The hypothetical habitat for larvae presumably accords to this spawning range.

Juvenile

No information is available on juvenile behavior or habitat.

Adult

Kikawa (1975) reports the lengths for three specimens in ripe condition; they were 1.52 m (bill tip to origin of lateral keels), 1.64 m (bill tip to caudal fork) and 1.39 m (center of orbit to shortest caudal ray). No more precise information is given for size or age at maturity.

Kikawa (1975), summarizing various studies, states that the diet of the spearfish is essentially similar to other billfish, which are in turn similar to that of tuna. Prey items include squid and fish of the Lepidotidae, Alepisauridae, Acinaceidae and Katsuwonidae.

The hypothetical habitat or known range for adults is not known to be significantly different from that for the species as described above. No features are known that affect abundance.

<u>Essential Fish Habitat</u>: Tropical species complex

In regards to this species, EFH is not a very useful concept because of its wide and sparse distribution. In addition, relatively little is known about its biology. EFH can only be described as epipelagic and mesopelagic tropical and subtropical waters. No features are known to identify Areas of Particular Concern. Howard and Ueyanagi (1965) provide a distribution map which is reproduced in Kikawa (1975).

Habitat description for shortbill spearfish (*Tetrapturus angustirostris*)

	Egg	**Larvae**	**Juvenile**
Duration	unknown	unknown	unknown, but juvenile described as 510 mm
Diet	NA	fish larvae, copepods	unknown
Distribution: General and Seasonal	tropics between 25º N and 25º S	same as eggs	unknown
Location	open ocean	open ocean	open ocean
Water Column	epipelagic	epipelagic	unknown, presumably epipelagic
Bottom Type	NA	NA	NA
Oceanic Features	unknown	unknown	unknown

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[WPRFMC] Western Pacific Regional Fishery Management Council. 1997. Pelagic Fisheries of the Western Pacific Region 1996 Annual Report. Honolulu: Western Pacific Regional Fishery Management Council. 26 p. + appendices.

6.7 Habitat description for broadbill swordfish (*Xiphias gladius*)

Management Plan and Area

American Samoa, Guam, MHI, NWHI, Northern Mariana Islands, Johnston Atoll, Kingman Reef, Midway Island, Palmyra Atoll, Jarvis Island, Howland and Baker Islands and Wake Island.

Life History and General Description

Numerous studies on the taxonomy, biology, diet, stock structure and exploitation of broadbill swordfish have been conducted. Information on billfishes, including swordfish is summarized in Nakamura et al. (1968) and Nakamura (1985). Palko et al. (1981) provide a detailed synopsis of the biology of broadbill swordfish from literature available at the time of their publication. A more recent review is available in Joseph et al. (1994). Recent information on the species and research being conducted on Pacific swordfish can be found in papers submitted to the First International Pacific Swordfish Symposium (1994 Dec 11–14; Ensenada, Mexico) and the Second International Pacific Swordfish Symposium (1996 Mar 3–6; Kahuku, HI). A great deal of information on Pacific swordfish is available with the NMFS Honolulu Laboratory that is conducting research in several areas, including the age, growth, reproductive biology, distribution and abundance of north Pacific swordfish.

Broadbill swordfish are worldwide in distribution in all tropical, subtropical and temperate seas, ranging from around 50°N to 50°S (Nakamura 1985, Bartoo and Coan 1989). The adults can tolerate a wide range of water temperature, from 5°–27°C but are normally found in areas with SSTs above 13°C (Nakamura 1985). Larvae and juveniles occur in warmer tropical and subtropical regions where spawning also occurs. Swordfish occur throughout the entire region of the Council's jurisdiction and in all neighboring states, territories and adjacent high seas zones.

Broadbill swordfish have separate sexes with no apparent sexual dimorphism, although females attain a larger size. Fertilization is external and the fish are believed to spawn close to the surface. There is some evidence for pairing up of spawning adults as the fish apparently do not school (Palko et al. 1981).

Swordfish are voracious feeders at all life stages. Adults feed opportunistically on a wide range of squids, fish and crustaceans. Sex ratio appears to vary with fish size and spatial distribution. Most large sized fish are females and females appear to be more common in cooler waters. Beckett (1974) noted that few males were found in waters below 18°C but make up the majority of warm water landings. Details of growth, maturity, fecundity and spawning are given later in this report.

Little is known about migration in Pacific swordfish although limited tagging data supports a general west to east movement from Hawaii toward North America. An association with cephalopod prey concentrated near frontal boundaries appears more significant in determining the distribution of swordfish in the north Pacific, and further research on the role of food and frontal systems is ongoing (Seki 1993, 1996).

Broadbill swordfish are targeted by a Hawaii based longline fishery that occurs primarily to the north of the EEZ. Incidental or targeted catches within the Hawaii EEZ are made by longline and handline vessels fishing primarily for tuna species. Incidental longline catches occur in other areas of Council jurisdiction but are not well documented.

Egg and Larval Distribution

Swordfish eggs measure 1.6–1.8 mm in diameter, are transparent and float at the sea surface due to the presence of a single oil droplet (Sanzo 1922). The incubation period is approximately 2.5 days (Palko et al. 1981). Newly hatched yolk-sac larvae have been measured at 4.0–4.45 mm in length (Fritzsche 1978, Yasuda et al. 1978). Larvae have been noted in tropical and subtropical waters of the three major oceans between about 30°N and 30°S. In a survey of swordfish larvae collections, Grall et al. (1983) determined that larval swordfish were abundant in the Pacific within latitudes 35°N to 25°S. Peak spawning occurs in the north Pacific between May and August, from December to January in the south Pacific and March to July in the central Pacific (Nishikawa et al. 1978, Palko et al. 1981). Sexually mature and ripening female swordfish have been noted in Hawaiian waters during the spring and early summer (Uchiyama and Shomura 1974). This observation is in agreement with an estimated spawning period of April to July based on the collection of larvae and juveniles near Hawaii (Matsumoto and Kazama 1974). It is probable that some degree of spawning occurs throughout the year in tropical waters, between 20°N and 20°S, with the distribution of larvae associated with SSTs between 24° and 29°C (Tåning 1955, Yabe et al. 1959, Nishikawa and Ueyanagi 1974).

Larval swordfish are believed to occupy surface waters where almost all catches have been made using plankton and dip nets (Tåning 1955, Nishikawa and Ueyanagi 1974). Larval swordfish are found within a SST range of 24° to 29°C and have been found in the Pacific where salinity ranged from 34.4–36.4 ‰ (Matsumoto and Kazama 1974). Larval abundance is high along sharp thermal and salinity gradients. However, this phenomenon may be due to passive collection along boundary areas.

The larval and young actively feed on zooplankton during the day and become piscivorous by 11–12 mm in length, feeding on a variety of epipelagic fish larvae (Arata 1954, Grobunova 1969). The young swordfish are voracious feeders; an 8 mm specimen will swallow prey as long as themselves (Tåning 1955). In contrast, Yabe et al. (1959) observed that Pacific swordfish of 9.0–14.0 mm fed on crustacean zooplankton and did not graduate to fish prey until 21 mm in length.

Juvenile

Young swordfish gradually metamorphose from larval state to adult, and it is difficult to elect a length or age when the juvenile stage has been reached. However, early development is rapid and juvenile fish greater than approximately 55 cm resemble a miniature adult swordfish. In the Pacific, fish of this size (51–61 cm) have been estimated to be approximately one year old (Yabe et al. 1959, Dewees 1992).

There are few specific references on the distribution of juvenile swordfish in the Pacific. However, swordfish recruit to longline gear at juvenile sizes of approximately 50 to 80 cm (rear of orbit to caudal fork), which can be monitored by catch statistics. Dewees (1992) states that swordfish tend to concentrate along productive thermal boundaries between cold upwelled water and warmer water masses where they feed on fish and squid. Gorbunova (1969) suggested that juvenile swordfish in the Pacific are restricted to areas of upwelling and high productivity and do not move far during the first year of life. Yabe et al. (1959) state that young swordfish originate in tropical and subtropical regions and migrate to higher latitudes as they increase in size.

Adult

Adult swordfish are the most widely distributed of all billfish species, ranging from approximately 50°N to 50°S in the Pacific as indicated by catch records of commercial longline vessels. Adult swordfish are able to occupy a very wide range of water temperatures, from 5°–27°C with a preferred temperature range of 18°–22°C (Nakamura 1985). The species can exceed 500 kg in weight with females growing larger than males. The larger fish occupy cooler waters, with few fish less than 90 kg and few males found in waters less than 18°C (Palko 1981).

Information on age and growth of swordfish is the subject of intense study, and findings have been somewhat contradictory. Age studies based on otolith analysis and other methods (length frequency, vertebrae, fin rays, growth studies) are reviewed by Sosa-Nishizaki (1996) and Ehrhardt (1996). Wilson and Dean (1983) estimated a maximum age or 9 years for males and 15 years for females from otolith analysis. Radtke and Hurley (1983), using otoliths estimated a maximum age of 14 years for males and 32 years for females. The assumed daily and annular increments used in these analyses have not yet been validated.

Research on the reproductive biology and size at maturity of swordfish is reviewed by DeMartini (1996). Yabe et al. (1959) estimate that swordfish reach maturity between 5 and 6 years of age at a size of 150–170 cm (eye to fork length). Sosa-Nishizaki (1990) estimate that female swordfish in the Pacific mature at 140–180 cm based on gonad indices. Arocha and Lee (1995) estimated a length at 50% maturity of 179–189 cm and 119–129 cm for female and male swordfish from the northwest Atlantic fishery. Length at first maturity has been observed in females as small as 101–110 cm (Nakano and Bayliff 1992). Spawning occurs in the upper mixed layer of the water column from the surface to 75 m (Nakamura 1985). Additional information on swordfish spawning is discussed in the section describing egg and larval distribution.

Optimal SSTs for swordfish are around 25°–29°C (Tåning 1955), which implies swordfish spend the majority of their time in cooler sub-surface waters. Swordfish can forage at great depths and have been photographed at a depth of 1,000 m by deep diving submersible (Mather 1976). Carey (1982) and other researchers have suggested that specialized tissues warm the brain and eyes, allowing swordfish to successfully forage at great depths in frigid waters. Holts (1994) used acoustic telemetry to monitor an adult swordfish and notes that the fish spent about 75% of its time in or just below the upper mixed layer at depths of 10 to 50 m in water temperatures about 14°C and made excursions to approximately 300 m where the water was close to 8°C.

The horizontal and vertical movements of several swordfish tracked by acoustic telemetry in the Atlantic and Pacific are documented by Carey and Robison (1981). Studies have noted a general pattern of remaining at depth, sometimes near the bottom, during the day and rising to the near the surface during the night which is believed to be a foraging strategy. They further proposed that differences in preferred diving depths between areas were due to an avoidance of depth strata with low dissolved oxygen.

Adult swordfish are opportunistic feeders, preying heavily on squid and various fish species. It is generally accepted that swordfish in the pelagic environment feed on squid and mesopelagic fish and forage on demersal fish when in shallower waters (Scott and Tibbo 1968, Palko 1981, Nakamura 1985, Stillwell and Johler 1985, Bello 1990, Carey 1990, Moreia 1990, Holts 1994, Markaida and Sosa-Nishizaki 1994, Barreto et al. 1995, Clarke et al. 1995, Hernandez-Garcia 1995, Orsi Relini 1995, Barreto 1996).

Oceanographic features that tend to concentrate forage species apparently have a significant influence on adult swordfish distributions. Swordfish are relatively abundant near boundary zones where sharp gradients of temperature and salinity exist (Palko 1981). Sakagawa (1989) notes that swordfish are found in areas of high productivity where forage species are abundant near current boundaries and frontal zones. The relationship between large-scale frontal systems, forage species and swordfish distribution and abundance in the North Pacific is currently a research priority of the NMFS Honolulu Laboratory.

<u>Essential Fish Habitat</u>: Temperate species complex

Habitat description for broadbill swordfish (*Xiphias gladius*)

	Egg	**Larvae**	**Juvenile**
Duration	approximately 2.5 days	uncertain	approximately 5 years
Diet	NA	zooplankton, larval fish	cephalopods and fish, few crustaceans
Season/Time	throughout the year 20°N–20°S, between 35°N and 25°S at SST between 24°– 29°C	throughout the year 20°N–20°S, between 35°N and 25°S at SST between 24°–29°C	tropical and subtropical regions, moving to higher latitudes with age
Location	offshore waters	offshore waters	offshore waters
Water Column	epipelagic	epipelagic	pelagic, upper mixed layer

Bottom type	NA	NA	NA
Oceanic Features	areas of sharp thermal and salinity gradients	areas of sharp thermal and salinity gradients	productive thermal boundary regions, areas of upwelling and convergence

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6.8 Habitat description for sailfish (*Istiophorus platypterus*)

Management Plan and Area

American Samoa, Guam, MHI, NWHI, Northern Mariana Islands, Johnston Atoll, Kingman Reef, Palmyra Atoll, Jarvis Island, Midway Island, Howland and Baker Islands and Wake Islands.

Life History and General Description

The main source for this description is Beardsley et al. (1975).

The sailfish is an Istiophorod billfish, sharing the genus with the Atlantic sailfish (*I. albicans*). Graves and McDowell (1995), using RFLP analysis of mitochondrial DNA, have called for a re-evaluation of the taxonomic separation of these two species (as well as other inter-oceanic distinctions among other Istophorod billfish), while noting considerable intra-oceanic genetic diversity, suggesting population structure. However, no information was found concerning possible sub-populations in the Pacific.

Howard and Ueyanagi (1965) emphasize that sailfish are more common near land masses. In the western Pacific they identify areas of high density near the land masses of Papua New Guinea, Caroline Islands and Solomon Islands, as well as in the Banda Sea, Timor Sea, East China sea and the waters east of Taiwan to southwestern Japan. They note that both adults and young are associated with the KuroshioCurrent, migrating to the coastal waters of southern Japan in this current. Beardsley et al. (1975) describe the Pacific distribution as more extensive in the western half than eastern and note that catch data show a distribution from 27ºS to 40ºN in the west and 5ºS to 25ºN in the east. In describing habitat parameters, they state, “The vertical zone of the community in which the sailfish lives is characterized by good illumination and is likely to be delimited below by temperature at the main thermocline (from 10–20 m to 200–250 m, depending on area). Temperature is apparently important also in the latitudinal distribution of the species.…” They suggest the 28º isotherm as optimal. Salinity may also have an effect. Kuwahara et al. (1982) note a negative correlation between catch and salinity for landings of Kyoto Prefecture in Japan. Nakamura (1985) notes that maximum abundance in the Indian Ocean is correlated with a maximum temperature of the East African Coastal Current of 29º–30º and low salinity of 32.2–33.3 º/00. He also notes that sailfish share habitat with the black marlin (*Makaira indica*), another managed species. Hypothetical habitat may be described based on these parameters, but only in general terms.

Howard and Ueyanagi (1965) note that there is limited information on which to postulate migration patterns. However, radioactively contaminated sailfish “began to occur throughout the entire western Pacific Ocean several months after the nuclear bomb test explosions at Bikini in 1954,” they say. This suggests interchange of fish between low and high latitude areas. There may also be a seasonal component to migration. Nakamura (1985) states that in the Sea of Japan sailfish “migrate with the Tsushima current (a branch of the Kuroshio) during summer (peak later summer), and southward against the current during autumn (peak in early autumn).” As noted above, in the eastern Pacific, migration is correlated with seasonal movement of the 28º isotherm. Sailfish form schools of 3 to 30 individuals and apparently school by size, at least in coastal Japan (Nakamura 1985, Beardsley et al. 1975).

The only habitat feature consistently mentioned in the literature that affects abundance and density of population (indicating preferred habitat) is the sailfish's preference for continental coasts.

As with other billfish, the age of individual sailfish is difficult to determine by analysis of hard parts. They apparently grow rapidly; Beardsley et al. (1975) give the following lengths at age: 1 year—183 cm, 2 years—216 cm and 3 years—233.7 cm. Prince et al. (1986) suggest a revision of the maximum age of sailfish based on a tag recapture. They estimate a maximum age of 13–15 years or more in contrast to earlier estimates in the range of 7 years.

Sailfish are heterosexual and do not exhibit sexual dimorphism.

De Sylva and Breder (1997), discussing Atlantic billfish, note that sailfish can spawn up to four times in a single season and males year around. They found that the sailfish spawning season of the US southeast Atlantic coast spanned April to October. They also state sailfish are largely coastal spawners. Nakamura (1985) states that in the Pacific sailfish spawn year around in the tropics with summer spawning at higher latitudes.

Most of the sailfish landings in the Pacific fisheries are made in the northwest and eastern central Pacific, mainly by Japanese and Korean vessels (Nakamura 1985). Longliners are undoubtedly the major gear type reflected in this description.

Hawaii commercial catch statistics do not separate out sailfish. The total for the "other billfish" category was 400,000 lb in 1996, the most recent published statistics (WPRFMC 1997). From the same source Guam reported no landings of sailfish; American Samoa reported 5,535 lb landed; and the Northern Marina Islands 545 lb. It can be seen that sailfish are a minor commercial species. Looking only at American Samoa, Guam and the Northern Mariana Islands, where landings for sailfish are reported separately, they represent less than half a percent of total PMUS landings. If this rate were applied to total Hawaii PMUS landings, 1996 sailfish landings would be about 130,000 lb. However, sailfish are an esteemed gamefish and is valuable to the charter boat fishery.

Egg and Larval Distribution

De Sylva and Breder (1997) give a recent detailed description of gonadal development based on Atlantic samples. Eggs are described as about 0.85 mm in diameter with a single oil globule surrounded by a pale yellow indefinite nimbus (Nakamura 1985, Beardsley et al. 1975). Duration of the egg phase is not stated in these sources but is probably similar to other billfishes.

Beardsley et al. (1975) summarize larval and juvenile development, stating that the transformation from larval to adolescent phase is without distinct break so the two phases are described together. Post et al. (1997) were able to capture larval sailfish and keep them alive in the laboratory for a maximum of 72 hours. However, they provide little information on larval behavior beyond noting that the larvae exhibited "extremely rapid swimming that led to contact wit the tank sides and bottom. Typically, fish maintained this pattern until their death." The larvae successfully fed on *Artemia* in the laboratory tanks. Summarizing other studies, Beardsley et al. (1975) state that larvae feed on copepods and fish larvae. The authors reproduce a table from Gehringer (1956) detailing larval stomach contents. Based on drawing reproduced in Beardsley et al. (1975), the transition from larval to adolescent phase occurs between 30 mm and 100 mm.

Little can be said about the distribution or habitat of larval sailfish beyond what has already been summarized about distribution of spawning activity. Post et al. (1997) noted a higher CPUE for larval sailfish during the first quarter of the moon phase.

Juvenile

No information was found on juvenile distribution, behavior or preferred habitat beyond the aforementioned observation that sailfish tend to school by size.

Adult

Nakamura (1985) gives a maximum size of 340 cm and 100 kg. De Sylva and Breder (1997) give the weight at first maturity for females as 13–18 kg and males at 10 kg. This accords with an age of 12–18 months.

Beardsley et al. (1975) give a summary of the sailfish diet based on stomach content analysis. They suggest that there is "a general consensus that although fish and squid form the major portion of their diet, adult sailfish are fairly opportunistic feeders and eat whatever happens to be present."

No additional habitat features affecting density and abundance can be described for adults that differ significantly from that of the species as a whole.

<u>Essential Fish Habitat</u>: Tropical species complex

In the western Pacific region, sailfish occur as a minor incidental catch in commercial fisheries. A few habitat parameters have been noted. This species seems to prefer continental margin areas. The description of EFH for sailfish has been based on the best available scientific information and the requirements of ecologically related managed species. Beardsley et al. (1975) reproduce a distribution map.

Habitat description for sailfish (*Istiophorus platypterus*)

	Egg	**Larvae**	**Juvenile**
Duration	unknown, hours or days	unknown, weeks	to 12–18 months
Diet	NA	copepods and fish larvae	unknown
Distribution: General and Seasonal	unknown, sailfish spawn year around in tropics, seasonally in cooler waters	unknown, probably similar to eggs	unknown, probably generally similar to adults
Location	higher density in coastal waters	higher density in coastal waters	unknown, probably similar to adults
Water Column	epipelagic	epipelagic	epipelagic
Bottom Type	NA	NA	NA
Oceanic Features	unknown	unknown	unknown

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[WPRFMC] Western Pacific Regional Fishery Management Council. 1997. Pelagic Fisheries of the Western Pacific Region 1996 Annual Report. Western Pacific Regional Fishery Management Council. 26 pp. + appendices.

6.9 Habitat description for blue shark (*Prionace glauca*)

Management Plan and Area

American Samoa, Guam, MHI, NWHI, Northern Mariana Islands, Johnston Atoll, Kingman Reef, Palmyra Atoll, Jarvis Island, Howland and Baker Islands, Midway Island and Wake Island.

Blue shark within the jurisdiction of the Western Pacific Regional Fishery Management Council (Council) are managed within the requium shark category (family Carcharhinidae) under the Fishery Management Plan (FMP) for the Pelagic Fisheries of the Western Pacific Region. Blue sharks occur throughout the entire region of the Council's jurisdiction and in all neighboring states, territories and adjacent high seas zones.

Life History and General Description

Several studies have examined the life history, distribution and behavior of blue sharks at different locations worldwide (e.g., Strasburg 1958, Hazin et al. 1994, Gruber 1991, Nakano 1994). For a general review of blue shark life history and distribution see Compagno (1984). Information on elasmobranch fisheries and bycatch is given in Pepperell (1992) and Bonfil (1994).

The blue shark is an oceanic-epipelagic and fringe littoral species with a circumglobal distribution. The species is relatively fecund for a requium shark. It is found in all temperate and tropical oceans and is thought to be the most wide ranging shark species. The basic environmental conditions favorable for survival include oceanic waters between 6°C and 28°C, but it prefers cooler water temperatures between 7°C and 16°C (Strasburg 1958, Compagno 1984). In tropical waters, blue shark exhibit submergence and are typically found at greater depths. In temperate waters, blue sharks are caught within the mixed layer and generally range between the surface and upper layer of the thermocline (Strasburg 1958, Nakano et al. 1985), but have been documented as deep as 650 m (Carey and Scharold 1990). In the Pacific blue sharks are most predominant between 35°N and 45°N (Nakano 1994, Stasburg 1958).

Age and growth studies of blue sharks indicate that they may reach maturity in 6 to 7 years (Compagno 1984, Nakano 1994), although there may be regional differences in growth rate (Tanaka et al. 1990, Cailliet and Bedford 1983). They are believed to be opportunistic feeders at all life stages and prey primary on small pelagic fishes, crustaceans and cephalopods (Strasburg 1958, Stevens 1973, Tricas 1979). Blue sharks have also demonstrated seasonal shifts in diet when prey such as squid become abundant during mass spawning events (Tricas 1979).

The blue shark is viviparous with a yolk-sac placenta. Litter size is relatively large but variable ranging from 4 to 135 pups and may be dependent on the size of female (Gubanov and Grigor'yev 1975, Pratt 1979, Nakano 1994). In the Pacific it is thought that mating occurs during the summer months in the equatorial region from May to August (Nakano 1994). Gestation period is thought to range from 9 to 12 months and may vary depending on location (Suda 1953, Nakano 1994). Females have been demonstrated to store sperm, which may also explain variability in gestation period estimates (Pratt 1979). Late term pregnant females are found in the northern Pacific in summer months where they give birth to large, well-developed pups averaging 36 cm FL. The lengthy gestation period and geographic separation of mating and birthing grounds suggests that mature females in the Pacific may reproduce every other year (Nakano 1994).

Seasonal migrations are thought to occur in the Atlantic, Pacific and Indian Ocean populations with seasonal periods of sexual segregation (Casey 1985, Stevens 1992, Nakano 1994). A large-scale shark tag and recapture program has confirmed a clockwise migrations pattern in the North Atlantic population suggesting blue sharks may follow the Gulf Stream (Casey 1985). However, migratory behavior in the Pacific and Indian Oceans is not known but has been proposed from length frequency and sex ration analysis of shark catch. A shark tagging program has recently been initiated by California Fish and Game further elucidate the migratory movements of blue sharks in the eastern Pacific (Laughlin 1997). However, only limited blue shark tagging has been conducted in the central Pacific, and thus, the extent of blue shark migrations in the central Pacific are still unconfirmed. Currently, the NMFS Honolulu Laboratory is collaborating with the National Research Institute of Far Seas Fisheries (Japan) to tag blue sharks in the north Pacific.

Blue sharks appear to aggregate in loose schools and are generally caught more frequently over depths greater than 1,000 m (Hazin et al. 1993, Ito and Machado 1997). They exhibit diel diving behavior similar to that of other pelagic teleosts and sharks (Sciarrota and Nelson 1977, Carey and Scharold 1990) and appear to show a fair degree of niche overlap with swordfish (C. Boggs, pers. comm.). Blue sharks are a bycatch of pelagic longline fisheries for tuna and swordfish in the Pacific and can seasonally comprise the largest percentage of the catch in some fisheries. In recent years there has been an increase in the number of blue sharks retained for their fins in the tuna and swordfish longline fishery in Hawaii (Ito and Machado 1997). The meat is seldom landed and sold at market because it has a low commercial value. Approximately 95% of shark fins landed in Honolulu by the pelagic longline fishery are from blue shark (WPRFMC 1997).

Neonate and Juvenile Distribution

Little is known about neonatal and juvenile blue sharks in the Pacific other than their general distribution. Young-of-the-year blue sharks (< 50 cm FL) were more frequently caught in large mesh drift-net fishery in the northern Pacific (35°N to 45°N), which is believed to be a parturition (birthing) area. It has been suggested that the separation of the parturition area from the adults habitats may serve to reduce predation on pups from adult sharks (Nakano 1994). Unfortunately, there is little known about the feeding habits or depth preferences of juveniles in their nursery grounds, although it has been speculated that nursery grounds are located in the more productive subarctic boundary where there may be more food for the young sharks (Nakano 1994).

Subadult

Subadult blue sharks appear to segregate according to sex in the Pacific. After leaving their parturition area, 2- to 5-year-old females are more frequently caught further northward (40°N to 50°N), while 2- to 4-year-old males move southward (30°N to 40°N) (Nakano 1994). Little is known about the feeding habits and depth preferences of subadults due to lack of study.

Adult

Adult blue sharks exhibit seasonal sexual segregation as well as possible migratory behavior. In the Pacific, adults range from equatorial waters to 40°N. In Nakano’s study (1994), adult females were predominant in waters off Japan throughout the year and in areas near the subarctic boundary in the summer, while males were most common in waters south of the subarctic boundary. In early summer reproductively ready females reportedly move to southern waters to mate with males. Large numbers of females exhibiting bite marks associated with recent matings were seen at equatorial latitudes. After mating, pregnant females reportedly migrate north where they give birth the following year (Nakano 1994).

Based on spatial and temporal changes in blue shark abundance in the Pacific, it is suspected that the north-south difference in catch rates of blue sharks is mediated by the transition zone. This is the area of water between the cooler Aleutian Current and the warmer water from the North Pacific Current. This transition zone shifts from 31°N and 36°N in the winter to 41°N and 36°N in the fall. Most of the larger catches of blue sharks have been made in or just south of this zone (Strasburg 1958).

Diel movements of blue sharks acoustically tracked off Southern California and in the North Atlantic indicate that adult blue sharks increase their activity at night and make shallower dives than during the day. Sharks tracked off Southern California ventured inshore at night, presumably to feed on seasonally available spawning squid (Sciarrota and Nelson 1977). The cyclical diving behavior is thought to serve as either a hunting, orientation and/or thermoregulatory function (Carey and Scharold 1990).

Although adult blue sharks are opportunistic feeders and prey mainly on small pelagic fishes, cephalopods and crustacean, they have also been observed scavenging on marine mammal carcasses at sea. Unfortunately, there are little data on the diet composition of blue sharks in the central Pacific.

Habitat description for blue shark (*Prionace glauca*)

	Gestation	**Juvenile**	**Subadult**
Duration	9-12 months	~ 1–2 years	~ 2–6 years
Diet	NA	small fishes, cephalopods, crustaceans	small fishes, cephalopods, crustaceans
Season/Time	throughout year	between 35°N and 45°N	females: between 40°N and 50°N males: between 30°N and 40°N
Location	offshore	offshore	offshore
Water Column	NA	epipelagic	epipelagic
Bottom type	NA	NA	NA
Oceanic Features	NA	subarctic boundary	females: cooler waters males: warmer waters

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6.10 Habitat description for pelagic sharks (Alopiidae, Carcharinidae, Lamnidae, Sphynidae)

Management Plan and Area

American Samoa, Guam, MHI, NWHI, Northern Mariana Islands, Johnston Atoll, Kingman Reef, Palmyra Atoll, Jarvis Island, Midway Island, Howland and Baker Islands and Wake Islands.

Life History and General Description

Sharks are only identified at the family level for the purpose of management. The four families identified comprise some 65 species, although the vast majority (48 species) are Carcharinids. Table 1, derived from Compagno (1984), lists all species in these families occurring in FAO Fishing Areas 71 and 77, which cover the management area. However, of this total many do not or may not occur in the management area. The table below summarizes this information.

Family	Total Species	Number of species in FAO Area 71 and 77	Possibly in Management Area	Definitely in Management Area
Alopiidae	3	3	-	3
Lamnidae	5	4	1	3
Carcharinidae	48	38	9	12
Sphyrnidae	9	7	1	2

Table 1: Summary of species occurring in management area

According to logbook data from the Hawaii-based longline fishery about 93% of sharks landed are blue sharks (*Prionace glauca*). Of the remainder, about 1.5% are mako sharks (family Lamnidae) and about 3% are thresher sharks (family Alopiidae). This leaves a remainder of about 3% in the “other” category. Table 2 below is based on observer “raw” data, representing total sharks recorded between 1994–1997. Since observer coverage is low and there may be uncorrected biases in the data it should be treated with caution. Nonetheless, it gives some indication of the relative frequency of capture for various sharks. Because of their predominance in the fishery, a separate habitat description has been prepared for the blue shark. Since the remainder of the species are caught in relatively small numbers, habitat and life history will only be discussed at a general or family level.

Strasburg (1958) reports shark landings during the fishery assessment cruises that were part of the Pacific Oceanic Fishery Investigations carried out by the US Fish and Wildlife Service from 1952 to 1955. Twelve species are mentioned in the text. One of these, *Galcorhinus zypterus* (the “soupfin shark”) now classed as *G. galeus* (the tope shark) (Compagno 1984), is in family Triakidae and therefore not a MUS. Of the remainder three were considered common, *Prionace glauca*, *Carcharinus longimanus* (oceanic whitetip) and *Carcharinus falciformus* (the silky shark) Uncommon sharks were *Isurus oxyrinchus* (shortfin mako), the three species of threshers (family Alopiidae) and *Lamna ditropis*, the salmon shark. Eight *G. galeus*, four hammerheads (the two species in family Sphyrnidae that occur in the management area, *Sphyrna lewini* and *S. zygaena*) and two *Carcharinus melanopterus* (blacktip reef shark) were also landed.

Crow et al. (1996) give life history information on 11 species of shark caught in Hawaii during control programs carried out between 1959 and 1980. A total of 15 different species were caught in these programs. Three species, *Hexanchus griseus* (bluntnose six gill), *Echinorhinus cookei* (prickly shark) and *Pseudotriakis microdon* (false cat shark) are deepwater forms. None of these species fall into the four MUS families. Commonly caught species include *Carcharhinus altimus*, *C. limbatus* (blacktip reef shark), *C. plumbeus*, *C. amblyrynchos* (gray reef shark), *C. galapagensis*, *Sphyrna lewini* and *Galeocerdo cuvier*. The pelagic sharks *Isurus oxyrinchus, C.*

falciformis and *Prionace glauca* were caught in very small numbers as was the great white, *Carcharodon carcharias*, an occasional visitor to the region. Kato (1964) describes seven Carcharhinid sharks caught by purse seiners in the eastern tropical Pacific: *C limbatus*, an inshore species; *C. azureus* (*now C. leucas*, the bull shark), a

Species	**Number**	**Percent**
Alopiidae		
Pelagic thresher (*Alopias pelagicus*)	19	0.08%
Bigeye thresher (*A. superciliosus*)	356	1.46%
Common thresher (*A. vulpinus*)	35	0.14%
Unidentified thresher (*Alopias sp.*)	38	0.16%
Subtotal	448	**1.84%**
Lamnidae		
Great white (*Charcharodon carcharias*)1	0.00%	
Shortfin mako (*Isurus oxyrinchus*)	312	1.28%
Longfin mako (*I. paucus*)	5	0.02%
Unidentifed mako shark (*Isurus sp.*)	8	0.03%
Salmon shark (*Lamna ditropis*)	57	0.23%
Subtotal	383	**1.57%**
Charcharhinidae		
Bignose shark (*Carcharhinus altimus*)	9	0.04%
Silky shark (*C. falciformis*)	56	0.23%
Galapagoes shark (*C. galapagensis*)	4	0.02%
Oceanic whitetip (*C. longimanus*)	629	2.58%
Dusky shark (*C. obscurus*)	2	0.01%
Sandbar shark (*C. plumbeus*)	27	0.11%
Tiger shark (*Galeocerdo cuvier*)	5	0.02%
Blue shark (*Prionace glauca*)	21,917	89.90%

Subtotal	22,649	**92.90%**
Sphyrnidae		
Scalloped hammerhead (*Sphyrna lewini*)2	0.01%	
Smooth hammerhead (*S. zygaena*)	8	0.03%
Unidentified hammerhead (*Sphyrna sp.*)5	0.02%	
Subtotal	15	**0.06%**
Unidentified sharks	885	3.63%
Total	24,380	100.00

Table 2: Observer data on sharks caught in the longline fishery

rarely caught shallow water and estuarine species*; C. galapagensis*; *C. platyrhyncus* (now *C. albimarginatus*), the silvertip, which aggregates near offshore islands; *C. lamiella* (now *C. obscurus*), a rarely caught coastal species; *C. malpeloensis*, the "net eater" (probably *C. falciformis*, which has *Eulamia malpeloensis* as a synonym), the most abundant species; and *C. altimus*, not common in the fishery and first reported in 1962.

The above information suggests that the fishery is dominated by a few species: *Prionace glauca*, *C. longimanus*, *A. superciliosus*, *Isurus oxyrinchus* and to a lesser extent *C. falciformis* and *Lamna ditropis*. However, numerous other Carcharhinid and Sphyrnid species are caught in low numbers. Many of the Carcharhinid species are coastal or reef dwelling but may on occasion venture far enough offshore to be captured by longliners operating near islands. In addition, seamounts and submerged banks outside of territorial waters may be habitat for some of these species. For example, Branstetter (1987) notes that female scalloped hammerheads are more oceanic and known to form offshore aggregations on seamounts.

The habitat, distribution and biology descriptions given in Compagno (1984) for each family are quoted below, supplemented by material from Strasburg (1958), and with information for specific species from various sources.

Family Alopiidae

Threshers are large, active, strong-swimming sharks, ranging in habitat from coastal to epipelagic and deepwater epibenthic. They are found worldwide in tropical, subtropical and cold-temperate waters. These sharks are apparently specialized for feeding on small to moderately large schooling fishes and squids. Threshers swim in circles around a school of prey, narrowing the radius and bunching the school with their long, strap-like caudal fins. The caudal fin is also used as a whip to stun and kill prey, and threshers are commonly tail-hooked on longlines after striking the bait with the caudal tip. The three species of this family broadly overlap in habitat and range, but differences in their structure, feeding habits and spatial and distribution suggest that they reduce interspecific competition by partitioning their habitat and available prey to some extent. *Alopias superciliosus*, with its huge eyes, relatively large teeth, broad caudal fin, and preference for deeper water (coastally near the bottom), take somewhat larger pelagic fishes (including billfishes and lancetfishes) as well as bottom fishes; *A. vulpinus*, with smaller eyes and teeth, a narrower caudal fin, and preference for the surface, takes small pelagic fishes (including clupeids, needlefishes and mackerels) and squids, but also bonitos and bluefishes. The oceanic *A. pelagicus* is poorly known, but its even smaller teeth and very slender caudal fin suggest that it may take smaller prey than *A. vulpinus* or *A. superciliosus* (Compagno 1984).

Strasburg (1958) reports that the three members of this family were uncommon so little about their distribution could be stated with confidence. He does, however, note a higher catch rate close to land, describing them as "definitely neritic [with] their abundance falling close to zero 40 miles from shore." He is uncertain about depth distribution except to say that they are possibly eurythermal and were most common at intermediate depths (49–85 m based on longline depth). Compagno (1984) gives the following depth distributions: *A. pelagicus* 0–152 m, *A. superciliosus* 0 to at least 500 m, *A. vulpinus* 0 to at least 366m.

Family Lamnidae

Lamnids are tropical to cold-temperate, littoral to epipelagic sharks with a broad geographic distribution in virtually all seas, in continental and insular waters from the surf line to the outer shelves and rarely down the slopes to at least 1,280 m. All the living species are of large size, with a maximum length of 3 to at least 6.4 m.

These sharks are fast-swimming, active pelagic and epibenthic swimmers, some of which are capable of swift dashes and spectacular jumps when chasing their prey. Mackerel sharks are partially warm-blooded and have a modified circulatory system that enables them to retain a body temperature warmer than the surrounding water. This permits a higher level of activity and increases the power of their muscles. They feed on a wide variety of bony fishes, other sharks, rays, marine birds and reptiles, marine mammals, squids, bottom crustaceans and carrion. Development is ovoviviparous, with a yolk-sac placenta. (Compagno 1984).

The two species mentioned by Strasburg (1958) are *Isurus oxyrinchus*, the shortfin mako and *Lamna ditropis*, the salmon shark, both considered uncommon. He notes that the shortfin mako has "almost the same range as the great blue shark" (i.e., *Prionace glauca*) and their depth distribution is also eurythermal. Compagno (1984) notes that this shark is seldom found in waters below 16ºC and is "the peregrine falcon of the shark world," the fastest shark and famed jumper. The salmon shark, as its name implies, is a temperate to boreal shark; according to Strasburg (1958), almost all were caught north of 35ºN. This shark may rarely occur at the northern margin of the Hawaii EEZ but are more likely occasionally caught by Hawaii-based vessels ranging outside the EEZ. There are two other species in the family. The longfin mako (*Isurus peucus*), which was first named fairly recently, in 1966. This suggests that it is a fairly rare species, or at least rarely caught. The great white shark (*Carcharodon carcharias*) is an infamous top level predator. It tends to be more common on continental margins, although Campagno (1984) notes that “the occurrence of large individuals off oceanic islands far from land where breeding populations of the species apparently do not exist suggests that it can and does make occasional epipelagic excursions into the ocean basins, even though it has never been taken in longline catches there (unlike its relatives in the genera *Isurus* and *Lamna*).” It may therefore be considered an occasional visitor to or vagrant in the management area.

Pratt and Casey (1983) provide growth and age estimates for *I. oxyrinchus* based on specimens captured in the northeast Atlantic. They estimate a one-year gestation period. Growth is considered fast but the species exhibits low fecundity. Size at birth is about 60 cm. Males mature at about 180 cm or 2.5 years, and females, 260 cm or 6–7 years. Theoretical maximum size, based on the von Bertalanffy growth curve is 302 cm for males and 345 cm for females, suggesting a maximum age in excess of 15 years. Size dimorphism between sexes, with females being larger, is common in many shark species.

Family Carcharhinidae

This is one of the largest and most important families of sharks, with many common and wide-ranging species found in all warm and temperate seas. These are the dominant sharks in tropical waters, often both in variety and in abundance and biomass. Most species inhabit tropical continental coastal and offshore waters; several species prefer coral reefs and oceanic islands while a few, including the blue, silky and oceanic whitetip sharks, are truly oceanic and range far into the great ocean basins. Requiem sharks are active strong swimmers, occurring singly or in small to large schools. Some species are continually active while others are capable of resting motionless for extended periods on the bottom. All are voracious predators, feeding heavily on bony fishes, other sharks, rays, squid, octopi, cuttlefishes, crabs, lobsters, and shrimp, but also sea birds, turtles, sea snakes, marine mammals, gastropods, bivalves, carrion, and garbage. (Compagno 1984)

The oceanic species mentioned above are also the three identified as common by Strasburg. The blue shark won’t be discussed here as a separate species description has been prepared. The silky (*Carcharinus falciformis*) and oceanic whitetip (*C. longimanus*) are described by Strasburg (1958) as equatorial species with a range practically restricted to within 10 degrees on either side of the equator. According to him, the whitetip is the more abundant of the two species and may be more abundant than the blue shark, even if it is caught less frequently. The whitetip is considered more oceanic while the silky shark was more abundant around the Line Islands (0ºN–10º N and 155ºW–165ºW). The oceanic nature of the whitetip may be due to a lower salinity preference or avoidance of competition with faster moving neritic species. Strasburg (1958) states, “In common with other species occurring in the equatorial area, neither the whitetip nor the silky shark shows much latitudinal change in vertical distribution. The whitetip appears to be principally a surface dweller north of the equator and more bathypelagic to the south, whereas the silky is almost uniformly distributed in depth to the north and is more deep-swimming in the south." Compagno (1984) gives a depth distribution for the silky of 0 to at least 500 m and preferring water temperatures of 23º–24ºC. The whitetip is described as occurring from 0 to at least 152 m and generally found in waters deeper than 184 m. It regularly occurs in waters 18º–20ºC but prefers 20ºC. Strasburg also notes the capture of two blacktips (*C. melanopterus*), but these were caught near shore and are unlikely to caught with any frequency in EEZ waters.

Branstetter (1987) discusses age and growth of *C. falciformis*, one of the more commonly caught species. Based on centrum annuli taken from sharks in the Gulf of Mexico he developed a growth curve for this species. Back calculated size at birth is 55–85 cm with probably a one-year gestation period. Males mature at 210–220 cm or 6–7 years while females mature at greater than 225 cm or more than 9 years. Theoretical maximum size is 290.5 cm or perhaps 20 years old or more, although a more typical maximum age is 10–15 years. Examination of stomach contents suggests that tuna, mackerel, mullet and squid are common prey items in the Gulf of Mexico.

Wetherbee et al. (1996) reviews the biology of the Galapagos shark based on specimens caught in Hawaii shark control programs. This species is essentially limited to oceanic islands and is common on around islands off the American coast but is also commonly found in Hawaii. It prefers rugged bottom terrain and strong currents. There is evidence of sex segregation by depth based on capture records with females preferring shallower water. In Hawaii it is not typically found in shallow water nursery areas, nor does it school, as is common elsewhere. Females are estimated to mature at 6.5–9 years and males at 6–8 years. Mating occurs in winter and spring and pupping in spring and summer of the following year. This species may give birth only once every two to three years, suggesting overall low fecundity.

Tricas et al. (1981) studied the diel behavior of the tiger shark (*Galeocerdo cuvier*) using a tracking device. They found that the shark they studied (at French Frigate Shoals in the NWHI) spent daylight hours on the outer leeward reef, especially near steep drop-offs. At night the shark would move off the reef into deep water, frequently diving but in general following the contour of the reef front slope. They suggest that this behavior is associated with foraging.

Family Sphyrnidae

The hammerheads are a small but common family of wide-ranging, warm-temperate and tropical sharks found in continental and insular waters on or adjacent to their shelves but with none being truly oceanic. Depths range from the surface, surf-line and intertidal region down to at least 275 m depth. Hammerheads are very active swimmers, ranging from the surface to the bottom, and occur in all warm seas. Several species occur in schools, sometimes with hundreds of individuals. Some of the large species seem to find fish baits on longlines quicker than other sharks and expire more swiftly than most other species after being caught. Hammerheads are versatile feeders that take a wide variety of bony fishes, elasmobranchs, cephalopods, crustaceans and other prey; some habitually feed on other elasmobranchs. (Compagno 1984)

Hammerheads were caught very incidentally according to Strasburg (1958), so no distribution information is provided by him. Two species were caught, *Sphyrna lewini* and *S. zygaena*. Compagno (1984) describes the scalloped hammerhead (*S. lewini*) as probably the most abundant hammerhead, remaining close into shore, even ranging into enclosed bays and estuaries, and occurring along insular shelves. They are also reported over seamounts. The depth range is given from intertidal to at least 275 m. They are viviparous with a yolk-sac placenta and adults apparently move inshore to mate and young primarily occur close inshore. The habitat for the smooth hammerhead (*S. zygaena*) is essentially similar; however, Compagno gives the depth distribution as "the surface down to at least 20 m and probably much more." Both species are omnivorous, feeding on a variety of inshore and reef species of fish, crustaceans and cephalopods. This information indicates that these are predominately inshore species and probably rarely caught in offshore fisheries.

Branstetter (1987) provides information on age and growth of *S. lewini* from the Gulf of Mexico. Size at birth is estimated 49 cm. Males mature at about 180 cm or 9–10 years and females at 250 cm or about 15 years. Theoretical maximum size is 329 cm, close to the largest known specimen, 309 cm, taken in Hawaii. The author estimates a maximum age for females of about 35 years and of males of 22–30 years.

Crow et al. (1996) provide information on *S. lewini* and *S. zygaena* captured around Hawaii during control programs. Juveniles of *S. zygaena* are common in coastal waters while adults may prefer offshore areas. Stomach content analysis from this and other studies suggest that teleost fish, crustaceans and pelagic cephalopods are common in the dies of *S. lewini*. *S. zygaena* apparently prefers cephalopods. Clarke (1971) and Holland et al. (1993) studied scalloped hammerhead (*S. lewini*) pups in Kaneohe Bay, Oahu, Hawaii. The southern part of the bay is a major breeding and pupping ground for this species. Pups apparently tend to avoid light, preferring more turgid waters. Pups school in a core refuge area during the day and then disperse at night, foraging along the base of patch reefs. Juveniles may move out of the bay somewhat inadvertently during foraging activities. As the move out of turgid water they may seek deeper water offshore where light intensity is lower.

Life History Notes on Sharks

Readers are referred to the habitat description for the blue shark as representative of life history aspects of the most commonly caught pelagic species. A very general and brief life history description for the group as a whole is given here.

Sharks are notable in that they produce relatively small numbers of young, which are either oviparous (egg laying, where the young develop inside an egg case) or viviparous (where pups are hatched or are born fully developed). This method of reproduction reduces the susceptibility of young to predation but also makes them more vulnerable to overfishing. Hoenig and Gruber (1990) state that, unlike teleost fish, they can be characterized as "K-selected species" and "the relationship between stock and recruitment in the elasmobranchs is quite direct, owing to the reproductive strategy of low fecundity combined with few, well-formed offspring." The authors further point out that this strategy is similar to marine turtles and baleen whales, other marine species that have been overfished. Most sharks, except for the exclusively pelagic, reproduce at specific nursery grounds, which are usually inshore and ideally represent a habitat different from likely predators. The main predators on juveniles appear to be other larger sharks (Castro 1987). Thus the availability of predator-free nursery grounds may be an important factor in regulating population (Springer 1967).

Branstetter (1990) describes Atlantic Carcharhinoid and Lamnoid sharks reproductive growth in terms of size at birth and growth rate. These strategies can be divided into various categories. There are slow growing types with large neonates that occupy coastal and surf areas and are exposed to predators. Slow growing species with smaller young use bays and estuarine areas as nursery grounds, where predators are absent. Among fast growing species are small and large sized coastal sharks and pelagic sharks, including species significant in the management area. The silky shark (*C. falciformis*) depends on rapid neonate growth for survival and also has relatively large neonates. According to Springer (1967) neonates are found on deep reef areas and move into the pelagic environment at about six months of age. Alopiids and Lamnids have similar strategies. Young tend to be large, although *Isurus oxyrinchus* has smaller neonates but compensates with large litter sizes. Alopiids produce two to four young of intermediate size. Rapid growth in the young of these species allows greater swimming efficiency and speed in order to escape predators. For truly pelagic species, nursery grounds are probably not used; thus the importance of large neonate size and rapid growth.

Sexual segregation in schools is often observed in sharks and is probably related to reproduction. Strasburg (1958) discusses sexual segregation in blue sharks based on longline data (refer to the blue shark habitat description).

Wetherbee et al., (1990) discuss feeding habits of sharks. Sharks are generally portrayed as opportunistic feeders but the authors wish to qualify this somewhat. First, in most species teleosts tend to dominate in stomach content. Diet also changes with ontogenetic development; juveniles, especially when they are at inshore nursery areas have a different diet, eating more crustaceans for example. There may also be seasonal variation due to changes in prey availability. Similarly prey may vary due to habitat; the authors cite a study (Clarke 1971) showing that scalloped hammerhead diet varied from one location to another in Kaneohe Bay, Oahu, Hawaii. Among their conclusions, Wetherbee et al. (1990) state that feeding occurs in short bouts followed by longer periods of digestion and there is not well established periodicity for feeding. Sharks's daily ration is apparently lower than for teleosts.

Pacific fisheries

Determination of total catch for sharks is difficult since they are bycatch in Pacific region fisheries. In the Hawaii-based longline fishery there has been an increasing trend towards cutting off the dorsal fins as these may be dried and are valued in Asian markets. Mako and thresher shark carcasses are sometimes retained because their meat has some market value. (For a full discussion of the bycatch issue refer to section 4.1 of this amendment.) The total number of sharks caught in the longline and purse seine fisheries is thought to be large (Heberer and McCoy 1997). Pacific-wide, blue sharks are the most significant component of catches, as they are in the region's fisheries. Bonfil (1984) gives a regional summary but relies on Strasburg's report (1958) to derive a breakdown by species based on estimates of the total number of sharks hooked. For 1989, he estimates 19,897 mt of silky sharks (*C. falciformis*), 10,799 mt of whitetips (*C. longimanus*), 8,193 of blue shark and 1,545 mt of other species for South Pacific longline fisheries. For North Pacific (above 20°N) longline fisheries estimated catch is 39,059 mt of blue shark, 145 mt of whitetip and 1,789 of other species. The author is unable to make similar estimates for the purse-seine fishery but cites Au (1991) who describes the nature of associations in different types of tuna schools.

As noted above, the bycatch discussion in this amendment provides some data on shark catches in the Hawaii-based longline fishery. From Table 4.1.b the following numbers and percentages can be derived for 1997: blue sharks 79,712 (93.21%), mako sharks 1,164 (1.36%), thresher sharks 2,321 (2.71%), other sharks 2,326 (2.72%). Published data (WPRFMC 1997) does not break down shark landings by species. In addition, landings data does not account for discards. In 1996 (the most recent data available) an estimated 4.5 million lb (2,041 mt) were landed in Hawaii. (Shark landings represent an estimate of whole weight based on the number of fins landed in addition to any carcasses.) American Samoa estimated landings were 12,747 lb (5.78 mt), and 3,348 lb (1.52 mt) were estimated for Guam. The regional total is thus 4,516,095 lb (2,048 mt). Total landings for the western Pacific region are about 2.5% of the estimated Pacific regional total of 80,927 mt.

<u>Essential Fish Habitat</u>: Shark species complex

If all sharks in the four MUS families are used as a basis for delineating EFH then it will necessarily be large because the families contain both offshore and inshore species occupying a wide variety of habitats. It is probably more realistic to base the delineation only on the more commonly caught pelagic species. Even so, the designation will encompass all epipelagic and mesopelagic EEZ waters. This broad designation results from the wide-ranging nature of many species (taken together covering tropical, temperate and even boreal seas) and lack of knowledge about relative density, although for all species taken together densities are higher in neritic and inshore waters. Very small-scale distribution maps are found in Compagno (1984); Strasburg (1958) has two distribution maps for "common" and "uncommon" species based on hooking rates.

Habitat description for pelagic sharks (Alopiidae, Carcharinidae, Lamnidae, Sphynidae)

	Gestation	**Juvenile / Sub-Adult**	**Adult**
Duration		to 5–10 years or more	to 20 years or more
Diet	NA	omnivorous, fish, squid	omnivorous, teleost fish, n some cases billfish, other e crustaceans, molluscs
Distribution: General and Seasonal	Major pelagic species gestation and parturition is probably wholly pelagic. Some species, such as Sphyrnids and probably many Carcharhinids have inshore nursery grounds	highly variable/unknown, see adult distribution	• Alopiidae: 20ºN– 20º S *vulpinus* • Lamnidae: 50ºN-–45ºS *paucus* uncertain but more tropical; *L. ditropis* boreal- in North Pacific • Carcharhinidae: 10º N *falciformis* and *C. longmar* variable
Location	variable, depends on adults	highly variable/unknown, see adult distribution	• Alopiidae: neritic to of pelagic • Lamnidae: epipelagic t • Carcharinidae: highly v species epipelagic • Sphyrnidae: *S. lewini*- warm temperate and tropic amphitemperate and tropic
Water Column	NA	inshore benthic, neritic to epipelagic	inshore benthic, neritic to e
Bottom Type	NA	highly variable	highly variable for inshore
Oceanic Features	NA	unknown	unknown, captured species schools

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Name (Order, Family, Genus, species)	Occur in FAO Fishing Areas 71 or 77	Habitat/Range	Common
ORDER LAMNIFORMES (Mackerel Sharks)			
Family Alopiidae (Thresher Sharks) (Strasburg 1958)			
Alopias pelagicus	71, 77	Oceanic and wide ranging in the Indo-Pacific, Hawaii	Pelagic th
superciliosus	71, 77	Oceanic and coastal, virtually cirumtropical, N and S of Hawaii	Bigeye thr
vulpinus	71, 77	Oceanic and coastal, virtually cricumglobal in warm seas, Fanning Is., Hawaii	Thresher
Family Lamnidae (Porkbeagles, White Sharks			
Carcharodon carcharias	71, 77	Coastal and mostly amphitemperate, Marshall Is., Hawaii	Great whi
Isurus oxyrinchus (Strasburg 1958, *I. glaucus*-bonito sh.)	71, 77	Coastal and oceanic, temperate and tropical, 50ºN–40º S	Shortfin m
paucus	71, 77	Oceanic and tropical, Near Phoenix and north of Hawaii	Longin ma
Lamna ditropis (Strasburg 1951, mackerel shark)	77	Coastal-liitoral and epipelagic in boreal and cool temperate waters, not in management area?	Salmon sh
ORDER CARCHARINIFORMES (Ground Sharks)			

Family Carcharhinidae (Requiem Sharks)			
Carcharinus albimarginatus	71, 77	Coastal-pelagic tropical, Guam	Silvertip
altimus	77	Offshore, bottom-dwelling warm-temperate and tropical, Hawaii	Bignose
amblyrhynchoides	71	Little known, common tropical inshore and offshore	Graceful
amblyrhynchos	71, 77	Coastal pelagic frequenting continental and insular shelves, common on coral reefs, coastal areas throughout management area	Grey reef
amboinensis	71	Inshore, Indo-West Pacific, not in management area	Pigeye
borneensis	71	Rare coastal, inshore, tropical shark of Indo-West Pacific, probably not found in management area	Borneo
brachyurus	71, 77	Inshore to offshore warm temperate shark, possibly confined to continental margins? Not found in management area?	Copper
brevipinna	71	Common coastal-pelagic, warm-temperate and tropical shark of continental and insular shelves, not in management area?	Spinner sh
cautus	71	Little known South Pacific reef shark of shallow water on continental and insular shelves. not in management area?	Nervous s
dussumieri	71	Common inshore shark of continental shelves, not in management area?	Whitechee
falciformis (Strasburg 1951, *Eulamia floridanus*)	71, 77	Abundant offshore, oceanic and epipelagic and littoral, tropical, near the edge of continental and insular shelves and in open sea, Caroline, Hawaiian, Phoenix and Line Islands	Silky
fitzroyensis	71	Little known, Australian littoral. Not found in	Creek wha

		management area	
galapagensis	71	Common but habitat limited tropical shark inshore and offshore, Marianas, to Marshalls, Hawaiian group including NWHI	Galapagos
hemiodon	71	Little known Indo-West Pacific. Not in management area	Pondicher
leucas	71	Coastal, estuarine continental. Not in management area?	Bull
limbatus	71, 77	Widespread in all tropical and subtropical shelves; not truly oceanic, Hawaii	Blacktip
longimanus (Strasburg 1951, *Pterolamiops longimanus*)	71, 77	Common oceanic-epipelagic, occasionally coastal, tropical and warm temperate, throughout management area	Oceanic w
macloti	71,	Little known Indo-West Pacific, not in management area	Hardnose
melanopterus (Strasburg 1951)	71, 77	Common shallow water reef shark throughout management area	Blacktip r
obscurus	71, 77	Common coastal-pelagic shark of continental margins. Not in management area?	Dusky
plumbeus	71, 77	Abundant inshore and offshore, coastal pelagic, temperate and tropical, Hawaii? Not in management area?	Sandbar
porosus	77	Common inshore shark of tropical America, not in management area	Smalltail
sealei	71	Common coastal shark of Indo-West Pacific, not in management area	Blackspot
signatus	77	Atlantic shark with possible extension to Pacific Panama, not in management area	Night
sorrah	71	Coastal, shallow-water shark of Indo-West	Spot-tail

		Pacific, not in management area	
Galeocerdo cuvier	71, 77	Common wide-ranging coastal pelagic, tropical and warm temperate shark with wide habitat tolerance, found throughout management area	Tiger
Glyphis glyphis	71	Little known shark of Bornea, New Guinea and Queensland, not in management area	Speartoot
Lamniopsis temmincki	71	Little known continental shark, not in management area	Broadfin
Loxodon macrohinus	71	Common inshore shark of continental areas, Indo-West Pacific, not in management area	Sliteye
Negaprion acutidena	71, 77	Tropical inshore shark of continental and insular shelves and terraces, Palau Marshall Islands, not in management area?	Sicklefin
brevirostis	77	Abundant inshore shark of tropical Americas and Atlantic, not in management area	Lemon sh
Prionace glauca (Strasburg 1951)	71, 77	Wide ranging, oceanic-epipelagic and fringe littoral to at least 152 m	Blue
Rhzoprionodon acutus	71	Abundant inshore and offshore shark of continental shelves, not in management area	Milk
longurio	77	Abundant on tropical littoral and continental shelf of America, not in management area.	Pacific sh
oligolinx	71	Common but little known littoral, inshore and offshore tropical, Palau?, not in management area?	Grey shar
taylori	71	Australia, not in management area.	Australian
Scoliodon laticaudus	71	Common tropical shark of continental and insular shleves, close inshore. Not in management area.	

Triaenodon obesus	71, 77	Common tropical inshore shark of continental shelves and island terraces. Wide ranging from Indo-West Pacific to central Pacific.	Whitetip r
Family Sphyrnidae (Bonnethead, Hammerhead, Scoopehead Sharks)			
Euphyra blochii	71	Shallow water on continental and insular shelves, Indo-West Pacific, not in management area.	Winghead
Sphyrna corona	77	Little known, tropical America, not in management area	Scalloped
lewini (Strasburg, 1958)	71, 77	Abundant coastal-pelagic, warm temperate and tropical, Hawaii	Scalloped
media	77	Little known, tropical America, not in management area.	Scoophead
mokarran	71, 77	Coastal pelagic and semi-oceanic tropical, not in management area?	Great ham
tiburo	77	Abundant inshore, tropical America, not in management area	Bonnethea
zygaena (Strasburg, 1958)	77	Common, coastal pelagic, semi-oceanic, Hawaii.	Smooth ha

6.11 Habitat description for albacore tuna (*Thunnus alalunga*)

Management Plan and Area

American Samoa, Guam, MHI, NWHI, Northern Mariana Islands, Johnston Atoll, Kingman Reef, Palmyra Atoll, Jarvis Island, Midway Island, Howland and Baker Islands and Wake Islands.

Life History and General Description

The main sources used in this description are Foreman (1980) and Collette and Nauen (1983). Other reviews include Bartoo and Foreman (1994) and Murray (1994).

The albacore is a member of the Scombridae family mackerels and tunas, composed of 15 genera and 49 species. *Thunnus* is one of four genera in the tribe Thunni, unique among bony fishes in having central and lateral heat exchangers. Separate northern and southern stocks, with separate spawning areas and seasons, are believed to exist in the Pacific. In the North Pacific there may be two sub-stocks, separated due to the influence of bathymetric features on water masses (Laurs and Lynn 1991). Growth rates and migration patterns differ between populations north and south of 40ºN (Laurs and Wetherall 1981, Laurs and Lynn 1991).

In the north Pacific albacore are distributed in a swath centered on 35ºN and as far as 50ºN in the west. In the south Pacific they are concentrated between 10º and 30ºS in the central Pacific (150ºE to 120ºW) and as far south as 50ºS. They are absent from the equatorial eastern Pacific, southeast of Hawaii (which apparently lies near the edge of its range) in an area stretching roughly from 165ºW to the American coast and between 15ºN and the equator. Temperature is recognized as the major determinant of albacore's distribution. Albacore are both surface dwelling and deep-swimming. The distribution maps in Foreman (1980) show the distribution of deep-swimming albacore, which are generally more concentrated in the western Pacific but with eastward extensions along 30ºN and 10ºS. Depth distribution is governed by vertical thermal structures, and they are found to a depth of at least 380 m. The 15.6º to 19.4º C SST isotherms mark the limits of abundant distribution although deep-swimming albacore have been found in waters between 13.5º and 25.2ºC (Saito 1973). Laurs and Lynn (1991) describe North Pacific albacore distribution in terms of the North Pacific Transition Zone, which lies between the cold, low salinity waters north of the sub-arctic front and the warm, high salinity waters south of the sub-tropical front. This band of water, roughly between 40º and 30–35ºN (the Transition Zone is not a perfectly stable feature) also helps to determine migration routes (see below). Telemetry experiments demonstrate that albacore will enter water as cold as 9.5ºC for short periods of time. Laurs and Lynn (1991) argue that acoustic tracking demonstrates that albacore have a wider temperature range than stated previously; their normal habitat is 10º–20ºC with a dissolved oxygen saturation level greater than 60%. The overall thermal structure of water masses, rather than just SST, has to be taken into account in describing total range. Albacore exhibit marked vertical movement and will move into water as cold as 9ºC at depths of 200 m. They move through temperature gradients of up to 10ºC within 20 minutes. This reflects the many advanced adaptations of this fish; it is a thermo-regulating endotherm with a high metabolic rate and advanced cardiovascular system. Albacore have differential temperature preferences according to size, with larger fish preferring cooler water, although the opposite is true in the northeast Pacific. They are considered epi- and mesopelagic in depth range. The minimum oxygen requirement is reckoned to be 2 ml/l.

Albacore are noted for their tendency to concentrate along thermal fronts, particularly the Kuroshio front east of Japan and the North Pacific Transition Zone. Laurs and Lynn (1991) note that they tend to aggregate on the warm side of upwelling fronts. Near continental areas they prefer warm, clear oceanic waters adjacent to fronts with cool turbid coastal water masses. It is not understood why they don't cross these fronts, especially given that they are able to thermo-regulate, but it may be because of water clarity since they are sight-dependent foragers. Further offshore fishing success correlates with biological productivity.

Albacore have a complex migration pattern with the North and South Pacific stocks having their own patterns. Most migration is undertaken by pre-adults, 2–5 years old. A further sub-division of the northern stock, each with separate migration, is also suggested. The model suggested by Otsu and Uchida (1963) shows trans-Pacific migration by year class. Generally speaking, a given year class migrates east to west and then east again in a band between 30º and 45ºN, leaving the northeast Pacific in September–October, reaching waters off Japan the following summer and returning to the east in the summer of the following year. Four- to 6-year-old albacore enter sub-tropical waters south of 30ºN and west of Hawaii (Kimura, et al. 1997) where they spawn. Migration may also be influenced by large-scale climate events that affect the Kuroshio Current regime (Kimura, et al. 1997). Albacore may migrate to the eastern Pacific when the Kuroshio takes a large meander path. This also affects the southward extension of the Oyashio Current and may reduce the availability of forage, primarily saury, in the western Pacific.

The aforementioned sub-stocks apparently divide along 40ºN. Albacore tagged off the US West Coast north of 40ºN apparently undertake more westward migration (58% of tag returns come from the western Pacific west of 180º) versus those tagged to the south (only 10% were recovered in the western Pacific, 78% from the tagging area) (Laurs and Lynn 1991).

Murray (1994), summarizing the work of Jones (1991), describes migration in the South Pacific. Juveniles move from the tropics into temperate waters at about 35 cm LCF and then generally eastward along the Sub-Tropical Convergence Zone. They do not return to the tropics until they are about 85 cm LCF. As they move towards the tropics it is presumed they move deeper, probably due to water temperature. Seasonal patterns are similar to the North Pacific. Juveniles prefer cooler water and move south from sub-tropical waters to temperate in the austral spring. Adults occur from the tropics to temperate zone throughout the years.

Young albacore congregate in large, loosely aggregated schools, at least off the West Coast of North America. Larger fish are observed to form more compact schools, but the dense schools common to yellowfin and skipjack tuna are not true of albacore.

As noted above, the most noted habitat feature affecting abundance and density of albacore populations is their preference for oceanic fronts or temperature discontinuities.

Foreman (1980) summarizes estimates of von Bertalanffy equation parameter in tabular form (Table 2). Growth rates for fish below 38ºN are reportedly higher than those taken to the north. Reported age-length relationships are also summarized. Estimates of the size at one year range from 38 to 57.3 cm, about a third of estimates for size at the von Bertalanffy asymptote, 104–145.3 cm. Juvenile growth has been estimated at 3.12 cm per month (Yoshida 1979). Bartoo and Foreman (1994) give the following von Bertalanffy parameter as the most reasonable for assessment purposes: $L_\infty = 135.6$ cm, $K = 0.17$ and $t_o = -0.87$.

Albacore or heterosexual with no external characters to distinguish males from females. Immature fish generally have an even sex ratio but males predominate in catches of mature fish. Table 4 in Foreman (1980) summarizes published information on sex ratios. For mature fish, male-female ratios range from 1.63:1 to 2.66:1. Like many other pelagic fish, it is believed that albacore release their gametes indiscriminately without selecting partners. Ramon and Bailey (1996) report sexual dimorphism in South Pacific stocks, confirming findings by Otsu and Sumida (1968) with the males being larger. Fecundity is estimated at 0.8–2.6 million eggs per spawning.

Albacore spawn in the summer in subtropical waters. There is also some evidence of multiple spawning (Otsu and Uchida 1959). Foreman (1980) provides a map showing distribution of spawning areas. In the North Pacific the area centers on 25ºN and 160ºE and does not extend east of about 150ºW. In the south Pacific the band is narrower, centered at about 25ºS and stretching from the sea east of Queensland, Australia, to about 110ºW. Ramon and Bailey (1996) discuss spawning seasonality in the South Pacific, near New Caledonia and Tonga. October to December was found to be peak spawning season. Maturing albacore were mostly taken between 20º and 23ºS. The same map in Foreman (1980, Figure 4) shows larval distribution, which is more restricted in extent than estimates of total spawning area.

The review articles consulted for this description summarize the main albacore fisheries in the Pacific. They may be distinguished as either surface or deep water. The surface fisheries are trolling operations off the American coast from Baja to Canada, baitboat operations south of Japan at the Kuroshio Front and a fishery in New Zealand waters. A troll fishery has also developed south of Tahiti. Purse-seine is also considered a surface method but apparently is not a major fishery. Albacore are occasionally bycatch in other tuna fisheries. Elsewhere, mainly the northwest and South Pacific, longline gear is used to capture deep-swimming fish. Taiwanese and Japanese high seas drift gillnetters rapidly expanded effort in the South Pacific after 1988, targeting albacore. A number of regional and international initiatives were put forward to limit or ban this fishery, and by 1990 operations had ceased (Wright and Doulman 1991). Foreman (1980) and Bartoo and Foreman (1994) provide maps of the major fishing areas. Generally, surface fisheries occur in cooler waters and target immature fish; the longline fishery, targeting deep-swimming fish, occurs closer to the equator.

The most recent report for pelagic fisheries in the western Pacific region (WPRFMC 1997) notes that albacore landings in Hawaii by longline, handline and other gear types have increased dramatically in the past five years with much of the catch sent to the US West Coast as a fresh frozen product. Hawaii landings have increased from 300,000 lb (136 mt) in 1987 to 3 million lb (1,361 mt) in 1996, a tenfold increase. The only other area reporting landings in 1996 was American Samoa, with 232,721 lb (105.56 mt). American Samoa also reports 44,500 t (40,370 mt) of albacore landed at the canneries there. Albacore represent 10% of total pelagic landings in Hawaii and 11% of total pelagic landings in the region.

Egg and Larval Distribution

Ueyanagi (1955) and Otsu and Uchida (1959) describe the eggs of albacore, taken from maturing fish. Roe is reported to be the same size as cod roe and light reddish-brown in color. The incubation period is estimated at no more than four days (Matsumoto 1958). Foreman (1980) provides references for papers describing larval albacore. They are easily distinguished from other tuna larvae except yellowfin.

Davis et al. (1990) studied diel distribution of tuna larvae, including albacore in the Indian Ocean off of northwest Australia. They found that albacore migrate to the surface in the day and are deeper at night. This diel pattern was much more marked in albacore than southern bluefin tuna (*Thunnus maccoyii*) larvae. Total vertical range was limited by pycnocline depth, which was 16–22 m in the study area. They concluded that the pycnocline acts as a physical barrier to movement. Albacore may forage during daylight hours and simply sink to neutral depth at night when they cease swimming. Other studies indicate that the top boundary of the pycnocline can be an area of concentration for larvae.

Young and Davis (1990) report on larval feeding of albacore in the Indian Ocean. They found *Corycaeus spp*., *Farranula gibbula* (Cyclopoida) and *Calanoid nauplii* to be major prey items. Diet breadth was greatest for larvae less than 5.5 mm. *Calanoid nauplii* were more important in the diet of smaller larvae; Cyclopoids were eaten by larvae of all sizes but more frequently by larger larvae. As noted above, albacore feed only during the day, although there is some evidence of increased activity around dusk.

Leis et al. (1991) found high concentrations of tuna larvae, including albacore, at sample sites near coral reefs on three islands in French Polynesia. They note that tuna larvae are sparsely distributed in the open ocean, possibly because they congregate near islands. Their findings are similar to Miller's (1979) findings around Oahu, Hawaii. Since their sampling had not been intended for tuna larvae (they were studying reef fish larvae), it was not possible to establish a inshore-offshore gradient from the data. They speculate on why larvae might be concentrated inshore and warn that "anthropogenic impact on near-reef waters will be of concern to tuna fishery management."

As noted above, Foreman (1980) provides a map showing distribution of larval albacore, which gives some idea of their preferred habitat. If the suggestion made by Leis et al. (1991) can be confirmed, it may be that inshore areas represent a habitat feature of special value to larval stage albacore.

Juvenile

Small juvenile albacore range from 12 to 300 mm in length and have been found in coastal waters from a number of areas in the western Pacific including the Mariana Islands, Japanese coastal waters, Fiji, waters east of Australia and Tuvalu. They have also been reported from Hawaiian waters. Albacore are not mature until about 5 years old. As noted above, immature fish prefer cooler water and enter the tropics as adults.

Adult

The size range of adults has already been discussed. Based on age groups it is believed that maximum longevity is around 10 years. Female albacore reach maturity by about 90 cm, while mature males are somewhat larger. Ueyanagi (1957) postulates that males reach maturity at 97 cm. This length would accord with ages between 5 and 7 years, based on length-at-age estimates.

Based on stomach content analysis, the type of food consumed varies among fisheries. Other fish and squid tend to predominate; crustaceans are the other major constituent, although minor in comparison (Iversen 1962). Iversen (1962) also discusses variation in forage based on age, latitude and distance from land. Smaller (younger) fish had a higher proportion of squid in their diet. Gempylids and Bramids were more prevalent in the diet of fish nearer the equator, sauries predominated in temperate waters. This may be due to differences in vertical distribution. Squid were also more prevalent in the diet of fish further from the equator (outside of 5ºS–5ºN). In the tropics squid increased as a part of the diet with greater distance from land. Foreman's (1980) summary emphasizes that albacore feed steadily during both night and day, although less so at night since they are dependent on sight for foraging. Species composition of forage varies by area, and there is a direct relationship between the amount of food in stomachs and the biomass of micronektonic animals (Laurs and Nishimoto 1973). Albacore are considered opportunistic feeders.

The habitat features affecting density and abundance of adults are poorly understood. As discussed above, water temperature, D.O, and salinity are of primarily importance

<u>Essential Fish Habitat</u>: Temperate species complex

EFH can be described in terms of the 15.6º and 19.4ºC SST isotherms that circumscribe the areas of major catches. In the North Pacific the transition zone represents an area of preferred habitat. Albacore are described as epi- and mesopelagic so EFH may be depth limited to about 400 m. Albacore occur throughout the EEZ waters of the western Pacific region. Deep-swimming adults are probably more prevalent, although overall albacore are concentrated away from the tropics and outside of the region's EEZ waters. It is recognized that oceanic fronts are areas where albacore congregate, but it is probably not practical to identify these features, which are not temporally stable with respect to location, as HAPC. Given the findings of Leis et al. (1991), inshore areas, particularly near coral reefs, might be considered of HAPC although findings are still preliminary in this matter. Foreman (1980) provides a wide variety of distribution maps, as noted in this description, for albacore life stages and the location of major fisheries.

Habitat description for albacore tuna (*Thunnus alalunga*)

	Egg	**Larvae**	**Juvenile**
Duration	about 4 days	weeks (?)	to 4–6 years
Diet	NA	*Corycaeus spp*. and *Farranula gibbula* (Cyclopoida) and Calanoid nauplii (from studies in Indian Ocean)	see adult
Distribution: General and Seasonal	based on spawning: sub-tropical, north Pacific area centers on 25ºN and 160ºE to about 150ºW; in south Pacific narrower band centered at about 25ºS from Australia to about 110ºW	somewhat more restricted than spawning area, possible preference for inshore areas	preference for cooler waters in comparison to adult, seasonal movement to temperate waters
Location		possibly inshore	offshore
Water Column	epipelagic	epipelagic above pycnocline	epi- to mesopelagic
Bottom Type	NA	NA	NA
Oceanic Features			oceanic fronts

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6.12 Habitat Description for Bigeye tuna (*Thunnus obesus*)

Management Plan and Area

American Samoa, Guam, MHI, NWHI, Northern Mariana Islands, Johnston Atoll, Kingman Reef, Palmyra Atoll, Jarvis Island, Midway Island, Howland and Baker Islands and Wake Island.

Bigeye tuna occur throughout the entire region of Council jurisdiction and in all neighboring states, territories and adjacent high seas zones.

Life History and General Description

Several studies on the taxonomy, biology, population dynamics and exploitation of bigeye tuna have been carried out, including comprehensive reviews by Alverson and Peterson (1963), Collette and Nauen (1983), Mimura and Staff (1963) and Whitelaw and Unnithan (1997). Calkins (1980), Martinez and Bohm (1983) and Miyabe (1994) provide descriptions of bigeye tuna biology and fisheries specific to the Pacific or Indo-Pacific region. Solov'yev (1970) provides information specific to Indian Ocean bigeye tuna.

During November 1996, the Inter-American Tropical Tuna Commission (IATTC) held the first world meeting on bigeye tuna at their headquarters in La Jolla, California, with participation from the Food and Agriculture Organization of the United Nations (FAO), the Indian Ocean Tuna Commission (IOTC), the Institut Français de Recherche Scientifique pour le Developpement en Coopération (ORSTOM) of France, the Instituto Español de Oceanografía (IEO) of Spain, the National Research Institute of Far Seas Fisheries (NRIFSF) of Japan, the South Pacific Commission (SPC; currently, the Secretariat of the Pacific Community), the US National Marine Fisheries Service (NMFS), the University of the Azores, and the University of Hawaii. The objectives of the meeting were to review and discuss current information on the species and associated fisheries and to make recommendations for necessary areas of research. Review papers on the biology and fisheries for bigeye tuna in the Atlantic, Indian and Pacific Oceans were tabled by Pallarés et al. (1998), Stobberup et al. (1998) and Miyabe and Bayliff (1998) and published in the proceedings to the meeting. Information provided in this document relies heavily on these review papers which represent the latest published information on bigeye tuna worldwide.

Bigeye tuna are trans-Pacific in distribution, occupying epipelagic and mesopelagic waters of the Indian, Pacific and Atlantic Oceans. The distribution of the species within the Pacific stretches between northern Japan and the north island of New Zealand in the western Pacific and from 40°N to 30°S in the eastern Pacific (Calkins 1980).

A single, Pacific-wide stock has been proposed as well as a two stock hypothesis separating the eastern Pacific from a central/western Pacific stock. Mitochondrial DNA and DNA microsatellite analyses have been conducted on bigeye otoliths from nine geographically scattered regions of the Pacific (SPC 1997b). The results of this study are not conclusive but do support a single stock hypothesis for areas of jurisdiction within the Council's jurisdiction. Although there is currently not enough information available to determine the stock structure of bigeye in the Pacific (Miyabe and Bayliff 1998), a single stock hypothesis is generally accepted for Pacific bigeye tuna and, for the purposes of the region of the Council, a single stock is assumed.

Large, mature-sized bigeye tuna are sought by high value sub-surface fisheries, primarily longline fleets landing sashimi grade product. Smaller, juvenile fish are taken in many surface fisheries, either as a targeted catch or as a bycatch with other tuna species (Miyabe and Bayliff 1998). Basic environmental conditions favorable for survival include clean, clear oceanic waters between 13°C and 29°C. Hanamoto (1987) estimated optimum bigeye habitat to exist in water temperatures between 10° to 15°C at salinities ranging between 34.5‰ to 35.5‰ where dissolved oxygen concentrations remain above 1 ml/l. He further suggested that bigeye range from the surface layers to depths of 600 m. However, evidence from archival tagging studies indicates that greater depths and much lower ambient temperatures can be tolerated by the species. Juvenile bigeye occupy an ecological niche similar to juvenile yellowfin of a similar size. Large bigeye generally inhabits greater depths, cooler waters and areas of lower dissolved oxygen compared to skipjack and yellowfin, occupying depth strata at or below the thermocline at water temperatures of 15°C or lower.

The species is a mixture between a tropical and temperate water tuna, characterized by equatorial spawning, high fecundity andrapid growth during the juvenile stage with movements between temperate and tropical waters during the life cycle. It is believed that the species is relatively long lived in comparison to skipjack and yellowfin tuna.

Feeding is opportunistic at all life stages, with prey items consisting primarily of crustaceans, cephalopods and fish (Calkins 1980). There is significant evidence that bigeye feed at greater depths than yellowfin tuna, utilizing higher proportions of cephalopods and mesopelagic fishes in their diet thus reducing niche competition (Whitelaw and Unnithan 1997). Spawning spans broad areas of the Pacific and occurs throughout the year in tropical waters and seasonally at higher latitudes at water temperatures above 23° or 24°C (Kume 1967). Bigeye are serial spawners, capable of repeated spawning at near daily intervals with batch fecundities of millions of ova per spawning event (Nikaido et al. 1991. Sex ratio is commonly accepted to be essentially 1:1 until a length greater than 150 cm after which the proportion of males increases.

There have been far fewer bigeye tagged in the Pacific in comparison to skipjack and yellowfin, and movement data from tagging programs is not conclusive. Miyabe and Bayliff (1998) present summary information of some long distance movements of tagged bigeye in the Pacific. Hampton et al. (1998) describes 8,000 bigeye releases made in the western Pacific during 1990–1992. Most of the fish were recaptured close to the point of release, approximately 25% had moved more than 200 nm and more than 5% had moved more than 1,000 nm. No tag recoveries have been made in the Indian Ocean or eastern tropical Pacific. Conventional tagging projects on bigeye tuna began in Hawaiian waters in 1996 and will continue into the year 2000 (Itano 1998b). The NMFS Honolulu Laboratory is conducting archival tagging of bigeye tuna in the Hawaiian EEZ.

Bigeye are clearly capable of large-scale movements which have been documented by tag and recapture programs, but most recaptures have occurred within 200 miles of the point of release. The tuna appear to move freely within broad regions of favorable water temperature and dissolved oxygen values. If the majority of spawning takes place in equatorial waters, then there must be mass movements of juvenile fish to higher latitudes and return movements of mature fish to spawn. However, the extent to which these are directed movements is unknown and the nature of bigeye migration in the central and western Pacific remains unclear.

Bigeye tuna, especially during the juvenile stages, aggregate strongly to drifting or anchored objects, large marine animals and regions of elevated productivity, such as near seamounts and areas of upwelling (Blackburn 1969; Calkins 1980; Hampton and Bailey 1993). Major fisheries for bigeye exploit aggregation effects either by targeting biologically productive areas and deep and shallow seamount and ridge features or by utilizing artificial fish aggregation devices (FADs) to aggregate commercial concentrations of bigeye. Bigeye tuna are exploited by purse-seine, longline, handline and troll gear within the Council area of jurisdiction (WPRFMC 1997, SPC 1997a).

Egg and Larval Distribution

The eggs of bigeye tuna resemble those of several scombrid species and can not be differentiated by visual means. Therefore, the distribution of bigeye eggs has not been determined in the Pacific Ocean. However, the duration of the fertilized egg phase is very short and egg distributions can be assumed to be roughly coincident with documented larval distributions. Eggs are epipelagic, buoyed at the surface by a single oil droplet until hatching occurs.

Kume (1962) examined artificially fertilized bigeye eggs in the Indian Ocean, noting egg diameters ranging from 1.03 to 1.08 mm with oil droplets measuring 0.23 to 0.24 mm. Hatching began 21 hours post-fertilization, and larvae measured 1.5 mm in length. Larval development soon after hatching has been described by Kume (1962) and Yasutake et al. (1973). Descriptions of bigeye larvae and keys to their differentiation from other *Thunnus* species are given by Matsumoto et al. (1972) and Nishikawa and Rimmer (1987). However, the early larval stages of bigeye and yellowfin are difficult or impossible to differentiate without allozyme or mitochondrial DNA analyses (Graves et al. 1988). An indexed bibliography of references on the eggs and early life stages of tuna is provided by Richards and Klawe (1972).

The distribution or areas of collection of larval bigeye in the Pacific has been described or estimated by Nishikawa et al. (1978), Strasburg (1960) and Ueyanagi (1969). Bigeye larvae are most common in warm surface waters between 30°N and 20°S in the Pacific. Data compiled by Nishikawa et al. (1978) indicates that bigeye larvae are relatively abundant in the western and eastern Pacific compared to central Pacific areas and are most common in the western Pacific between 10°N and 15°S. The basic environment of bigeye larvae can be characterized as warm, oceanic surface waters at the upper range of temperatures utilized by the species, which is a consequence of preferred spawning habitat. Kume (1967) noted a correlation between mature but sexually inactive bigeye at SSTs below 23° or 24°C which may represent a lower limit to spawning activity. In the eastern Pacific, bigeye spawning occurs between 10°N and 10°S throughout the year and during summer months at higher latitudes (Collette and Nauen 1983). Hisada (1979) noted from a study in the Pacific that a temperature of 24°C and a maximum depth of 50 m were necessary for maturity and spawning, suggesting a similar seasonal pattern of spawning in the western Pacific. The study by Boehlert and Mundy (1994) in Hawaiian waters and McPherson (1991a) in eastern Australian waters supports the concept of equatorial spawning throughout the year and seasonal spawning of bigeye at higher latitudes. Additional information on the maturity and spawning of western and central Pacific bigeye is provided by Kikawa (1953, 1957, 1961, 1962, 1966), Nikaido et al. (1991) and Yuen (1955). Additional information on the maturity and spawning of eastern Pacific and Atlantic bigeye is given in Goldberg and Herring-Dyal (1981), Pereira (1985, 1987) and Rudomiotkina (1983). It can be assumed that bigeye larvae are common at SSTs above 26°C but may occur in some regions with SSTs of approximately 23°C and above.

Bigeye larvae appear to be restricted to surface waters of the mixed layer well above the thermocline and at depths less than 50 to 60 m, with no clear consensus on diurnal preference by depth or patterns of vertical migration (Matsumoto 1961, Strasburg 1960, Ueyanagi 1969). Prey species inhabit this zone, consisting of crustacean zooplankton at early stages, shifting to fish larvae at the end of the larval phase and early juvenile stages. The diet of larval and juvenile bigeye tuna is similar to that of yellowfin tuna, consisting of a mix of crustaceans, cephalopods and fish (Uotani, et al. 1981).

The age and growth of larval, post-larval and early juvenile bigeye is not well known or studied. Yasutake et al. (1973) recorded newly hatched larvae at 2.5 mm in total length, growing to 3.0 and 3.1 mm at 24 and 48 hours. The early post-larval stage was achieved at 86 hours after hatching. However, it is likely that the early development of bigeye tuna is similar to that of yellowfin tuna which is the subject of current land based tank studies by the IATTC (IATTC

1997). The larval stages of bigeye tuna likely extend for approximately two to three weeks after hatching.

The short duration of the larval stage suggests that the distribution of bigeye larvae is nearly coincident with the distribution of bigeye spawning and eggs. It has been suggested that areas of elevated productivity are necessary to support broad spawning events that are characteristic of skipjack, yellowfin and bigeye tuna whose larvae would subsequently benefit from being in areas of high forage densities (Sunc et al. 1981, Miller 1979, Boehlert and Mundy 1994).

Juvenile

The juvenile phase of bigeye is not clearly defined in the literature. Calkins (1980) suggests grouping bigeye into larval, juvenile, adolescent, immature adult and adult stages. For the purposes of defining EFH, this report will utilize the categories of egg, larval, juvenile and adult. The juvenile phase extends from the time of transformation from the post-larval phase into a small tuna up to the onset of sexual maturity at approximately 3 years of age. For the purposes of discussion, the juvenile phase will include sexually immature fish to approximately 60 cm FL; pre-adult, 61 to 99 cm FL; and adult, greater than or equal to 100 cm FL.

The distribution of juvenile bigeye tuna less than 35 cm FL is not known but is assumed to be similar to that of larval bigeye, i.e. occupying warm surface waters. The distribution of juveniles greater than 35 cm FL is better understood as they begin to enter catch statistics of purse-seine, pole-and-line and handline fisheries worldwide. Bigeye as small as 32 cm are taken in the Japanese coastal pole-and-line fishery (Honma et al. 1973). Juvenile and pre-adult bigeye of 35 cm to approximately 99 cm are regularly taken as a bycatch in the eastern and western Pacific purse-seine fisheries, usually on sets made in association with floating objects (Hampton and Bailey 1993). Bigeye tuna enter a seamount-associated handline fishery and FAD-based pole-and-line and handline fisheries in Hawaii at approximately 40 cm FL (Boggs and Ito 1993, Itano 1998). Juvenile and pre-adult bigeye of increasing sizes appear in higher latitude fisheries, so one can infer a movement away from equatorial spawning grounds as the fish grow and begin to utilize greater amounts of sub-surface habitat.

Juvenile bigeye form mono-specific schools at or near the surface with similar-sized fish or may be mixed with skipjack and/or juvenile yellowfin tuna (Calkins 1980). Yuen (1963) has suggested that the mixed-species schools are actually separate single-species schools that temporarily aggregate to a common factor such as food. Echo sounder, sonar traces and test fishing strongly support a separation of bigeye, yellowfin and skipjack schools that are aggregated to the same floating object, with the bigeye beneath the other species (Itano, pers. observ.). It is well known that juvenile bigeye aggregate strongly to drifting or anchored objects or to large, slow-moving marine animals, such as whale sharks and manta rays (Calkins 1980, Hampton and Bailey 1993). This phenomenon has been exploited by surface fisheries to aggregate juvenile yellowfin and bigeye tuna to anchored or drifting FADs (Sharp 1978).

Juvenile and adult bigeye tuna are also known to aggregate near seamounts and submarine ridge features where they are exploited by pole-and-line, handline and purse-seine fisheries (Fonteneau 1991, Itano 1998a).

The majority of feeding studies conducted on bigeye tuna have examined large longline-caught fish. However, juvenile bigeye are generally recognized to feed opportunistically during day and night on a wide variety of crustaceans, cephalopods and fish in a manner similar to yellowfin of a similar size (Collette and Nauen 1983). Prey items are epipelagic or mesopelagic members of the oceanic community or pelagic post-larval or pre-juvenile stages of island-, reef- or benthic-associated fish and crustaceans. Alverson and Peterson (1963) state that juvenile bigeye less than 100 cm generally feed at the surface during daylight, usually near continental land masses, islands, seamounts, banks or floating objects.

Adult

Estimates of size at maturity for Pacific bigeye vary between authors (Whitelaw and Unnithan 1997). Kikawa (1957,1961) estimate size at first maturity for males at 101–105 cm and 91–95 cm for females and select 100 cm as a general size for “potential maturity” for Pacific bigeye. The following description will use 100 cm as a rough definition for adult bigeye.

Adult bigeye are distributed across the tropical and temperate waters of the Pacific, between northern Japan and the north island of New Zealand in the western Pacific, and from 40°N to 30°S in the eastern Pacific (Calkins 1980). Numerous references exist on the distribution of Pacific bigeye tuna in relation to general distribution and migration (Hanamoto 1986; Kume 1963, 1967, 1969a, 1969b; Kume and Shiohama 1965; Laevastu and Rosa 1963); the oceanic environment (Blackburn 1965, 1969; Hanamoto 1975, 1976, 1983, 1987; Nakamura and Yamanaka 1959; Suda et al. 1969; Sund et al. 1981; Yamanaka et al.1969); the physiology of tunas (Magnuson 1963; Sharp and Dizon 1978; Stretta and Petit 1989); and fish aggregation devices (Holland et al. 1990).

There is some consensus that the primary determinants of adult bigeye distribution are water temperature and dissolved oxygen levels. Salinity does not appear to play an important role in tuna distribution in comparison to water temperature, dissolved oxygen levels and water clarity. Hanamoto (1987) reasons that optimum salinity for bigeye tuna ranges from 34.5‰ to 35.5‰ given the existence of a 1:1 relationship between temperature and salinity within the optimum temperature range for the species. Alverson and Peterson (1963) state that bigeye tuna are found within SST ranges of 13°to 29°C with an optimum temperature range of 17° to 22°C. However, the distribution of bigeye tuna can not be accurately described by SST data since the fish spend a great deal of time at depth in cooler waters. Hanamoto (1987) analyzes longline catch and gear configurations in relation to vertical water temperature profiles to estimate preferred bigeye habitat. He notes that bigeye are taken by longline gear at ambient temperatures ranging from 9° to 28°C and concludes from relative catch rates within this range that the optimum temperature for large bigeye lies between 10° and 15°C if available dissolved oxygen levels remain above 1ml/l. In a similar study in the Indian Ocean, the optimum temperature for bigeye tuna was estimated to lie between 10° and 16°C (Mohri et al. 1996).

According to several authors, bigeye can tolerate dissolved oxygen levels as low as 1 ml/l, which is significantly lower than the dissolved oxygen requirements of skipjack and yellowfin tuna (Sund et al. 1981). Brill (1994) has proposed a physiological basis to explain how bigeye are able to utilize oxygen in a highly efficient manner thereby allowing them to forage in areas that are not utilized by other tuna species. He theorizes that bigeye tuna spend the majority of their time at depth, making short excursions to the surface to warm up. This vertical movement pattern, which has been clearly demonstrated by sonic tracking experiments of bigeye tuna, is exactly the opposite pattern demonstrated by skipjack and yellowfin tuna (Holland et al. 1992). Sonic tracking and archival tagging of bigeye tuna consistently indicate deep foraging during the daytime near or below the thermocline and shallow swimming behavior during at night.

Hanamoto (1987) examines vertical temperature profiles of water masses within the known range of bigeye in the Pacific and proposes that bigeye range from the surface to as deep as 600 m in areas where suitable temperatures exist at that depth. However, evidence from archival tagging experiments (Boggs, pers. comm.) suggests that bigeye tuna are capable of diving to greater depths and to temperatures well below the values cited by Alverson and Peterson (1963) or estimated by Hanamoto (1987). This work is still in progress and currently unpublished.

The fact that large bigeye take longline hooks at greater depths than yellowfin coupled with a rising demand for sashimi-grade tuna and improved storage techniques prompted a shift to deep longline gear to target bigeye tuna during the late 1970s and early 1980s (Sakagawa et al. 1987, Suzuki et al. 1977). This development promoted numerous studies on differential catch rates and gear configurations to define productive hooking depths for bigeye given different oceanographic conditions (Bahar 1985, 1987; Boggs 1992; Gong et al. 1987, 1989; Hanamoto 1974; Nishi 1990; Saito 1975; Shimamura and Soeda 1981; Suzuki and Kume 1981, 1982; Suzuki et al. 1979).

Several investigators have proposed that the greater depth distribution of bigeye is a foraging strategy to exploit regions less utilized by yellowfin or skipjack tuna, thus reducing niche competition. Bigeye tuna are opportunistic feeders like yellowfin, relying on a mix of crustaceans, fish and cephalopods with feeding taking place during the day and night (Calkins 1980; Collette and Nauen 1983). However, several authors support the notion that the composition of bigeye diet differs significantly from that of similar-sized yellowfin (Watanabe 1958, Talbot and Penrith 1963, Kornilova 1980). Adult bigeye appear to forage at significant depths, utilizing a higher proportion of squid and mesopelagic fishes compared to yellowfin. Solov'yev (1970) suggests that the preferred feeding depth of large bigeye is 218–265 m, which is the most productive depth for longline catches. Miyabe and Bayliff (1998) summarize diet items of bigeye in the Pacific in tabular form from studies by Alverson and Peterson (1963), Blunt (1960), Juhl (1955), King and Ikehara (1956) and Watanabe (1958). Bigeye tuna are also known to aggregate to large concentrations of forage, such as the spawning aggregations of lanternfish (*Diaphus* sp.) [MYCTOPHIDAE] that occur seasonally in the Australian Coral Sea (Hisada 1973, McPherson 1991b).

Whitelaw and Unnithan (1997) provide a useful summary of studies on the age and growth of bigeye tuna in the Pacific and Indian Oceans. Pertinent references include Iverson (1955), Kume and Joseph (1966), Marcille and Stequert (1976), Peterson and Bayliff (1985), Tankevich (1982) and Talbot and Penrith (1960). There is some consensus, which is supported by tagging data, that the bigeye's growth is rapid during the first couple of years similar to yellowfin's and then slows down and that the bigeye's lifespan is longer than the yellowfin's. Age studies of bigeye tuna are not complete and the subject requires further work. A recent study by Matsumoto (1998) analyzing presumed daily otolith increments finds a relationship indicating 200 and 400 increments corresponding to fish 40 and 55 cm FL.

Currently, an age validation study using daily growth increments on otoliths is being conducted by the IATTC and the Commonwealth Scientific & Industrial Research Organization (CSIRO) of Australia. Bigeye age and growth is being investigated by the Offshore Fisheries Programme of the Secretariat of the Pacific Community (SPC) using presumed daily increments on otoliths and tagging data. (Hampton and Leroy 1998, IATTC 1997, SPC 1997b). Preliminary results indicate that bigeye may be relatively slow growing and long lived after year 4.

Estimates of length at maturity for Pacific bigeye vary, and a large-scale study using histological methods is required. Kikawa (1957, 1961) proposed 100 cm as the length for potential to be sexually mature, which appears to be a reasonable estimate. Kume (1962) recorded a length at first maturity of 92 cm, and McPherson (1988) recorded mature bigeye of 100 cm. A 100 cm fish corresponds approximately to a fish of age 3 according to the best available estimates of age and growth reviewed in Whitelaw and Unnithan (1997).

Information on sex ratios of bigeye are inconsistent though there is general agreement that males are more abundant in the larger size classes, > 150 cm. Spawning occurs throughout the year in tropical waters and at higher latitudes when SSTs rise above 23° to 24°C (Kume 1967). Bigeye are serial spawners, capable of near daily spawning periodicity during spawning seasons of unknown length (Nikaido et al. 1991). Spawning takes place during the afternoon or evening hours at or near the surface (McPherson 1991a).

Adult bigeye tuna aggregate to drifting flotsam and anchored buoys, though to a lesser degree than juvenile fish. Bigeye also aggregate over deep seamount and ridge features where they are targeted by some longline and handline fisheries. Regions of elevated primary productivity and high zooplankton density—such as near regions of upwelling and convergence of surface waters of different densities that are very important to the distribution of skipjack and yellowfin tuna—

are less important to the distribution of adult bigeye. This is logical if one assumes skipjack and yellowfin are inhabitants of the upper mixed layer while adult bigeye are sub-surface in nature, more closely tied to the thermocline and organisms of the deep scattering layer. Water temperature, thermocline depth and season appear to have much stronger influences on the distribution of large bigeye (Calkins 1980). Hanamoto (1987) proposes that productive longline fishing grounds for bigeye do not necessarily equate to regions of higher abundance, but "are nothing more than areas where the hook depths happened to coincide with the optimum temperature layer and where the amount of dissolved oxygen happened to be greater than the minimum required for bigeye tuna (1ml/l)." Nakamura (1969) suggests that bigeye are closely associated with particular water masses or current systems during different life stages. Fish taken in the northern longline fishing grounds around 30°N are reproductively inactive young adults or pre-adults or spent spawners while the fish taken in the equatorial longline fishery are actively spawning adults (Calkins 1980).

<u>Essential Fish Habitat</u>: Temperate species complex

Habitat Description for Bigeye tuna (*Thunnus obesus*)

	Egg	**Larvae**	**Juvenile**
Duration	approximately 24 hours	to approximately 3 weeks	approximately 3 years
Diet	NA	zooplankton, larval fish	crustaceans, cephalopods, fish
Season/Time	throughout the year in tropics, seasonally where SST is above 23°–24°C	throughout the year in tropics, seasonally where SST is above 23°–24°C	little information available approximately 25°N to 25°S
Location	offshore waters	offshore waters	offshore waters
Water Column	epipelagic	epipelagic	pelagic, surface to region of thermocline
Bottom type	NA	NA	NA
Oceanic Features	areas of upwelling, convergence, oceanic gyres, general productivity	areas of upwelling, convergence, oceanic gyres, general productivity	known to concentrate in areas of high productivity, upwelling, convergence including seamount and ridge features

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6.13 Habitat Description for Yellowfin tuna (*Thunnus albacares*)

Management Plan and Area

American Samoa, Guam, MHI, NWHI, Northern Mariana Islands, Johnston Atoll, Kingman Reef, Palmyra Atoll, Jarvis Island, Midway Island, Howland and Baker Islands and Wake Island.

Yellowfin tuna within the jurisdiction of the Council are managed under the FMP for the Pelagic Fisheries of the Western Pacific Region. Yellowfin tuna occur throughout the entire region of council jurisdiction and in all neighboring states, territories and adjacent high seas zones.

Life History and General Description

Several studies on the taxonomy, biology, population dynamics and exploitation of yellowfin tuna have been carried out, including comprehensive reviews by Cole (1980), Collette and Nauen (1983), Wild (1994) and Suzuki (1994). The information in this brief synopsis of yellowfin tuna distribution and habitat relies heavily on these works.

Yellowfin tuna are trans-Pacific in distribution, occupying the surface waters of all warm oceans and form the basis of large surface and sub-surface fisheries. Basic environmental conditions favorable for survival include clean oceanic waters between 18°C and 31°C within salinity ranges normal for the pelagic environment with dissolved oxygen concentrations greater than 1.4 to 2.0 ml/l (Blackburn 1965, Sund et al. 1981). Larval and juvenile yellowfin occupy surface waters with adults increasingly utilizing greater depth strata while remaining within the mixed layer, i.e., generally above the thermocline (Suzuki et al. 1978).

The species is a tropical tuna characterized by a rapid growth rate and development to maturity and high spawning frequency and fecundity with a high natural mortality and relatively short life span. Feeding is opportunistic at all life stages, with prey items consisting primarily of crustaceans, cephalopods and fish (Cole 1980). Spawning spans broad areas of the Pacific and occurs throughout the year in tropical waters and seasonally at higher latitudes at water temperatures over 24°C (Suzuki, 1994). Yellowfin are serial spawners, capable of repeated spawning at near daily intervals with batch fecundities of millions of ova per spawning event (June 1953, Nikaido 1988, McPherson 1991, Schaefer 1996). Sex ratio is commonly accepted to be essentially 1:1 until a length of approximately 120 cm after which the proportion of males increases (Kikawa 1966, Yesaki 1983).

Yellowfin are clearly capable of large-scale movements, which have been documented by tag and recapture programs, but most recaptures occur within a short distance of release. The tuna appear to move freely within broad regions of favorable water temperature and are known to make seasonal excursions to higher latitudes as water temperatures increase with season. However, the extent to which these are directed movements is unknown, and the nature of yellowfin migration in the central and western Pacific remains unclear (Suzuki 1994).

Yellowfin tuna are known to aggregate to drifting flotsam, large marine animals and regions of elevated productivity, such as near seamounts and regions of upwelling (Blackburn 1969, Wild 1994, Suzuki 1994). Major fisheries for yellowfin exploit aggregation effects either by utilizing artificial fish aggregation devices (FADs) or by targeting areas with vulnerable concentrations of tuna (Sharp 1979). Yellowfin are exploited by purse-seine, longline, handline and troll gear within the Council area (WPRFMC 1997, SPC 1996).

Egg and Larval Distribution

The eggs of yellowfin tuna resemble those of several scombrid species and can not be differentiated by visual means. (Cole 1980). Therefore, the distribution of yellowfin eggs has not been determined in the Pacific. However, the duration of the fertilized egg phase is very short, and egg distributions can be assumed to be roughly coincident with documented larval distributions. Eggs are epipelagic, floating at the surface until hatching. The observation of yellowfin spawning and the development of yellowfin egg and early larval stages is now possible at shore-based facilities where yellowfin spawning was first observed during late 1996 (IATTC 1997). Egg diameter ranged from 0.90 to 0.95 mm, and the duration of the egg stage was approximately 24 hours. The notochord lengths of larvae at hatching ranged from 2.2 to 2.5 mm. The duration of the larval stage has been variable in laboratory reared specimens. Research on yellowfin larvae collected at sea and identified as yellowfin tuna by mitochondrial DNA analysis indicate that wild larvae grow at a rate approximately twice that of laboratory reared larvae and average sizes are 1.5 to 2.5 larger than laboratory reared specimens of a similar age (Wexler 1997).

The larval development from artificially fertilized eggs has been described by Harada et al. (1971), Mori et al. (1971) and Harada et al. (1980). A review of research on the development, internal anatomy and identification yellowfin larvae and early life stages is available in Wild (1994). The early larval stages of yellowfin and bigeye are difficult or impossible to differentiate without allozyme or mitochondrial DNA analyses. The distribution of larval yellowfin in different regions of the Pacific has been described by several authors (Matsumoto 1958, Strasburg 1960, Sun´ 1960). Studies on the larval distribution of yellowfin by Yabe et al. (1963), Matsumoto (1966), Ueyanagi (1969) and Nishikawa et al. (1985) encompass broad areas of the Pacific.

Yellowfin larvae are trans-Pacific in distribution and found throughout the year in tropical waters but are restricted to summer months in sub-tropical regions. For example, peak larval abundance occurs in the Kuroshio Current during May and June and in the East Australian Current during the austral summer (November to December). Yellowfin larvae have been reported close to the MHI in June and September but were not found in December and April (Beohlert and Mundy 1994).

The basic environment of yellowfin larvae can be characterized by warm, oceanic surface waters with a preference toward the upper range of temperatures utilized by the species, which may be a reflection of preferred spawning habitat. It can be assumed that yellowfin larvae are common at SST above 26°C (Ueyanagi 1969) but may occur in some regions with SST of approximately 24°C and above. Harada et al. (1980) found the highest occurrence of normally hatched larvae at water temperatures between 26.4°C to 27.8°C with no normal larvae found in water less than 18.7°C or greater than 31.9°C from laboratory observations.

Yellowfin larvae appear to be restricted to surface waters of the mixed layer well above the thermocline and at depths less than 50 to 60 m, with no clear consensus on diurnal preference by depth or patterns of vertical migration (Matsumoto 1958, Strasburg 1960, Ueyanagi 1969). Prey species inhabit this zone, consisting of crustacean zooplankton at early stages of the yellowfin larval phase with some fish larvae at the end of the larval phase.

Age and growth of yellowfin larvae has been investigated under a variety of laboratory conditions and from field collections. Observations from both laboratory raised and wild specimens indicate highly variable growth rates, with wild fish consistently exhibiting higher growth rates compared to laboratory reared specimens (IATTC 1997). It was suggested the differences in growth rates and size at age were due to less than optimal growth conditions in the laboratory environment. Two critical periods of larval mortality have been identified, the first at 4–5 days and the second at about 11 days after hatching; the latter corresponds to the time period when the diet of yellowfin larvae is proposed to shift from crustaceans to fish larvae (FSFRL 1973).

The distribution of yellowfin larvae has been linked to areas of high productivity and islands, but how essential these areas are to the life history of the species is not known. Grimes and Lang (1991) note high concentrations of yellowfin larvae in productive waters on the edge of the Mississippi River discharge plume, and *Thunnus* larvae (most likely yellowfin due to spawning distributions) have been noted to be relatively abundant near the Hawaiian Islands compared to offshore areas (Miller 1979, Boehlert and Mundy 1994).

Juvenile

The distribution of juvenile tuna less than 35 cm FL has not been well documented but is assumed to be similar to that of larval yellowfin. Juveniles occupy warm oceanic surface waters above the thermocline and are found throughout the year in tropical waters. Published accounts on the capture of juvenile tuna have been summarized by Higgins (1967). Juveniles have been reported in the western Pacific between 31°N near the east coast of Japan to 23°S and 23°N near the Hawaiian Islands to 23°S in the central Pacific region. Juvenile yellowfin form single species schools at or near the surface of similar-sized fish or may be mixed with other tuna species such as skipjack or juvenile bigeye tuna. Yuen (1963) has suggested that the mixed-species schools are actually separate single-species schools that temporarily aggregate to a common factor such as food. Juvenile fish will aggregate beneath drifting objects or with large, slow moving animals such as whale sharks and manta rays (Hampton and Bailey 1993). This characteristic has been exploited by surface fisheries to aggregate yellowfin tuna, most of which are juvenile fish, to anchored or drifting FADs. Juvenile and adult yellowfin tuna are also known to aggregate near seamounts and submarine ridge features (Fonteneau 1991).

Juvenile yellowfin feed primarily during the day and are opportunistic feeders on a wide variety of forage organisms, including various species of crustaceans, cephalopods and fish (Reintjes and King 1953, Watanabe 1958). Prey items are epipelagic or mesopelagic members of the oceanic community or pelagic post-larval or pre-juvenile stages of island-, reef- or benthic-associated organisms. Significant differences in the composition of prey species of FAD- and non-FAD–associated yellowfin have been noted in Hawaii (Brock 1985), American Samoa (Buckley and Miller 1994) and the southern Philippines (Yesaki 1983).

Adult

The habitat of adult yellowfin can be characterized as warm oceanic waters of low turbidity with a chemical and saline composition typical of tropical and sub-tropical oceanic environments. Adult yellowfin are trans-Pacific in distribution and range to higher latitudes compared to juvenile fish. The adult distribution in the Pacific lies roughly within latitudes 40°N to 40°S as indicated by catch records of the Japanese purse-seine and longline fishery (Suzuki et al. 1978). SSTs play a primary role in the horizontal and vertical distribution of yellowfin, particularly at higher latitudes. Blackburn (1965) suggests the range of yellowfin distribution is bounded water temperatures between 18°C and 31°C with commercial concentrations occurring between 20°C and 30°C. Salinity does not appear to play an important role in tuna distribution in comparison to water temperature and clarity.

Estimates of length at maturity for central and western Pacific yellowfin vary widely with some studies supporting an advanced maturity schedule for yellowfin in coastal or archipelagic waters (Cole 1980). However, most estimates suggest that the majority of yellowfin reach maturity between 2 and 3 years of age on the basis of length-age estimates for the species (Ueyanagi 1966). Longevity for the species has not been defined, but a maximum age of 6 to 7 years appears likely based on growth estimates and tag recapture data. Observations of length at first maturity for female yellowfin range widely from 56.7 cm in the Philippines (Buñag 1956) to 112.0 cm for western Pacific yellowfin (Sun and Yang 1983). However, most of these studies were based on macroscopic staging techniques that are far less accurate compared to histological methods for determining maturity in serial spawning fishes. Using histological analysis of yellowfin ovaries, McPherson (1991) estimates that the length at 50% maturity for yellowfin in the Australian Coral Sea is 107.9 cm in the inshore handline fishery and 120.0 cm in the offshore longline fishery. These results are similar to Kikawa (1962) who notes from the central and western tropical Pacific that a few longline caught yellowfin were reproductive at 80–110 cm and estimates a length at 50% maturity between 110 and 120 cm from GI analysis. Itano (1997) notes that 50% of yellowfin sampled form purse-seine and longline gear at 105 cm were histologically classified as mature from a large data set from the western tropical Pacific and predicts a length at 50% maturity of 107.9 cm.

Spawning occurs throughout the year in tropical waters at least within 10 degrees of the equator and seasonally at higher latitudes when SSTs rise above 24°C (Suzuki 1994). Several different areas and seasons of peak spawning for yellowfin have been proposed for the central and western equatorial Pacific. Koido and Suzuki (1989) propose a peak spawning period for yellowfin in the western tropical Pacific from April to November. Kikawa (1966) report the peak spawning potential of yellowfin in the western tropical Pacific (120°E–180°) to occur December–January and April–May east of the dateline (180°–140°W). Fish taken by purse-seine gear are more reproductively active with a higher spawning frequency than longline caught fish in the same areas. A positive relationship between spawning activity and areas of high forage abundance has been noted (Itano 1997). Yellowfin spawn in Hawaiian waters during the spring to fall period. June (1953) notes well-developed ovaries in yellowfin caught by longline close the MHI from mid-May to the end of October. Spawning in Hawaiian waters has been histologically confirmed from April to October, and spawning frequency estimates approach a daily periodicity during the peak spawning period of June to August (Itano 1997).

Adult yellowfin tuna are opportunistic feeders, relying primarily on crustaceans, cephalopods and fish as has been described for juvenile fish. However, the larger size of adult fish allows the exploitation of larger prey items, with large squid and fish species becoming more important diet items. For example, Yesaki (1983) notes a high degree of cannibalism of large FAD-associated yellowfin on juvenile tunas in the southern Philippines. The baiting of longlines with saury, mackerel and large squid also implies that mature fish will take large prey items if available.

Yellowfin tuna are known to aggregate to drifting flotsam, anchored buoys, porpoise and large marine animals (Hampton and Bailey 1993). Adult yellowfin also aggregate in regions of elevated productivity and high zooplankton density, such as near seamounts and regions of upwelling and convergence of surface waters of different densities, presumably to capitalize on the elevated forage available (Blackburn 1969, Cole 1980, Wild 1994, Suzuki 1994). However, the degree to which these regions are essential or simply advantageous to yellowfin is not known.

<u>Essential Fish Habitat</u>: Tropical species complex

Habitat Description for Yellowfin tuna (*Thunnus albacares*)

	Egg	**Larvae**	**Juvenile**	**Ad**
Duration	24 hours	to approximately 3 weeks	approximately 2 years	ap
Diet	NA	zooplankton, larval fish	crustaceans, cephalopods, fish	cr fis
Season/Time	throughout the year in tropics, seasonally where SST is above 24°–25°C	throughout the year in tropics, seasonally where SST is above 24°–25°C	31°N near Japan, at least 23°N–23°S in central Pacific	40 ra be Sp ye wl 25
Location	offshore waters	offshore waters	offshore waters	of
Water Column	epipelagic	epipelagic	pelagic, upper mixed layer	pe la ex th
Bottom type	NA	NA	NA	N
Oceanic Features	areas of upwelling, convergence, oceanic gyres, general productivity	areas of upwelling, convergence, oceanic gyres, general productivity	known to concentrate in areas of high productivity, upwelling, convergence	kr ar up

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6.14 Habitat description for northern bluefin tuna (*Thunnus thynnus*)

Management Plan and Area

American Samoa, Guam, MHI, NWHI, Northern Mariana Islands, Johnston Atoll, Kingman Reef, Palmyra Atoll, Jarvis Island, Midway Island, Howland and Baker Islands and Wake Islands.

Life History and General Description

Material for this habitat description is drawn from Bayliff (1994) and Collette and Nauen (1983). Bayliff provides an extensive list of references which are not, in general, re-cited here.

There are seven species in the genus *Thunnus*, a member of the Thunnini tribe of the subfamily Scombrinae. Three of these species, *T. thynnus, T. alabacares* (yellowfin tuna) and *T. obsesus* (bigeye tuna) are PMUS. Tunas of this genus are unique in their high metabolic rate and vascular heat exchanger systems allowing thermo-regulation and endothermy. The Pacific northern bluefin is considered a sub-species. *T. thunnus orientalis* (Temminck and Schlegel) along with an Atlantic sub-species, *T. thynnus thynnus* (Linnaeus). The Pacific population is considered a single stock but with a long range, complex migratory pattern (see below).

The range of the species is between about 20º and 40º N in the eastern and central Pacific, but with a northern extension to the Gulf of Alaska in the east. In the western Pacific they are found as far south as 5º N and north to Sakhalin Island near the Asian mainland. This represents the limits of distribution; based on historic fish landings they are concentrated between about 25º and 40ºN in the central and western Pacific. In the eastern Pacific bluefin are caught mostly between Cabo San Lucas, Baja California, Mexico and Point Conception, California. They are occasionally caught further north along the California coast, in Oregon and Washington and to Shelikoff Straight in Alaska. This probably represents an occasional range extension due to elevated SST. In the eastern and central Pacific preferred habitat as defined by temperature is between 17º and 22º or 23ºC. In the western Pacific off Japan optimal temperature is reported as between 14º and 19º or 15º and 17º. Juvenile fish are caught by Japanese coastal fishermen in warmer water, as high as 29ºC for fish 15 to 31 cm. Temperature range reportedly increases with size. Bayliff (1994) provides maps of the areas of the North Pacific bounded by the 17º and 23ºC isotherm by season. Roughly, in winter it is a band centered on 30ºN latitude and in summer on 40ºN.

In addition to the review article cited earlier, migration is described in Bayliff, et al. (1991) and Bayliff (1993). Bluefin spawn in the western Pacific, off of the Philippines (April–June) and Japan (July–August). Larvae, postlarvae and juveniles are transported northward in the Kuroshio Current. Some fish remain in the western Pacific while others migrate eastward after their first winter. Bayliff suggests that the isotherm band described above, which coincides roughly with the North Pacific Subarctic-Subtropical Transition Zone (see the habitat description for albacore tuna for more discussion of this oceanographic feature), bounds their migration path. The migration time is relatively brief, seven months or less. It is unclear how long fish remain in the eastern Pacific or whether they make multiple migrations back and forth, although this seems unlikely. Eventually fish return to the western Pacific to spawn; the return journey takes longer, around two years, as the minimum time based on tag returns is 674 days. Some juvenile fish also move southward from the spawning areas off the Philippines and Japan. Northern bluefin have been caught as far south as New Zealand and are occasionally caught off of Papua New Guinea, the Solomon Islands and the Marshall Islands. However, there is no evidence of spawning in these areas.

In addition to the temperature ranges discussed above, habitat features mentioned by Bayliff that may affect population abundance and density include the California Current in the eastern Pacific, the aforementioned Pacific Transition Zone and the Kuroshio Current off of Japan.

The papers by Bayliff cited above discuss age and growth. While von Bertalanffy parameter estimates have been made, Bayliff et al. (1991) argue for a two-stage model with separate parameter estimates for fish less than 564 mm following the Gompertz model and linear growth for fish greater than 564 mm. The parameters are also presented in Bayliff (1994) but will not be reproduced here. Estimates for size at age for 1-year-old fish range from 43 to 76.3 cm and for 4-year-old fish, 113.1 to 178 cm (see Table 1 in Bayliff (1991)). Bayliff (1993) presents age at length—by month—for bluefin in the eastern Pacific. The maximum size fish caught in the North Pacific is reported as 300 cm. Using the growth equations presented by Bayliff this corresponds to an age of about 9.5 years, but bluefin from the Pacific have lived as long as 16 years in captivity. Bayliff (1993) discusses the coefficient of natural mortality and arrives at a range of 0.161–0.471 for the 90% confidence interval. Using these figures, at 10 years about 79% and 99%+ mortality is achieved respectively.

Bluefin may be sexually dimorphic with respect to size as is common in other tunas; fish raised in captivity reached a size of 1,190 mm for males and 1,353 mm for females at 3 years of age

(Hirota et al. 1976). Male-female sex ratios reported in Bayliff (1993) range from 45:0 for fish caught in the eastern Pacific by purse seine to 28:47 (1:1.68) for longline caught fish landed off of Taiwan. Fecundity has been estimated at 10 million eggs for fish 270–300 kg.

Spawning areas and seasons were discussed above. Larvae were reported off of Oahu, Hawaii, by (Miller,1979) but other unpublished sampling data (from 1984–85) reported by Bayliff (1993) found no bluefin larvae off of Oahu.

The major fisheries for bluefin in the eastern Pacific are a sport fishery and commercial purse seining off the US West Coast; foreign longliners also catch a small number of fish in this region. In the western Pacific a variety of gear is used, primarily in coastal fisheries but also by purse seiners in an area about 30º–42ºN and 140º–152ºE. Bayliff (1993) discusses landing trends; CPUE trend is only available for the eastern Pacific. There both CPUE and effort declined during the 1980s and early 1990s.

In the western Pacific region only Hawaii reported commercial bluefin tuna landings in 1996. All of this total of 100,000 lbs (45.36 mt) was landed by the longline fleet (WPRFMC 1997). No information is given on catch areas, but they are most likely north and west of the Hawaiian Islands and mostly in international waters. Total landings in managed fisheries is small in comparison to total catch in the Pacific. For example Bayliff (1993) reports 13,183 mt landed in 1986 by all Japanese vessels, almost 300 times 1996 Hawaii landings.

Egg and Larval Distribution

Eggs and larvae are probably confined to known spawning areas in the western Pacific, outside of the management area. As noted above, Miller (1979) reports larvae from Hawaiian waters but later more extensive sampling in Hawaii failed to turn up larvae. Given the distance from known spawning areas it would seem unlikely the bluefin larvae normally occur in Hawaiian waters. Larvae reportedly feed on small zooplankton, mainly copepods (Uotani et al. 1990).

Bayliff (1994) provides no details on larval growth and habitat. More information may be found in Yabe and Ueyanagi (1962) and Yabe et al. (1966).

Juvenile

Bluefin are estimated to reach maturity at 3–5 years, with the latter age more likely according to Bayliff and equivalent to a size of about 150 cm. As already noted, some juvenile fish migrate across the Pacific, probably within the Transition Zone, and remain off the American West Coast from Baja to southern California. Juvenile fish migrate seasonally (November to April) offshore, perhaps into the central Pacific but probably not returning all the way to the western Pacific. Fish stay in the eastern Pacific for several years, up until 5 or 6 years of age, but return to the western Pacific at or before sexual maturity, eventually to spawn.

Feeding habits of bluefin in the eastern Pacific would represent juvenile food preferences. These are reviewed by Bayliff (1994). Major prey items include anchovies, red crabs (*Pleurocodes planipes*), sauries (*Cololabis saira*), squid (*Loligo opalescens*) and hake (*Merluccius productus*); anchovies make up 80% of stomach contents by volume. Anchovies, crustaceans and squid are also reported as the main prey items for immature fish caught in the western Pacific.

The distribution and preferred habitat of juveniles has already been discussed in connection with migration.

Adult

As already noted, bluefin reach maturity at about 5 years of age or possibly somewhat earlier. Their distribution and habitat preferences have already been discussed. Prey items are squid and a variety of fish including anchovies (*Engraulis japonica* and *Stolephorus zollingeri*), herring (*Etrumeus teres*), pampanos (Carangidae), mackerel (*Scomber spp*.) and other tunas (*Auxis spp*. and *Katsuwonus pelamis*). In the western Pacific, Bluefin are also reported to associate with schools of sardine (*Sardinops melanosticta*), which are probably also an important prey item.

<u>Essential Fish Habitat</u>: Temperate species complex

Bluefin is caught in significant quantifies by the Hawaii-based longline fleet. The North Pacific Transition Zone, areas off the west coast of America and off of east Asia are all important habitat areas outside of the region.

Habitat description for northern bluefin tuna (*Thunnus thynnus*)

	Egg	**Larvae**	**Juvenile**
Duration	days	weeks	to 5 years or somewhat less
Diet	NA	copepods	fish, squid, crustaceans, especially anchovies
Distribution: General and Seasonal	western Pacific, Philippines to Japan	western Pacific, Philippines to Japan	western Pacific off of Japan and north, North Pacific Transition Zone and off the American coast Baja to southern California
Location	offshore?	offshore?	offshore and inshore outside management area
Water Column	epipelagic	epipelagic	epipelagic
Bottom Type	NA	NA	NA
Oceanic Features	Kuroshio Current	Kuroshio Current	Kuroshio Current, North Pacific Transition Zone, California Current

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6.15 Habitat description for skipjack tuna (*Katsuwonus pelamis*)

Management Plan and Area

American Samoa, Guam, MHI, NWHI, Northern Mariana Islands, Johnston Atoll, Kingman Reff, Palmyra Atoll, Jarvis Island, Howland and Baker Islands Midway Island and Wake Island.

Life History and General Description

Major reviews of skipjack tuna life history and distribution used in the preparation of this description include Matsumoto et al. (1984), Forsburgh (1980) and Wild and Hampton (1991).

Morphological and genetic research indicate that *Katsuwonis pelamis* is one worldwide species, and no subspecies are recognized. Serological and genetic analysis of Pacific populations has not conclusively determined the sub-population structure. The species is genetically heterogeneous across the Pacific. A longitudinal variation in the esterase Est 1 gene was argued to be discontinuous, at least in the southern hemisphere, supporting the argument that there are at least two sub-populations in the eastern and western Pacific (Fujino 1972, 1976). A longitudinal cline has also been detected in Est 2 gene frequency between 140ºE and 130ºW (SPC 1981). Sharp

(1978) argued that there are at least five sub-populations, but Ianelli (1993) consider this improbable. Richardson (1983) argues that skipjack exist in a series of semi-isolated "genetic neighborhoods" enclosing a group of randomly breeding adults. However, it is difficult to reliably delimit the size and location of these neighborhoods. In sum, two hypotheses are currently considered: an isolation by distance model where the probability of two individuals mating is inversely proportional to the distance between them at birth and a discrete sub-population model where breeding groups are relatively distinct. Wild and Hampton (1991) state that "the difficulties that are encountered in applying either the isolation-by-distance or discrete–sub-population hypotheses prevent the choice of a single, descriptive model of the skipjack population at this time."

Skipjack tuna are found in large schools across the tropical Pacific. They prefer warm, well-mixed surface waters. Barkley (1969) and Barkley et al. (1978) describe the hypothetical habitat for skipjack as areas where a shallow salinity maximum occurs seasonally or permanently. Matsumoto et. al. (1984) describe the habitat in terms of temperature and salinity: "1) a lower temperature limit around 18ºC, 2) a lower dissolved O_2 level of around 3.5 p/m, and 3) a speculative upper temperature limit, ranging from 33ºC for the smallest skipjack tuna caught in the fishery to 20ºC or less for the largest." These limits represent constraints on activity based on available dissolved oxygen and water temperature. Wild and Hampton (1991) suggest a minimum oxygen level of 2.45 ml/l in order to maintain basal swimming speed. (Since skipjack lack a swim bladder Sharp (1978) calculated that a 50 cm skipjack must swim 60.5 km/d just to maintain hydrodynamic stability and respiration.) A maximum range is proposed as an area bounded by the 15ºC or roughly between 45ºN and S in the western Pacific and 30ºN and S in the east. This range is more restricted in the eastern Pacific due to the basin-wide current regime, which brings cooler water close to the equator in the east. (See Figure 10 in Matsumoto et al. (1984) for a map of skipjack distribution.)

Wild and Hampton (1991) note the a variety of other oceanographic and biological features influence distribution, including thermocline structure, bottom topography, water transparency, current systems, water masses and biological productivity. In the tropics these factors may be more important in determining distribution than temperature. Temperature change in sub-tropical regions affects seasonal abundance. Large-scale climatic features, of which El Niño is the most well known, also affect distribution. This primarily affects localized distribution in the eastern tropical Pacific.

Vertical distribution is generally limited by the depth profile of the temperature and oxygen concentrations given as minimums above. Dizon et al. (1978) found that skipjack move between the surface and 263 m during the day but remain within 75 m of the surface at night.

Although skipjack form large schools, these are not stable and often break up at night. Tagging data indicate that school membership is not stable over time (Bayliff 1988, Hilborn 1991). From analysis of parasite fauna, Lester et al. (1985) determine that school half-life is likely to be only a few weeks.

Pre-recruits disperse from the central Pacific, arriving in the eastern Pacific at 1 to 1 ½ years old and return to the central Pacific at 2 to 2 ½ years old (Wild and Hampton 1991). Migrants to the eastern Pacific split between a northern and southern group off of Mexico and Central and South America respectively. Ianelli (1993) reviews three possible migration models that might account for this north-south distribution. These models are based on large-scale current patterns in the region.

In the western Pacific substantial work has been carried out, although Wild and Hampton (1991) note that many issues have not been resolved. In some cases data indicate that there is relatively little movement, particularly in the Papua New Guinea and Solomon Islands area. There is also evidence of an eastward migration in the Micronesian region (Mullen 1989, Polacheck 1990).

A reliable means for establishing an age-length relationship does not exist. Matsumoto et al. (1984) estimate a maximum age for skipjack of 8–12 years based on the largest individual documented in the literature (Miyake 1968) as in 106.5–108.4 cm size class. Matsumoto et. al. (1984) provide an extensive review of growth estimates. Estimates for a 1-year-old are 26–41 cm and 54–91 cm for 4-year-olds.

Skipjack are heterosexual with a few instances of hermaphroditism being recorded. Sex ratio is variable: young fish have ratios dominated by females, and older fish have a higher proportion of males (Wild and Hampton 1991). Observations by Iversen et al. (1970) suggest courtship behavior between pairs of tuna. Mating is most likely promiscuous (Matsumoto et al. 1984). Although relatively little has been published on the fecundity of skipjack, in the Pacific the reported range is between 100,000 and 2 million ova for fish 43–87 cm.

Skipjack spawn more than once in a season, but the frequency is not known. They spawn year-round in tropical waters and seasonally, spring to early fall, in sub-tropical areas.

Historically bait boats (pole-and-line) were the main gear used in catching skipjack. Since the 1950s purse seiners have come to dominate the fishery. (Some skipjack are also caught incidentally by longliners targeting on yellowfin tuna.)

There are two major fisheries in the eastern Pacific. The most important is located east of 100ºW off of Central and South America. The northern fishery, separated by a region of low abundance (described above) occurs near Baja California, the Revillagigedo Islands and Clipperton Island. In the western Pacific the fishery is diverse, occurring in the waters of a number of island nations and carried out by both small domestic fleets and distant water fleets from developed nations, primarily Japan and the US. Fishing effort is concentrated in the waters around Micronesia and northern Melanesia.

	1995	1996
American Samoa	179,104	75,967
Guam	192,218	21,5944
Hawaii	1,700,000	2,300,000
Northern Mariana Islands	105,423	132,155
Total	2,178,740	2,726,062

Skipjack tuna are caught throughout the management plan area by a variety of methods. The largest fishery is in Hawaii utilizing bait boats. The other principle method of capture is by trolling. Skipjack are also caught by longliners although they are usually not the target species. For comparison, 666,834 mt of skipjack tuna were caught in the SPC statistical area in 1995. The management plan area landings represent about 0.2% of this amount. A significant amount of tuna caught outside of the management plan area is delivered to canneries in American Samoa.

Egg and Larval Distribution

Matsumoto et al. (1984) summarize larval development; Ueyanagi et al. (1974) is the primary source. Ripe eggs are described as spherical smooth, transparent and usually containing a single yellow oil droplet. Diameter range from 0.80 to 1.135 mm. They are comparable in appearance to the eggs of other tunas and thus difficult to distinguish in plankton tows. Therefore, distribution cannot be determined although it is assumed to be coincident with larval distribution since eggs hatch rapidly. Spawned eggs are buoyant and thus epipelagic. Once fertilized, eggs hatch in about 1 day, depending on temperature.

Matsumoto et al. (1984) describe the typical characteristics of larvae as “a disproportionately large head which is bent slightly downward in relation to the body axis, the appearance of 2 or 3 melanophores over the forebrain area when the larvae are about 7 mm long (the number of melanophores increase to about 12 in larvae 14.5 mm in length), heavy pigmentation over the midbrain area throughout all sizes, and the appearance of the first dorsal fin spines in larvae about 7 mm long (the number increases to about 12 in larvae about 14.5 mm in length), heavy pigmentation over the mid-brain area throughout all sizes, and the appearance of the first dorsal fin spines in larvae about 7 mm long (the number of spines increase to about 13 in larvae 11 mm TL)."

Matsumoto et al. (1984) state that the onset of the juvenile stage is evidenced by "attainment of the full complement of 15 spines and 15 rays in the first and second dorsal fins, respectively, and 15 rays in the anal fin.…" These developments occur by the time larvae reach about 12 mm, which conflicts somewhat with the earlier description of larvae up to about 14.5 mm. No age for this size is given but it is probably about 2–3 weeks.

No information was given on feeding and food, but likely food are phytoplankton and for larger-sized larvae, zooplankton also.

As noted earlier, skipjack spawn year-round in tropical waters so it would be expected that in tropical waters eggs and larvae would be present much of the time. The distribution of larvae has been documented by Japanese research vessel net tows (Ueyanagi 1969, Nishikawa et al. 1985). (See Matsumoto et al., 1984, Fig. 11 for a map of larval distribution.) Like adults, larvae have a wider latitudinal distribution in the western Pacific than in the east. Kawasaki (1965) suggests that the center of abundance of skipjack tuna larvae in the Pacific Ocean lies between 5ºN and 4ºS and 160ºE and 140ºW. Matsumoto (1975) later reports the center of abundance between 160ºE and 140ºW but moderate between 100ºW and 140ºW and 120ºE and 160ºE. Areas above 20ºN with relatively high larval abundance include the Hawaiian Islands. Klawe (1963) did not find any larvae below the mixed layer. Larvae apparently migrate to the surface at night while staying deeper at night (Wild and Hampton 1991).

Wild and Hampton (1991) state that skipjack larval distribution is strongly influenced by temperature. Forsbergh (1989) demonstrates that the concentration of larvae in the Pacific approximately doubles with each 1ºC increase in SST between 24º–29ºC and then begins to decrease above 30ºC. Matsumoto et al. (1984) present a limit for larval distribution based on the 25ºC isotherm. As noted above, larvae remain in the mixed layer.

Leis et al. (1991) found particularly high concentrations of skipjack larvae near coral reefs of islands in French Polynesia. It may be that the more productive waters around oceanic islands and reefs provide preferred habitat for larval development.

Juvenile

Mori (1972) defines juveniles as smaller than 15 cm (but above 12–15 mm as the upper limit for larvae as defined by Matsumoto et al. (1984)) while young are 15–35 cm. Skipjack first spawn at about 40 cm length (see below). Relatively little is known about the juvenile phase (especially the adolescent or pre-adult stage) since they do not turn up in plankton tows and are too small to enter any fishery. Most have been collected from the stomachs of larger tunas and billfish (Wild and Hampton 1991).

Skipjack have closely spaced gillrakers, allowing them to consume a variety of prey (Ianelli 1993). Matsumoto et al. (1984) note that smaller skipjack tuna mainly rely on crustaceans for food, presumably zooplankton.

No information on juvenile habitat is available although the range appears to be similar to that of larvae. Matsumoto et al (1984) note that the distribution in the Pacific Ocean is generally from 35ºN to 35ºS in the west and between 10ºN and 5ºS in the east. (See figure 13 in this publication for a distribution map based on captures.)

No information is available on special habitat features that affect density and abundance.

Adult

Matsumoto et al. (1984), reviewing a variety of sources, argue that the minimum size for female skipjack at maturity is 40 cm and initial spawning occurs between 40–45 cm. Based on growth estimates, skipjack are about 1-year-old at this size.

Skipjack are opportunistic foragers, and an extensive range of species have been found in their stomachs. Matsumoto et al. (1984) document taxonomic groups found in various studies analyzing stomach contents; 11 invertebrate orders and 80 or more fish families are listed. In the western and central Pacific fishes are the most important prey, followed by molluscs and crustaceans. Scombrids are the most important group of fish consumed by skipjack.

Experiments with captive skipjack indicate that a intense feeding period occurs in the early morning (Magnuson 1969). Despite intense feeding these fish did not immediately fill their stomachs; apparently they ate slowly over the entire 2-hour feeding. Fish ate about 15% of their body weight per day. In another experiment it was observed that fish feed intensively at first and then in smaller amounts throughout the day; they could not feed effectively at night; introduced fish learned feeding methods from other fish that had been in the experimental tanks for some time; and fish never fed off the bottom of the tank (Nakamura 1965).

In the wild skipjack exhibit feeding peaks in the early morning and late afternoon.

The hypothetical habitat for skipjack tuna has already been described and the adult range encompasses all of the areas where earlier life stages are concentrated. Figures 56–60 in Matsumoto et al. (1984) provide information on the distribution of this habitat.

<u>Essential Fish Habitat</u>: Tropical species complex

EFH encompasses the whole EEZ of the management plan area in the near surface waters of the mixed layer. Figure 57 in Matsumoto et al. (1984) suggests that the deepest habitat depth attained in the Pacific is around 300 m but in the management plan areas is probably half that or less. Since skipjack occur in schools, they are not distributed uniformly across the EEZ at any given time. However, all of these waters meet habitat criteria, and it is not possible to determine what part of this habitat is occupied at any given time, except perhaps for seasonal variations in sub-tropical areas.

Waters close to islands, banks and reefs may be areas of larval concentration and could be considered as HAPC.

Habitat description for skipjack tuna (*Katsuwonus pelamis*)

Duration	**Egg**	**Larvae** to 12–15 mm (2–3 weeks?)	**Juvenile** 15 mm–40 cm	**Adult** above 40 cm
Diet	NA	zooplankton	similar to adult diet?	highly variab crustaceans
Distribution: General and Seasonal	Center of spawning abundance: 5ºN-4º S and 160º E–140ºW.	From 24º to 29ºC with preference at higher temperatures but decreasing above 29ºC.	35ºN–35ºS in the west and 10ºN–5ºS in the east	Warm well m 15º–33ºC ma 3.5 p/m disso the west and east. Warm well m waters. 15º–3 Above 3.5 p/ 45ºS in the w the east.
Location	offshore waters	offshore waters	offshore waters	offshore wate
Water Column	epipelagic	pelagic, upper mixed layer	pelagic, mixed layer	pelagic, mixe
Bottom Type	NA	NA	NA	NA
Oceanic Features	depends on adult preferences	depends on adult preferences	eddies, upwelling, oceanic fronts and other areas of high productivity	eddies, upwe other areas o

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6.16 Habitat Description for kawakawa (*Euthynnus affinis*)

Management Plan and Area

American Samoa, Guam, MHI, NWHI, Northern Mariana Islands, Johnston Atoll, Kingman Reef, Palmyra Atoll, Jarvis Island, Midway Island, Howland and Baker Islands and Wake Islands.

Life History and General Description

The main sources for this description were the review documents Yesaki (1994), Collette and Nauen (1983) and Yoshida (1979). Both Yesaki and Yoshida contain extensive reference lists; in general those references are not re-cited here.

The genus *Euthynnus* is a member of the Thunni tribe of the subfamily Scombrinae. There are three species in the genus. Of the other two species, *Euthynnus lineatus* is reported from the American west coast from southern California to Peru and Hawaii but is not a management unit species. For kawakawa no sub-species are recognized and no information is reported on stock separation.

Kawakawa is an epipelagic neritic species, mainly of the west and south Asian and east African continental margin. It is found throughout the archepelagic waters of Southeast Asia to northern Australia. Most reports emphasize its association with continental margins, but it also occurs around oceanic islands and island archipelagoes. Strays have also been reported from the American continental margin. Generally, its distribution is tropical-subtropical between 35ºN and 35ºS. In Hawaiian waters, kawakawa are reportedly confined to the 20–30 fm (36.5–54.8 m) contour. Trolling studies in Thailand indicate that kawakawa are most commonly taken in the outer neritic zone (50–200 m depth) with almost none caught in deeper waters. Fish of 20–40 cm are more common in the inner neritic zone (less than 50 m depth) and apparently move into deeper water after 50 cm (Yesaki 1982). In Japan and Hong Kong favorable habitat characteristics include relatively low salinity (31.22 to 33.80 ppt in Japan, as low as 26 ppt during the monsoon in Hong Kong) and higher productivity either due to upwelling or estuarine influence. However, kawakawa are not found in brackish (i.e., very low salinity) water. The species has a relatively wide temperature range, 18º–29ºC according to Collette and Nauen (1983) or 14º–29ºC for Hong Kong waters as reported by Williamson (1970).

Seasonality in landings is reported throughout the kawakawa's range, although generally it is not strong. However, no definitive migration pattern is reported. Kawakawa tend to form mixed schools, co-occurring with other tunas including yellowfin (*Thunnus albacares*), skipjack (*Katsuwonus pelamis*) and the frigate tuna (*Auxis thazard*). It also schools with the carangid *Megalaspis cordyla*. Juveniles are commonly preyed upon by yellowfin and skipjack, and Yesaki (1994) suggests that all these species are probably competitors.

Yesaki (1994) reviews age and growth studies for kawakawa and concludes that "studies of kawakawa completed to date give conflicting results" (p 392). Lengths at age based on these studies rang from 19–47 cm for 1-year-olds, 41–65 cm for 2-year-olds and 41–72 cm for 3-year-olds. The range in growth parameters given are K 0.37–0.96 (with an outlier of 2.23), L_{∞} 59.5–81.0 cm and t_o -0.15 and -0.344 (only two studies reported this parameter). Yesaki (1994) emphasizes that all studies suggest rapid growth during the juvenile stage. Maximum age for the species is 5 or 6 years. The largest specimen reported by Yoshida (1979) is 87 cm and 8.6 kg although specimens over 100 cm have reportedly been taken from Japanese waters.

Kawakawa are heterosexual, and sexual dimorphism is not reported. Fecundity estimates range from .202 to 2.5 million eggs. Kawakawa apparently spawn inshore based on captures of larval fish. Yesaki (1994) states that they are widely but very patchily distributed and generally taken close to land masses. Larvae are reported from Hawaii and French Polynesia, indicating spawning around oceanic islands where they occur, but the highest concentrations of larvae are found off of Australia, Java, Papua New Guinea, the Solomon Islands and the Ryukyu Islands of southern Japan. According to Yesaki (1994) there are two spawning seasons in the tropics, a main season in the first half of the year and a secondary season in the latter half.

Total landings for kawakawa throughout its range are reported at 122,893 mt in 1989. The Philippines generally reports the highest landings, and in 1989 they were 57,899 mt, or close to half total landings. Kawakawa are captured by a variety of gear in coastal fisheries including troll, gillnet, purse seine and ringnet. In general they are part of multi-species, small-pelagic coastal fisheries that are most intense in the Southeast Asian Indo-Pacific.

Kawakawa is not an important commercial species in the western Pacific region. In Hawaii, landings of kawakawa are lumped in the "miscellaneous pelagics" category based on longline logbook reports. However, it is likely that kawakawa are more commonly caught by inshore small boat fishermen. However, these landings do not appear in the Council's annual report. Guam reported 1996 landings of 4,043 lb (1,833.87 kg), but gear type is not specified; American Samoa reported 225 lb (102.10 kg), all troll caught (WPRFMC 1997). In comparison to total commercial landings in the western Pacific region or total landings of kawakawa throughout its range it can be seen that landings of kawakawa in the Council's management area are negligible.

Egg and Larval Distribution

The distribution of eggs and larvae has already been discussed in connection with spawning. There is little information about kawakawa eggs. Reported egg diameter from one study are 0.85–0.95 mm. Yoshida (1979) provides an extensive treatment of egg and larval development. Eggs take less than 24 hours to hatch.

The key descriptive paper on kawakawa larvae is Matsumoto (1958). The transition from larval to juvenile stage occurs between 10 and 20 mm. No information on larval diet is given in the literature. As already noted, eggs and larvae are found close inshore. At the end of the juvenile stage fish move offshore, although adults are still found in the neritic environment.

Juvenile

Yenagi (1994), summarizing various studies, states that kawakawa reach maturity at about 38 cm. Based at length at age estimates this would correspond to about a 1-year-old fish. As already noted, adult and juvenile kawakawa do not differ markedly in habitat.

Adult

Age and growth have already been discussed. Kawakawa are opportunistic feeders; according to Yoshida (1979) "these fishes feed primarily on whatever is available at any particular place and time." He gives an extensive list of prey items, based on earlier studies. In excess of 17 kinds of fish, some only identified to family or genus, are listed as well as various cephalopods (squid) and crustaceans.

Habitat has already been discussed. As Yoshida (1979) points out for the genus as a whole, they "are generally coastal fishes and judging from the distribution of the various life stages of these species, the entire life cycle is completed within the coastal province."

<u>Essential Fish Habitat</u>: Tropical species complex

The neritic environment can be considered EFH for this species. All of the review articles used in preparing this description contain a variety of distribution maps.

Habitat Description for kawakawa (*Euthynnus affinis*)

	Egg	**Larvae**	**Juvenile**
Duration	24 hours	weeks	to about 1 year
Diet	NA	unknown	similar to adult
Distribution: General and Seasonal	coastal-neritic	coastal-neritic	coastal-neritic
Location	inshore	inshore	inshore
Water Column	epipelagic	epipelagic	epipelagic
Bottom Type	NA	NA	NA
Oceanic Features	unknown/coastal	unknown/coastal	unknown/coastal

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6.17 Habitat Description for Opah or Moonfish (*Lampris guttatus*)

Management Plan and Area

American Samoa, Guam, MHI, NWHI, Northern Mariana Islands, Johnston Atoll, Kingman Reef, Palmyra Atoll, Jarvis Island, Midway Island, Howland and Baker Islands and Wake Islands.

American Samoa, Guam, Main Hawaiian Islands (MHI), Northwestern Hawaiian Islands (NWHI), Commonwealth of the Northern Mariana Islands (NMI), Johnston Atoll, Kingman Reef, Palmyra Atoll, Jarvis Island, Howland and Baker Islands and Wake Islands.

For management purposes, opah are generally classified under the miscellaneous pelagics. In the Hawaii-based longline fishery, miscellaneous pelagics make up only a small portion of total revenue; however, revenue from this group (led by moonfish) has increased for the three most consecutive years of data (1994-96). Opah landings have increased consistently from 1992 to a high of 760,000 lbs in 1996 averaging 0.52 fish/1000 hooks set; mean ex-vessel price 1987-96 (based on whole weight) was $1.07/lb (Ito and Machado 1997).

Life History and General Description:

The opah, also commonly known as moonfish, are not a target species in any fishery and as a result, very limited biological and ecological information pertaining to the species is currently available in the published literature. Opah was, however, a common incidental take in the now defunct Asian high-seas driftnet fisheries and is a common bycatch in pelagic longline fisheries targeting tunas and swordfish and to a lesser degree in U.S. coastal albacore and salmon fisheries. On Japanese research cruises to waters east of Hawaii and to the equatorial eastern Pacific, mean catch rate for opah was 0.98 and 0.57 fish/hooks, respectively.

Opah are typically found well offshore in temperate and tropical waters of all the world's oceans, including the Mediterranean and Caribbean Seas (Russo 1981, Heemstra 1986). In the Hawaii-based longline fishery where nearly 5000 opah are landed each year, catches and catch rates for the species tend to be highest within the 200 mile EEZ around the main Hawaiian Islands as compared to more distant waters offshore (outside the EEZ) or in the EEZ around the atolls and islets that comprise the Northwestern Hawaiian Islands (Ito and Machado 1997). Off the coast of Europe, Orkin (1950) reported opah to be often taken in 183 m (100 fathoms) near the edge of the Continental Shelf.

Through the water column, opah reportedly inhabit waters from the surface to the lower epipelagial-mesopelagic in excess of 500 m (Miller and Lea 1972, Nakano et al. 1997). On longlines set in the morning and retrieved during the afternoon-evening, opah were among species that are caught more frequently as the depth of the fished hooks increased; i.e., higher catch rates at deeper depths (Nakano et al. 1997). Regular captures in high seas driftnets set in the evening and retrieved in the morning provide evidence that opah frequent waters within 10 m of the surface at night (Seki, in prep). Because captures in driftnets took place exclusively in the northern Transition Zone, it is still not clear whether this species exhibits diel vertical migration or more likely exhibit broad horizontal migrations and/or distributions within a preferential temperature range. In the northeast Atlantic, opah move northward into the waters of the North Sea and off Norway in the summer (Muus and Dahlstrom 1974). Opah catch around Hawaii is usually highest in the fourth quarter of the calendar year (Ito and Machado 1987).

Opah are generally solitary fish (Orkin 1950, Palmer 1986) and attains 185 cm in length and reportedly reach 227-282 kg in weight (Eschmeyer et al. 1983, Palmer 1986). Mean whole weight of opah taken in the Hawaii-based longline fishing fleet (1991-96) was 47.4 kg (104.5 lbs) (Ito and Machado 1997). Little to no information is available on spawning habits, age, or growth or migrations. A single large female caught in the early spring off the west coast of North America appeared to be nearly ready to spawn suggesting that spawning probably takes place during the spring months (Fitch and Lavenberg 1968). Off Scotland, ovaries in a 137 cm (4.5 ft) gravid female measured 290x70 mm and 240x70 mm and weighed 276 and 255 grams, respectively. The largest ova measured 0.82 mm in diameter (Herald 1939). Opah eggs and larvae are pelagic; larvae range from less that 4.7 mm to 10.5 mm at which size fin ray development is complete and juveniles resemble miniature adults in form (Olney 1984). Size at maturity is not known.

As adults, opah are midwater predators that feed on cephalopods (particularly oceanic squid), bony fishes (small pelagics) and to a lesser extent, crustaceans (Orkin 1950, Fitch 1951, McKenzie and Tibbo 1963, Eschmeyer et al. 1983, Heemstra 1986). Predators of opah are not known; no information is available on the diet and trophic relationships of larvae or juveniles.

Habitat Description for Moonfish (*Lampris guttatus*): Opah or Moonfish

	Egg	**Larvae**	**Juvenile**
Duration	Not known	Not known	Size at maturity is not known
Diet	Not known	Not known	Not known
Distribution: General and Seasonal	Not known	Not known	Not known, unlikely differnet from adults
Water Column	epipelagic	epipelagic	epipelagic
Bottom Type	N/A	N/A	N/A
Oceanic Features	Eggs subject to advection by prevailing currents	Larvae subject to advection by prevailing currents	Not known

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6.18 Habitat Description for Oilfish Family (Gempylidae): the escolar (*Lepidocybium flavobrunneum*) and the oilfish (*Ruvettus pretiosus*)

Management Plan and Area

American Samoa, Guam, Main Hawaiian Islands (MHI), Northwestern Hawaiian Islands (NWHI), Commonwealth of the Northern Mariana Islands (NMI), Johnston Atoll, Kingman Reef, Palmyra Atoll, Jarvis Island, Midway Island, Howland and Baker Islands and Wake Islands.

In the Pacific, several species of snake mackerels (Family Gempylidae) are caught in pelagic fisheries. Of particular interest are the two most commonly taken in western Pacific longline fisheries: the escolar, *Lepidocybium flavobrunneum*, and the oilfish, *Ruvettus pretiosus*. For management purposes, the escolor and oilfish are generally classified under the miscellaneous pelagics.

Life History and General Description:

Neither species of snake mackerel is a target species in any fishery and as a result, very limited biological and ecological information pertaining to the species is currently available in the published literature. Both species were, however, among the more common incidental takes in the now defunct Asian high-seas driftnet fisheries and are a common bycatch in pelagic longline fisheries targeting tunas and swordfish. On Japanese research cruises to waters east of Hawaii, mean catch rate for escolar was 0.98 fish/1000 hooks; no oilfish were caught (Nakano et al. 1997). In two areas off the west coast of Africa, escolar catches were 0.20 and 0.17 fish/1000 hooks (Maksimov 1970). Between the two snake mackerel species, the escolar is more frequently caught and possesses the greater commercial value. Excessively high oil content in the flesh of the oilfish renders the species unpalatable as a food fish but historically has possessed value as a laxative (Fitch and Schultz 1978).

Both the escolar and the oilfish are widely distributed, typically found over the continental slope and offshore in all tropical and subtropical waters of the world's oceans but is apparently nowhere abundant (Parin 1986). In a commercial scale fishing effort conducted in the western Pacific, catch rates were highest where topographic relief was steepest, namely in the vicinity of shoals, reefs, and seamounts (Nishikawa and Warashina 1988).

Through the water column, escolar inhabit epipelagic waters from the surface to about 200 m, oilfish to the lower epipelagial-mesopelagic in excess of 700 m (Parin 1978, Nakano et al. 1997). In the vicinity of New Caledonia and New Hebrides, Fourmanoir (1970) reported catching escolar (74.3 to 91.8 cm SL) while fishing at depths of 110 to 195 m. Nakano et al. (1997) found similar catch rates for escolar throughout the water column and concluded no clear trend in escolar depth of capture. Escolar are also believed to vertically migrate upward at night to feed on pelagic fishes, crustaceans and especially squids (Nakamura and Parin 1993). Captures in high seas driftnets set in the evening and retrieved in the morning provide evidence that both the escolar and oilfish frequent waters within 10 m of the surface at night (Seki, in prep). Oilfish are typically solitary or in pairs when near the bottom. Like the escolar, oilfish feed predominantly on squids, also fishes and crustaceans (Parin 1986, Nakamura and Parin 1993). Predators of juvenile escolar include yellowfin and albacore tuna, swordfish, and other escolars (Fourmanoir 1970, Maksimov 1970). Predators of adult escolar and oilfish are not known.

Little information is available on other life history aspects. From length frequencies, Maksimov (1970) concluded that escolar females grew faster than males but no ages were assigned. Based on the capture of larvae and juvenile stages of escolar, spawning seems to take place in the vicinity of oceanic islands or the coasts of large islands (Nishikawa 1982, 1987). Nishikawa (1982) also found all postlarvae forms of escolar were taken in horizontal subsurface net tows while all juveniles were caught at the surface suggesting differential ontogenetic habitats. In a similar pattern, oilfish were collected near topography particularly in warm waters of the western Pacific (Nishikawa 1987).

Escolar attain about 200 cm SL , most commonly to 150 cm (Nakamura and Parin 1993). Nakamura and Parin (1993) reports escolar weigh 6.5 kg at 77 cm SL (89 cm TL) and 13 kg at 91 cm SL (105 cm TL). Nishikawa and Warashina (1988) reported the relationship between body (fork) length (FL) and weight (in kg) for escolar as:

$W = 1.46 \times 10^{-5} \cdot FL^{2.96}$ (n=46, 59-95 cm FL).

Habitat Description for Oilfish Family (Gempylidae)

	Egg	**Larvae**	**Juvenile**
Duration	Not known	Not known	Not known
Diet	Not known	Not known	Not known, unlikely different than adults
Distribution: General and Seasonal	Not known	Not known	Not known
Water Column	epipelagic	epipelagic, based on the capture of larvae and juvenile stages of escolar, spawning seems to take place in the vicinity of oceanic islands or the coasts of large islands	epipelagic, juveniles are caught at the surface suggesting differential ontogenetic habitats.
Bottom Type	N/A	N/A	N/A
Oceanic Features	Eggs are subject to advection be prevailing currents	Larvae are subject to advection be prevailing currents	Not known

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6.19 Habitat Description for Pomfret (family Bramidae): the sickle pomfret (*Taractichthys steindachneri*) and the lustrous pomfret (*Eumegistus illustris*)

Management Plan and Area

American Samoa, Guam, Main Hawaiian Islands (MHI), Northwestern Hawaiian Islands (NWHI), Commonwealth of the Northern Mariana Islands (NMI), Johnston Atoll, Kingman Reef, Palmyra Atoll, Jarvis Island, Howland and Baker Islands, Midway Island, and Wake Islands.

In the Pacific, several species of pomfret (Family Bramidae) are caught in pelagic fisheries. Of particular interest is the sickle pomfret, *Taractichthys steindachneri*, the species most commonly taken in western Pacific longline fisheries and the lustrous pomfret, *Eumegistus illustris*, caught both in the longline fishery and in the deep bottomfish snapper fishery. For management purposes, both the sickle and lustrous pomfret are generally classified under the miscellaneous pelagics and marketed commercially as "monchong".

Life History and General Description:
Neither species of pomfret is a target species in any fishery and as a result, very limited biological and ecological information pertaining to the species is currently available. Both species, as mentioned above however, are common incidental bycatch in western Pacific fisheries.

Adult and juvenile (30-150 mm SL) sickle pomfret are widely distributed in the tropical waters of the Pacific and Indian Oceans (Mead 1972). Lustrous pomfret are also known from the tropical Pacific and eastern Indian Ocean but unlike other bramids, are typically found in association with topography (e.g., near islands and over seamounts or submarine ridges) (Mead 1972, Prut'ko 1986, Chave and Mundy 1994).

Through the water column, sickle pomfret inhabit epipelagic waters to at least 300 m (Nakano et al. 1997). On longlines set in the morning and retrieved during the afternoon-evening, sickle pomfret were among the species that are caught more frequently as the depth of the fished hooks increased; i.e., higher catch rates at deeper depths (Nakano et al. 1997). Most of the lustrous pomfrets caught in exploratory deep water bottomfishing at seamounts off Hawaii were taken in depths less than 549 m (300 fathoms); no pomfret were caught at seamounts when the summit exceeded 457 m (250 fathoms) (Okamoto 1982).

There are no descriptions of food or feeding habits of the sickle pomfret. A single stomach collected by a NMFS research cruise contained a pelagic squid, *Moroteuthis* spp. (NMFS, unpubl.) Lustrous pomfret taken on bottom handline rigs off Hawaii (Okamoto 1982) as well as those caught in the Indian Ocean with trawl nets (Prut'ko 1986) fed on midwater fishes such as lanternfishes, crustaceans and some squid . Predators of juvenile pomfrets (both species) include tunas and swordfish (NMFS, unpubl.).

Sickle pomfret attain about 80 cm TL (Dotsu 1980). No maximum size for lustrous pomfret has been reported but a single 70 cm FL individual was taken bottomfishing at Johnston Atoll (Ralston et al. 1986). The range of pomfret weights in Okamoto's (1982) exploratory study off Hawaii was 2.2 - 9.6 kg and averaged 5.5 kg. He further reported the relationship between body (fork) length (FL) and weight (in kg) for escolar as:

$W = 3.0 \times 10^{-6} \cdot FL^{3.442}$ (n=75, 59-95 cm FL).

Trawl caught lustrous pomfret (n=100) in the Indian Ocean ranged from 44.0 to 67.0 cm SL and 2.36 to 7.05 kg in weight (Prut'ko 1986).

Little information is available on other life history aspects. A 60 cm sickle pomfret weighing 11 kg was estimated to be 8 years old (Smith 1986). A 78 cm TL mature female (originally identified as *T. longipinnis* but now considered a misidentified *T. steindachneri)*, taken in the Southeast Pacific possessed ova spherical in shape and 1.2 mm in diameter (Dotsu 1980). The mature varies were small and about 90 g in weight, the gonadosomatic index (GSI) was less than 1 and the ovaries contained about 7.0 x 10^5 eggs (Dotsu 1980). The male to female ratio in the Indian Ocean collection of lustrous pomfrets was 1:1 and judging from the advanced maturation stages observed in the gonads, the school was in spawning condition (Prut'ko 1986).

Habitat Description for Pomfret (family Bramidae)

	Egg	**Larvae**	**Juvenile**	**Adult**
Duration	Not known	Not known	Not known	A 60 c weigh to be 8
Diet	N/A	Not known	There are no descriptions of food or feeding habits of the sickle pomfret.	There food o sickle stomac resear pelagi spp.
Distribution: General and Seasonal	Not known	Not known	Not known	Adult mm Sl widely tropica and In pomfr the tro Indian bramic associ (e.g., r seamo ridges)
Water Column	epipelagic	epipelagic	epipelagic	Throu sickle epipel 300 m pomfr deep v seamo taken r m (300 were c when t

				457 m
Bottom Type	N/A	N/A	N/A	N/A
Oceanic Features	Eggs are subject to advection by prevailing ocean currents	Larvae are subject to advection by prevailing ocean currents	Not known	Not kn

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6.20 Habitat description for bullet tuna (*Auxis rochei*) and frigate tuna (*A. thazard*)

Management Plan and Area

American Samoa, Guam, MHI, NWHI, Northern Mariana Islands, Johnston Atoll, Kingman Reef, Palmyra Atoll, Jarvis Island, Midway Island, Howland and Baker Islands and Wake Islands.

Life History and General Description

This description is based on the following summary documents: Yesaki and Arce (1994), Collette and Nauen (1983) and Uchida (1981).

The genus *Auxis* is a member of the Thunni tribe and the subfamily Scombrinae. For management purposes, regulations identify these fish only to the generic level, but only two cosmopolitan species are currently recognized in this genus. However, there has been a lot of synonymy in scientific names for the species; the two species are very similar in appearance and usually only reported to the generic level in landings reports. *Auxis* are considered both the most primitive and the smallest of tunas in the Thunni tribe. No sub-species are recognized. No information on stock separation is given in the review articles. Hybrids of the two species have been produced under artificial rearing conditions, but none lived beyond a month.

The genus is distributed worldwide in tropical and subtropical waters. Because of their similar appearance, differential distribution is hard to determine. They are confined to neritic waters of continental margins but have also been reported from coastal waters of oceanic islands in the Pacific including Hawaii. Total latitudinal range extends from northern Japan (about 45ºN) to southern New Zealand (almost 50ºS) in the west and from northern California to northern Chile along the American coast. The 20ºC isotherm has been suggested as a range limit, but optimal temperature is probably higher. In any case, it seems clear that they have a fairly wide temperature tolerance. Preference for high fertility coastal waters has been reported from East Africa.

There is little information on migration. Studies conducted in Japan suggest seasonal migration with northward movement in summer and southward movement in winter. *Auxis* have a strong schooling instinct and form dense schools segregated by size. The two species often form mixed schools and have also been reported to school with other tunas and tuna-like fishes.

The largest reported frigate tuna (*A. thazard*) is 53 cm; bullet tuna (*A. rochei*) rarely exceed 30 cm. Maximum ages are estimated to be 2 years and 1 year, respectively.

Auxis are heterosexual and do not exhibit sexual dimorphism. Fecundity estimates are 78,000–717,900 eggs for frigate tuna and 52,000–162,00 for bullet tuna. They generally spawn inshore, although (Klawe 1963) found that while spawning occurred inshore at Baja, California, it occurred in oceanic waters further south. *Auxis* also spawn around oceanic islands, including Hawaii, based on larval distribution and the occurrence of males of both species with freely flowing milt caught at Oahu. In general is appears that these tunas spawn in the warmer regions of their total range, but the precise distribution is unknown.

Yesaki and Arce (1994) state that “there are two spawning seasons for bullet tuna, and most probably frigate tuna, at least in the equatorial regions of their distributions.”

Worldwide most *Auxis* are caught in the Philippines; in 1988, total of 107,000 mt were landed there, 61% of the world total. Yesaki and Arce (1994) provide a detailed review of the Philippine fishery. These authors also state that “the world catch is low considering it is generally acknowledged that *Auxis* is the most abundant tuna, in numerical terms, in the world’s oceans.” The landings for these species are not reported separately in the western Pacific region; however, total “miscellaneous tunas” reported for the region in 1996 is 12,558 lbs (5.70 mt) (WPRFMC 1997). Clearly commercial landings of *Auxis* are negligible both in terms of total western Pacific region landings and for *Auxis* in the Pacific.

Egg and Larval Distribution

Eggs are pelagic and described by (Uchida 1981) as “perfectly spherical, [having] a colorless homogeneous yolk mass and an average diameter of 0.87 mm (range of 0.88–1.09 mm.” The eggs of both species hatch within 2 days. Larval/post-larval stages last to about 2 weeks. Uchida (1981) provides a comprehensive description of larval morphological characteristics, including differentiation among the species and larval and juvenile development.

Uchida (1981) states that temperature “is clearly a highly important variable in explaining the distribution of *Auxis* larvae.” Optimum temperature is reported as 27.0º–27.9ºC. The larvae are reported as only occurring above the thermocline. Salinity may also affect distribution, and larvae are reported for a relatively narrow range, 33.2–35.4 ppt. They may also undergo diel migration, being more common near the surface at night. Larval habitat is generally coastal, as with adults.

Juvenile

No information is provided in the review papers on juvenile distribution, but as a neritic epipelagic species juveniles probably occur in the same coastal habitat as adults. Planktonic crustaceans and fishes are the main prey items of juveniles, including larval copepods and decapods.

Adult

Frigate tuna reach maturity at about 30–35 cm. In one study all fish measured were mature by 42.1 cm. Bullet tuna were found to reach first maturity in the Philippines 17.0 cm. A study from India indicated that 50% maturity was 24.0 cm for males and 23.8 cm for females.

Adults feed on a wide variety of organisms with fish the most common item, followed by crustaceans. Common prey fishes include herring and herring-like fish, anchovies and other small fishes. Adults also cannibalize their young and are reported to feed on plankton in Japanese waters. In a study from Indian waters fish formed the major constituent of the juvenile diet, while crustaceans were prevalent in the diet of adults. Frigate tuna also are known to occasionally prey on squid.

<u>Essential Fish Habitat</u>: Tropical species complex

There is relatively little information on the habitat preferences of these two species. They are also not important to managed fisheries in the western Pacific region. Nonetheless, given that they are cosmopolitan neritic epipelagic species, the inshore waters may be considered EFH, although it cannot be defined with any precision.

Habitat description for bullet tuna (*Auxis rochei*) and frigate tuna (*A. thazard*)

	Egg	**Larvae**	**Juvenile**
Duration	about 40 hours	2 weeks	1 year or less
Diet	NA	not reported	planktonic crustaceans and fish
Distribution: General and Seasonal	neritic, coastal areas in the warmer waters throughout range	as with eggs	differential distribution not known
Location	neretic/inshore ? also found offshore but generally not mid-ocean	as with eggs	neritic / inshore
Water Column	epipelagic	epipelagic	epipelagic
Bottom Type	NA or unknown	NA or unknown	NA or unknown
Oceanic Features	unknown	unknown	unknown

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Appendix H: EFH Impacts Provisions

The EFH provisions of the Magnuson Stevens Act impose procedural requirements on both Councils and federal agencies related to marine planning. First, for each FMP, Councils must identify adverse impacts to EFH resulting from both fishing and non-fishing activities, and describe measures to minimize these impacts. Second, the provisions allow Councils to provide comments and make recommendations to federal or state agencies that propose actions that may affect the habitat, including EFH, of a managed species. NMFS is required to consult with federal agencies on actions that may adversely affect EFH, which usually occurs concurrently with the NEPA planning process.

None of the fisheries operating under the Pelagic FEP are expected to have adverse impacts on EFH or HAPC for species managed under the different fisheries. Continued and future operations of fisheries under the Pelagic FEP are not likely to lead to substantial physical, chemical, or biological alterations to the habitat, or result in loss of, or injury to, these species or their prey.

1. MSA and non-MSA fishing activities that may adversely affect EFH

The Council is required to act to prevent, mitigate, or minimize adverse effects from fishing on evidence that a fishing practice has identifiable adverse effects on EFH for any MUS covered by an FMP. Adverse fishing impacts may include physical, chemical, or biological alterations of the substrate and loss of, or injury to, benthic organisms, prey species, and their habitat or other components of the ecosystem.

The predominant fishing gear types—hook and line, longline, troll, traps—used in the fisheries managed by the Council cause few fishing-related impacts to the benthic habitat utilized by coral reef species, bottomfish, crustaceans, or precious corals. The current management regime prohibits the use of bottom trawls, bottom-set nets, explosives, and poisons. The use of non-selective gear to harvest precious corals is prohibited and only selective and non-destructive gear may be allowed to fish for Coral Reef Ecosystem MUS. Although lobster traps have a potential impact on the benthic habitat, the tropical lobster *Panulirus penicillatus* does not enter lobster traps. In the limited areas where harvesting does occur in the Hawaii Archipelago, lobsters are caught by hand. This technique causes limited damage or no fishing-related impacts to the benthic habitat, and its continued use is likely.

The Council has determined that current management measures to protect fishery habitat are adequate and that no additional measures are necessary at this time. However, the Council has identified the following potential sources of fishery-related impacts to benthic habitat that may occur during normal fishing operations:

- Anchor damage from vessels attempting to maintain position over productive fishing habitat.
- Heavy weights and line entanglement occurring during normal hook-and-line fishing operations.
- Lost gear from lobster fishing operations.
- Remotely operated vehicle (ROV) tether damage to precious coral during harvesting operations.

Trash and discarded and lost gear (leaders, hooks, weights) by fishing vessels operating in the EEZ, are a Council concern. A report on the first phase of a submersible-supported research project conducted in Hawaii in 2001 preliminarily determined that bottomfish gear exhibited minimal to no impact on the coral reef habitat (C. Kelley, personal communication). A November 2001 cruise in the Main Hawaiian Islands determined that precious corals harvesting has “negligible” impact on the habitat (R. Grigg, personal communication). The Council is concerned with habitat impacts of marine debris originating from fishing operations outside the Western Pacific Region. NMFS is currently investigating the source and impacts of this debris. International cooperation will be necessary to find solutions to this broader problem.

Because the habitat of pelagic species is the open ocean, and managed fisheries employ variants of hook-and-line gear, there are no direct impacts to EFH. Lost gear may be a hazard to some species due to entanglement, but it has no direct effect on habitat. A possible impact would be caused by fisheries that target and deplete key prey species, but currently there is no such fishery.

There is also a concern that invasive marine and terrestrial species may be introduced into sensitive environments by fishing vessels transiting from populated islands and grounding on shallow reef areas. Of most concern is the potential for unintentional introduction of rats (*Rattus* spp.) to the remote islands in the NWHI and PRIA that harbor endemic land birds. Although there are no restrictions that prohibit fishing vessels from transiting near these remote island areas, no invasive species introductions due to this activity have been documented. However, the Council is concerned that this could occur as fisheries expand and emerging fisheries develop in the future.

While the Council has determined that current management measures to protect fishery habitat are adequate, should future research demonstrate a need, the Council will act accordingly to protect habitat necessary to maintain a sustainable and productive fishery in the Western Pacific Region.

In modern times, some reefs have been degraded by a range of human activities. Comprehensive lists of human threats to coral reefs in the U.S. Pacific Islands are provided by Maragos et al. (1996), Birkeland (1997a), Grigg 2002, and Clark and Gulko (1999). (These findings are summarized in Table 27.) More recently, the U.S. Coral Reef Task Force identified six key threats to coral reefs: (1) landbased sources of pollutions, (2) overfishing, (3) recreational overuse, (4) lack of awarness, (5) climate change, and (6) coral bleaching and disease. In general, reefs closest to human population centers are more heavily used and are in worse condition than those in remote locations (Green 1997). Nonetheless, it is difficult to generalize about the present condition of coral reefs in the U.S. Pacific Islands because of their broad geographic distribution and the lack of long-term monitoring to document environmental and biological baselines. Coral reef conditions and use patterns vary throughout the U.S. Pacific Islands.

A useful distinction is between coral reefs near inhabited islands of American Samoa, CNMI, Guam, and the main Hawaiian islands and coral reefs in the remote NWHI, PRIAs, and northern islands of the CNMI. Reefs near the inhabited islands are heavily used for small-scale artisanal, recreational, and subsistence fisheries, and those in Hawaii, CNMI and Guam are also the focus for extensive non-consumptive marine recreation. Rather than a relatively few large-scale mechanized operations, many fishermen each deploy more limited gear. The more accessible banks in the main Hawaiian Islands (Penguin Bank, Kaula Rock), Guam (southern banks), and the CNMI (Esmeralda Bank, 300 Reef, Marpi Reef, Dump Coke and Malakis Reef are the most heavily fished offshore reefs in the Western Pacific Region management area.

The vast majority of the reefs in the Western Pacific Region are remote and, in some areas, they have protected status. Most of these are believed to be in good condition. Existing fisheries are limited. Poaching by foreign fishing fleets is suspected at Guam's southern banks, in the PRIA, and possibly in other areas. Poachers usually target high-value and often rare or overfished coral reef resources. These activities are already illegal but difficult to detect.

2. Non-fishing related activities that may adversely affect EFH

On the basis of the guidelines established by the Secretary under Section 305 (b)(1)(A) of the MSA, NMFS has developed a set of guidelines to assist councils meet the requirement to describe adverse impacts to EFH from non-fishing activities in their FMPs (67 FR 2376). A wide range of non-fishing activities throughout the U.S. Pacific Islands contribute to EFH degradation. FEP implementation will not directly mitigate these activities. However, as already noted, it will allow NMFS and the Council to make recommendations to any federal or state agency about actions that may impact EFH. Not only could this be a mechanism to minimize the environmental impacts of agency action, it will help them focus their conservation and management efforts.

The Council is required to identify non-fishing activities that have the potential to adversely affect EFH quality and, for each activity, describe its known potential adverse impacts and the EFH most likely to be adversely affected. The descriptions should explain the mechanisms or processes that may cause the adverse effects and how these may affect habitat function. The Council considered a wide range of non-fishing activities that may threaten important properties of the habitat used by managed species and their prey, including dredging, dredge material disposal, mineral exploration, water diversion, aquaculture, wastewater discharge, oil and hazardous substance discharge, construction of fish enhancement structures, coastal development, introduction of exotic species, and agricultural practices. These activities and impacts, along with mitigation measures, are detailed in the next section.

Table 1: Threats to Coral Reefs in the Hawaiian Archipelago

Activity	**MHI**	**NWHI**
Coastal construction	x	
Destructive fishing	x	
Flooding	x	
Industrial pollution		
Overuse/over harvesting	x	
Nutrient loading (sewage/eutrophication)	x	
Soil erosion/sedimentation	x	
Vessel groundings/oil spills		x
Military activity	x	x
Hazardous waste		x

Tourist impacts	x	
Urbanization	x	
Thermal pollution	x	
Marine debris	x	x
Introduced species	x	

Sources: Birkeland 1997a; Clark and Gulko 1999; Grigg 2002; Jokiel 1999; Maragos et al. 1996

3. Cumulative Impacts Assessment

A cumulative impacts analysis (CIA) is required by the NMFS EFH Final Rule (2002) to the extent feasible and practicable. The CIA "should analyze how the cumulative impacts of fishing and non-fishing activities influence the function of EFH on an ecosystem or watershed scale" (67 FR 2378, January 17, 2002). The assessment should include multiple threats, including natural stresses.

There are a variety of past, present, and future activities that have the potential to affect EFH in the Hawaiian Archipelago. In the Main Hawaiian Islands, there has been interest in aquaculture, inter-island electricity cables, and offshore energy development as the state moves toward self-sufficiency in energy and food production. Since many water column impacts are temporary in nature, benthic alteration associated with laying cables and anchoring are most likely to have an adverse impact and pose the greatest threat to EFH for juvenile and adult life stages. Nearshore impacts associated with development have the potential to impact shallow water species. Large-scale impacts such as global climate change that affect ocean temperatures, currents, and potentially food chain dynamics are most likely to threaten EFH for egg and larval pelagic stages.

The Northwestern Hawaiian Islands are very remote. All commercial fishing for bottomfish and seamount groundfish species is under moratorium in the Hancock Seamount Ecosystem Management Area; commercial fishing is banned within the Papahānaumokuākea Marine National Monument. Activity within the Monument is generally limited to scientific research. Similar to larval and egg life stages, global environmental problems pose the largest threat to EFH in the NWHI.

Future analyses will seek to analyze cumulative impact of habitat conversion and the impacts of discharges in order to evaluate the cumulative impacts on EFH. Information and techniques that are developed for this process will be used to supplement future revisions of these EFH provisions as the information becomes available.

4. Conservation and Enhancement Recommendations

According to NMFS guidelines, Councils should describe ways to avoid, minimize, or compensate for the adverse effects to EFH and promote the conservation and enhancement of EFH. Generally, non-water dependent actions that may have adverse impacts should not be located in EFH. Activities that may result in significant adverse effects on EFH should be avoided where less environmentally harmful alternatives are available. If there are no alternatives, the impacts of these actions should be minimized. Environmentally sound engineering and management practices should be employed for all actions that may adversely affect EFH. Disposal or spillage of any material (dredge material, sludge, industrial waste, or other potentially harmful materials) that would destroy or degrade EFH should be avoided. If avoidance or minimization is not possible, or will not adequately protect EFH, compensatory mitigation to conserve and enhance EFH should be recommended. FEPs may recommend proactive measures to conserve or enhance EFH. When developing proactive measures, Councils may develop a priority ranking of the recommendations to assist federal and state agencies undertaking such measures. Councils should describe a variety of options to conserve or enhance EFH, which may include, but are not limited to the following:

Enhancement of rivers, streams, and coastal areas through new federal, state, or local government planning efforts to restore river, stream, or coastal area watersheds.

Improve water quality and quantity through the use of the best land management practices to ensure that water-quality standards at state and federal levels are met. The practices include improved sewage treatment, disposing of waste materials properly, and maintaining sufficient in-stream flow to prevent adverse effects to estuarine areas.

Restore or create habitat, or convert non-EFH to EFH, to replace lost or degraded EFH, if conditions merit such activities. However, habitat conversion at the expense of other naturally functioning systems must be justified within an ecosystem context.

Established policies and procedures of the Council and NMFS provide the framework for conserving and enhancing EFH. Components of this framework include adverse impact avoidance and minimization, provision of compensatory mitigation whenever the impact is significant and unavoidable, and incorporation of enhancement. New and expanded responsibilities contained in the MSA will be met through appropriate application of these policies and principles. In assessing the potential impacts of proposed projects, the Council and the NMFS are guided by the following general considerations:

- The extent to which the activity would directly and indirectly affect the occurrence, abundance, health, and continued existence of fishery resources.
- The extent to which the potential for cumulative impacts exists.
- The extent to which adverse impacts can be avoided through project modification, alternative site selection, or other safeguards.
- The extent to which the activity is water dependent if loss or degradation of EFH is involved.
- The extent to which mitigation may be used to offset unavoidable loss of habitat functions and values.

Seven non-fishing activities have been identified that directly or indirectly affect habitat used by MUS. Impacts and conservation measures are summarized below for each of these activities. Although not all inclusive, what follows is a good example of the kinds of measures that can help to minimize or avoid the adverse effects of identified non-fishing activities on EFH.

o Habitat Loss and Degradation

Impacts:

- Changes in abundance of infaunal and bottom-dwelling organisms
- Turbidity plumes
- Biological availability of toxic substances
- Damage to sensitive habitats
- Current patterns/water circulation modification
- Loss of habitat function

- Contaminant runoff
- Sediment runoff
- Shoreline stabilization projects

Conservation Measures:

1. To the extent possible, fill materials resulting from dredging operations should be placed on an upland site. Fills should not be allowed in areas with subaquatic vegetation, coral reefs, or other areas of high productivity.
2. The cumulative impacts of past and current fill operations on EFH should be addressed by federal, state, and local resource management and permitting agencies and should considered in the permitting process.
3. The disposal of contaminated dredge material should not be allowed in EFH.
4. When reviewing open-water disposal permits for dredged material, state and federal agencies should identify the direct and indirect impacts such projects may have on EFH. When practicable, benthic productivity should be determined by sampling prior to any discharge of fill material. Sampling design should be developed with input from state and federal resource agencies.
5. The areal extent of the disposal site should be minimized. However, in some cases, thin layer disposal may be less deleterious. All non-avoidable impacts should be mitigated.
6. All spoil disposal permits should reference latitude–longitude coordinates of the site so that information can be incorporated into GIS systems. Inclusion of aerial photos may also be required to help geo-reference the site and evaluate impacts over time.
7. Further fills in estuaries and bays for development of commercial enterprises should be curtailed.
8. Prior to installation of any piers or docks, the presence or absence of coral reefs and submerged aquatic vegetation should be determined. These areas should be avoided. Benthic productivity should also be determined, and areas with high productivity avoided. Sampling design should be developed with input from state and federal resource agencies.
9. The use of dry stack storage is preferable to wet mooring of boats. If that method is not feasible, construction of piers, docks, and marinas should be designed to minimize impacts to the coral reef substrate and subaquatic vegetation.
10. Bioengineering should be used to protect altered shorelines. The alteration of natural, stable shorelines should be avoided.

o Pollution and Contamination

Impacts:

- Introduction of chemicals
- Introduction of animal wastes
- Increased sedimentation
- Wastewater effluent with high contaminant levels
- High nutrient levels downcurrent of outfalls
- Biocides to prevent biofouling
- Thermal effects
- Turbidity plumes
- Affected submerged aquatic vegetation sites
- Stormwater runoff

- Direct physical contact
- Indirect exposure
- Cleanup

Conservation Measures:

1. Outfall structures should be placed sufficiently far offshore to prevent discharge water from affecting areas designated as EFH. Discharges should be treated using the best available technology, including implementation of up-to-date methodologies for reducing discharges of biocides (e.g., chlorine) and other toxic substances.
2. Benthic productivity should be determined by sampling prior to any construction activity. Areas of high productivity should be avoided to the maximum extent possible. Sampling design should be developed with input from state and federal resource agencies.
3. Mitigation should be provided for the degradation or loss of habitat from placement of the outfall structure and pipeline as well as the treated water plume.
4. Containment equipment and sufficient supplies to combat spills should be on-site at all facilities that handle oil or hazardous substances.
5. Each facility should have a Spill Contingency Plan, and all employees should be trained in how to respond to a spill.
6. To the maximum extent practicable, storage of oil and hazardous substances should be located in an area that would prevent spills from reaching the aquatic environment.
7. Construction of roads and facilities adjacent to aquatic environments should include a storm-water treatment component that would filter out oils and other petroleum products.
8. The use of pesticides, herbicides, and fertilizers in areas that would allow for their entry into the aquatic environment should be avoided.
9. The best land management practices should be used to control topsoil erosion and sedimentation.

o Dredging

Impacts:

- Changes in abundance of infaunal and bottom-dwelling organisms
- Turbidity plumes
- Bioavailability of toxic substances
- Damage to sensitive habitats
- Water circulation modification

Conservation Measures:

1. To the maximum extent practicable, dredging should be avoided. Activities that require dredging (such as placement of piers, docks, marinas, etc.) should be sited in deep-water areas or designed in such a way as to alleviate the need for maintenance dredging. Projects should be permitted only for water-dependent purposes, when no feasible alternatives are available.
2. Dredging in coastal and estuarine waters should be performed during the time frame when MUS and prey species are least likely to be entrained. Dredging should be avoided in areas with submerged aquatic vegetation and coral reefs.
3. All dredging permits should reference latitude–longitude coordinates of the site so that information can be incorporated into Geographic Information Systems (GIS). Inclusion of aerial photos may also be required to help geo-reference the site and evaluate impacts over time.

4. Sediments should be tested for contaminants as per the EPA and U.S. Army Corps of Engineers requirements.
5. The cumulative impacts of past and current dredging operations on EFH should be addressed by federal, state, and local resource management and permitting agencies and should be considered in the permitting process.
6. If dredging needs are caused by excessive sedimentation in the watershed, those causes should be identified and appropriate management agencies contacted to assure action is done to curtail those causes.
7. Pipelines and accessory equipment used in conjunction with dredging operations should, to the maximum extent possible, avoid coral reefs, seagrass beds, estuarine habitats, and areas of subaquatic vegetation.

o Marine Mining

Impacts:

- Loss of habitat function
- Turbidity plumes
- Resuspension of fine-grained mineral particles
- Composition of the substrate altered

Conservation Measures:

1. Mining in areas identified as a coral reef ecosystem should be avoided.
2. Mining in areas of high biological productivity should be avoided.
3. Mitigation should be provided for loss of habitat due to mining.

o Water Intake Structures

Impacts:

- Entrapment, impingement, and entrainment
- Loss of prey species

Conservation Measures:

1. New facilities that rely on surface waters for cooling should not be located in areas where coral reef organisms are concentrated. Discharge points should be located in areas that have low concentrations of living marine resources, or they should incorporate cooling towers that employ sufficient safeguards to ensure against release of blow-down pollutants into the aquatic environment.
2. Intake structures should be designed to prevent entrainment or impingement of MUS larvae and eggs.
3. Discharge temperatures (both heated and cooled effluent) should not exceed the thermal tolerance of the plant and animal species in the receiving body of water.
4. Mitigation should be provided for the loss of EFH from placement of the intake structure and delivery pipeline.

o Aquaculture Facilities

Impacts:

- Discharge of organic waste from the farms
- Impacts to the seafloor below the cages or pens

Conservation Measures:

1. Facilities should be located in upland areas as often as possible. Tidally influenced wetlands should not be enclosed or impounded for mariculture purposes. This includes hatchery and grow-out operations. Siting of facilities should also take into account the size of the facility, the presence or absence of submerged aquatic vegetation and coral reef ecosystems, proximity of wild fish stocks, migratory patterns, competing uses, hydrographic conditions, and upstream uses. Benthic productivity should be determined by sampling prior to any operations. Areas of high productivity should be avoided to the maximum extent possible. Sampling design should be developed with input from state and federal resource agencies.
2. To the extent practicable, water intakes should be designed to avoid entrainment and impingement of native fauna.
3. Water discharge should be treated to avoid contamination of the receiving water and should be located only in areas having good mixing characteristics.
4. Where cage mariculture operations are undertaken, water depths and circulation patterns should be investigated and should be adequate to preclude the buildup of waste products, excess feed, and chemical agents.
5. Non-native, ecologically undesirable species that are reared may pose a risk of escape or accidental release, which could adversely affect the ecological balance of an area. A thorough scientific review and risk assessment should be undertaken before any non-native species are allowed to be introduced.
6. Any net pen structure should have small enough webbing to prevent entanglement by prey species.
7. Mitigation should be provided for the EFH areas impacted by the facility.

o Introduction of Exotic Species

Impacts:

- Habitat alteration
- Trophic alteration
- Gene pool alteration
- Spatial alteration
- Introduction of disease

Conservation Measures:

1. Vessels should discharge ballast water far enough out to sea to prevent introduction of nonnative species to bays and estuaries.
2. Vessels should conduct routine inspections for presence of exotic species in crew quarters and hull of the vessel prior to embarking to remote islands (PRIAs, NWHI, and northern islands of the CNMI).
3. Exotic species should not be introduced for aquaculture purposes unless a thorough scientific evaluation and risk assessment are performed (see section on aquaculture).
4. Effluent from public aquaria display laboratories and educational institutes using exotic species should be treated prior to discharge.

5. Essential Fish Habitat Research Needs

The Council conducted an initial inventory of available environmental and fisheries data sources relevant to the EFH of each managed fishery. Based on this inventory, a series of tables were created that indicated the existing level of data for individual MUS in each fishery. These tables are available in Supplements to Amendment 4, 6, and 10 to the Precious Corals, Bottomfish and Seamount Groundfish, and Crustaceans FMPs respectively (WPRFMC 2002), and the Coral Reef Ecosystems FMP (WPRFMC 2001) and are summarized below.

Additional research is needed to make available sufficient information to support a higher level of description and identification of EFH and HAPC. Additional research may also be necessary to identify and evaluate actual and potential adverse effects on EFH, including, but not limited to, direct physical alteration; impaired habitat quality/functions; cumulative impacts from fishing; or indirect adverse effects, such as sea level rise, climate change, and climate shifts. The following scientific data are needed to more effectively address EFH provisions:

All Species

- Distribution of early life history stages (eggs and larvae) of MUS by habitat
- Juvenile habitat (including physical, chemical, and biological features that determine suitable juvenile habitat)
- Food habits (feeding depth, major prey species, etc.)
- Habitat-related densities for all MUS life history stages
- Habitat utilization patterns for different life history stages and species for BMUS
- Growth, reproduction, and survival rates for MUS within habitats

Bottomfish Species

- Inventory of marine habitats in the EEZ of the Western Pacific Region
- Data to obtain a better SPR estimate for American Samoa’s bottomfish complex
- Baseline (virgin stock) parameters (CPUE, percent immature) for the Guam/NMI deep- and shallow-water bottomfish complexes
- High-resolution maps of bottom topography/currents/water masses/primary productivity

Crustaceans Species

- Identification of postlarval settlement habitat of all CMUS
- Identification of source–sink relationships in the NWHI and other regions (i.e., relationships between spawning sites settlement using circulation models, and genetic techniques)
- Establish baseline parameters (CPUE) for the Guam/Northern Marinas crustacean populations
- Research to determine habitat related densities for all CMUS life history stages in American Samoa, Guam, Hawaii, and NMI
- High-resolution mapping of bottom topography, bathymetry, currents, substrate types, algal beds, and habitat relief

Precious Corals Species

- Distribution, abundance, and status of precious corals in the Western Pacific Region

Coral Reef Ecosystem Species

- The distribution of early life history stages (eggs and larvae) of MUS by habitat
- Description of juvenile habitat (including physical, chemical, and biological features that determine suitable juvenile habitat)
- Food habits (feeding depth, major prey species, etc.)
- Habitat-related densities for all MUS life history stages
- Habitat utilization patterns for different life history stages and species
- Growth, reproduction, and survival rates for MUS within habitats.

- Inventory of coral reef ecosystem habitats in the EEZ of the Western Pacific Region
- Location of important spawning sites
- Identification of postlarval settlement habitat
- Establishment of baseline parameters for coral reef ecosystem resources
- High-resolution mapping of bottom topography, bathymetry, currents, substrate types, algal beds, and habitat relief

NMFS guidelines suggest that the Council and NMFS periodically review and update the EFH components of FMPs as new data become available. The Council recommends that new information be reviewed, as necessary, during preparation of the annual and SAFE reports by the Plan Teams, in accordance with the National Standards guidelines. EFH designations may be changed under the FEP amendment process if information presented in an annual review indicates that modifications are justified.

Appendix I: Essential Fish Habitat and Habitat Areas of Particular Concern Maps

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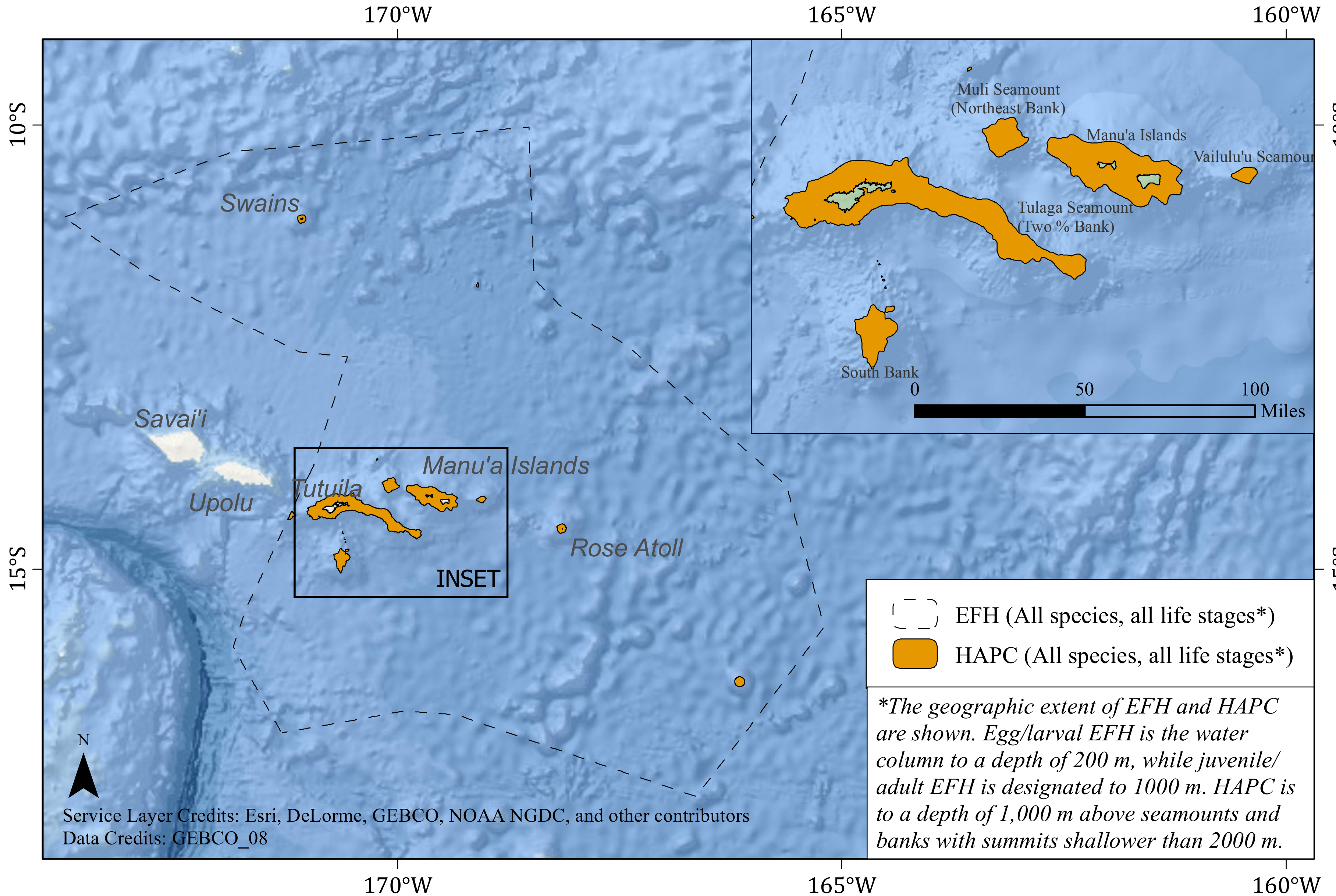
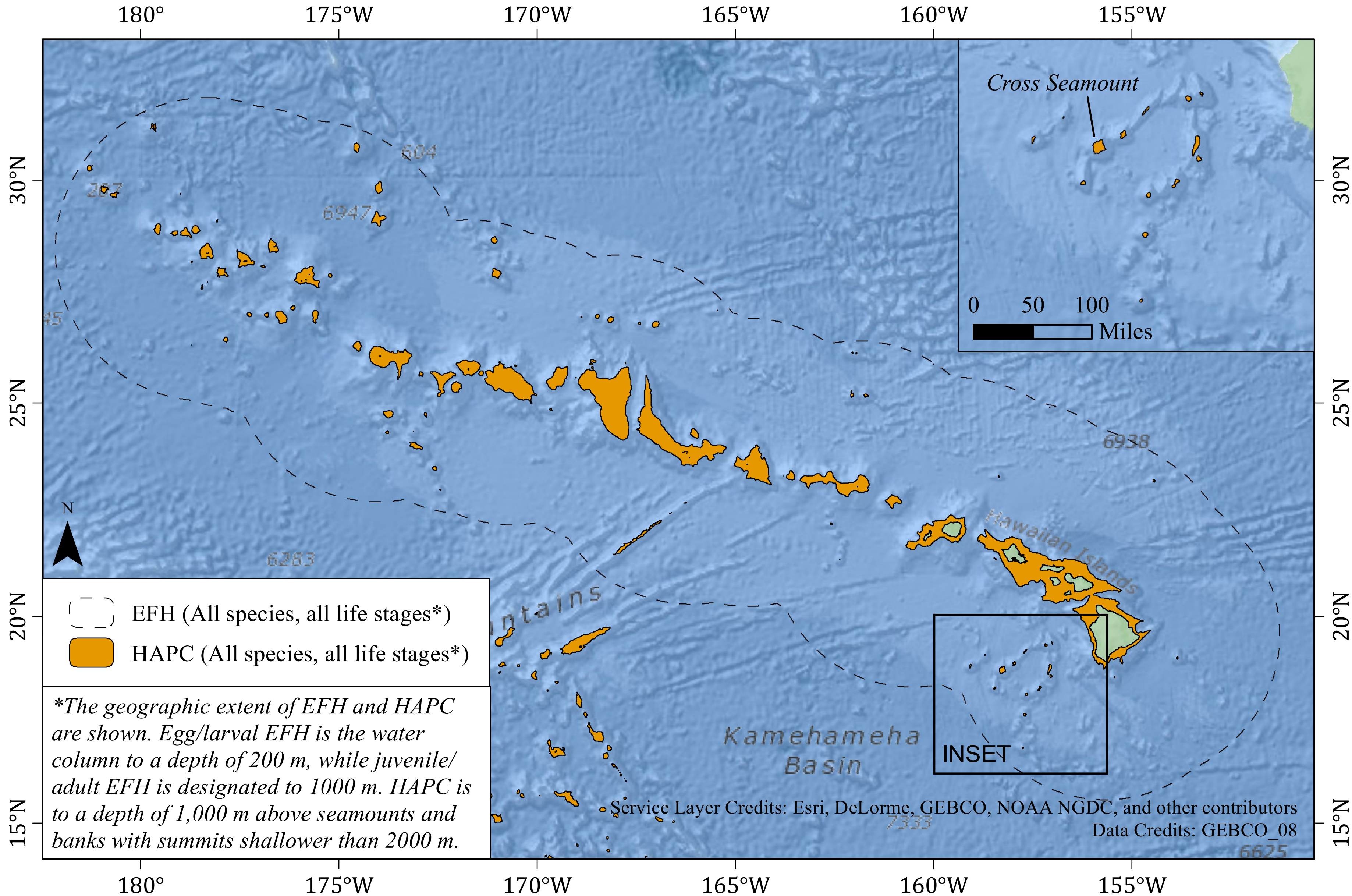
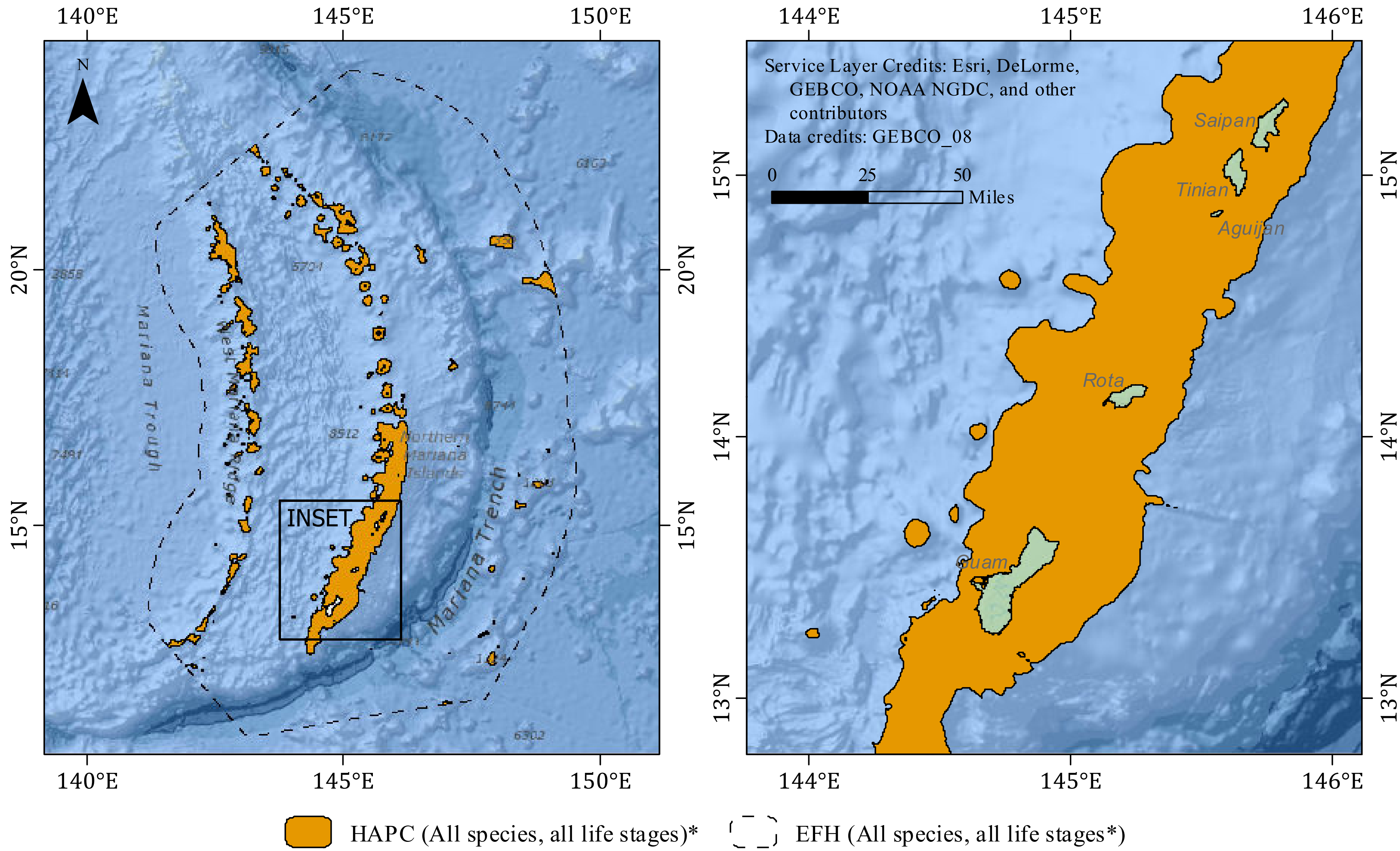
American Samoa Pelagic MUS EFH and HAPC



Hawaiian Archipelago Pelagic MUS EFH and HAPC

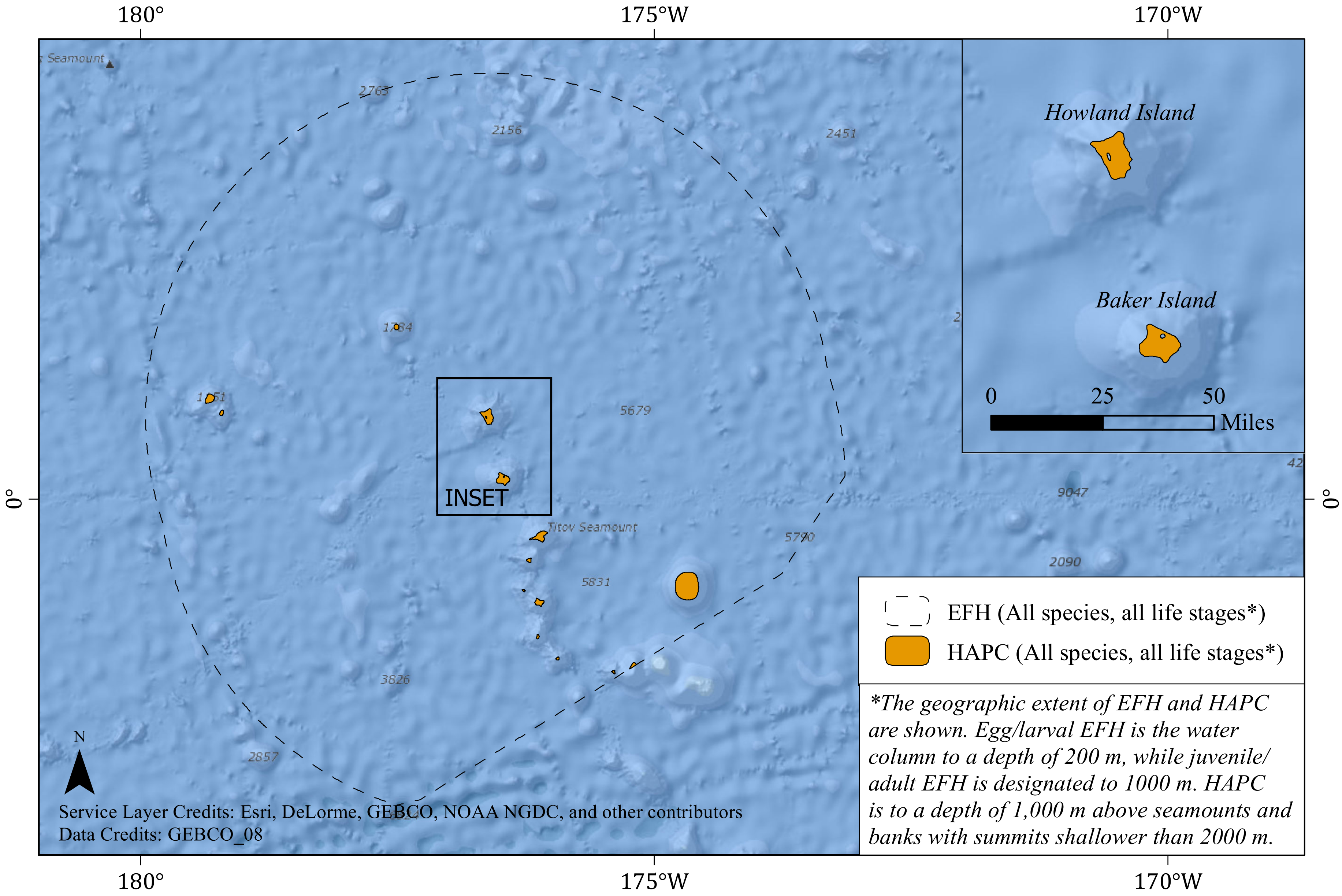


Mariana Islands Pelagic MUS EFH and HAPC

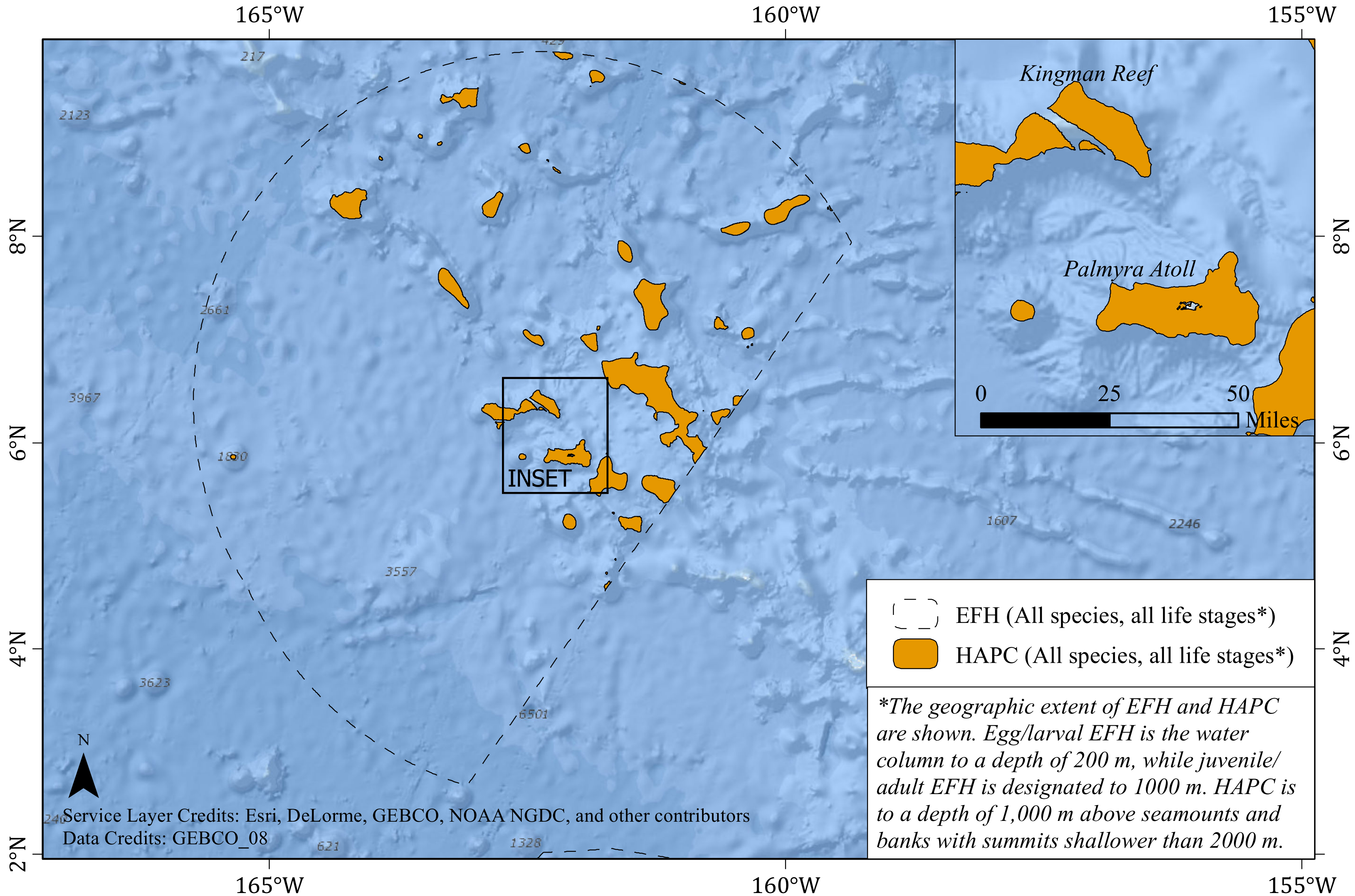


** The geographic extent of EFH and HAPC are shown. Egg/larval EFH is the water column to a depth of 200 m, while juvenile/adult EFH is designated to 1000 m. HAPC is to a depth of 1,000 m above seamounts and banks with summits shallower than 2000 m.*

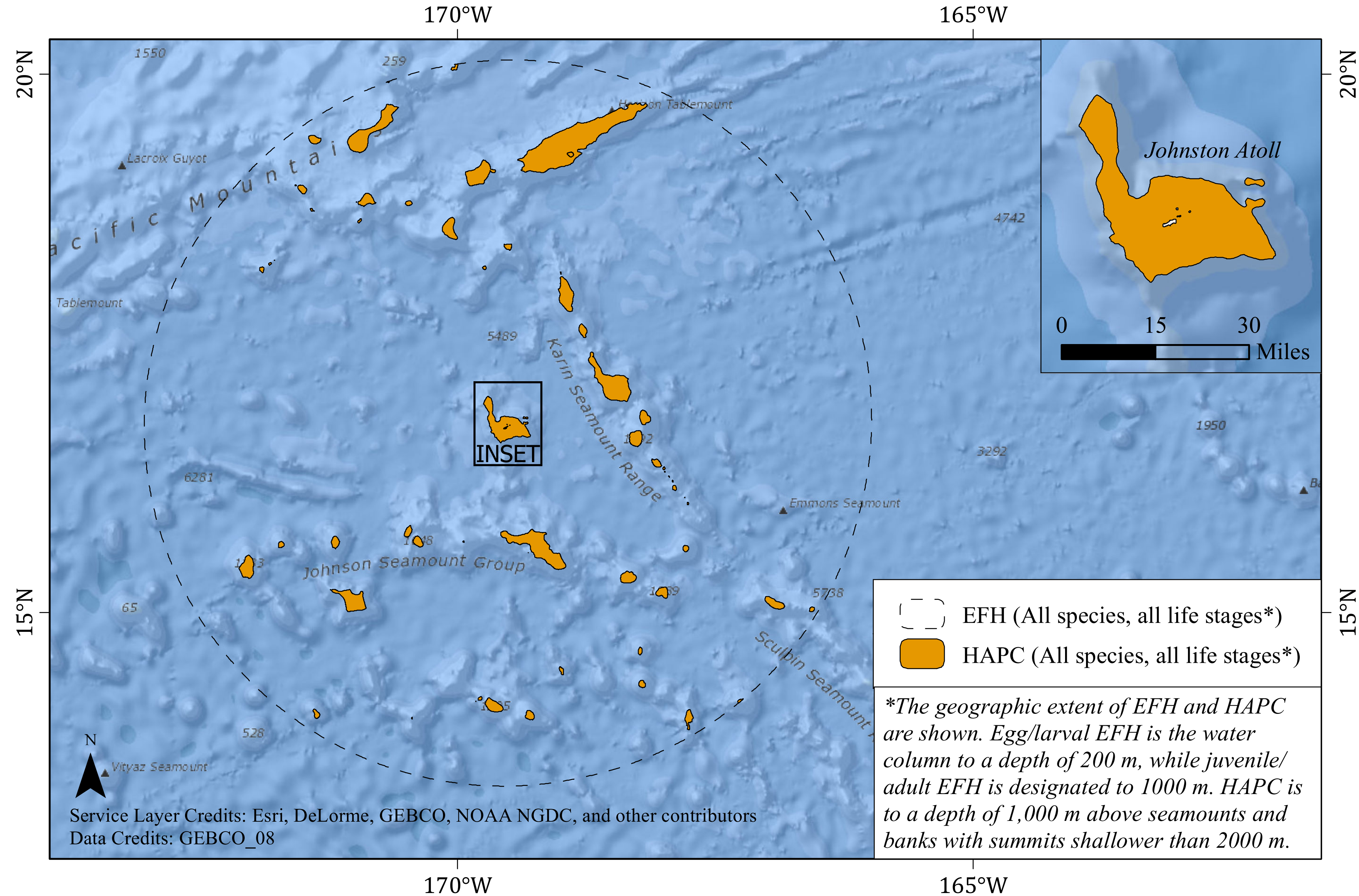
Howland and Baker Islands Pelagic MUS EFH and HAPC



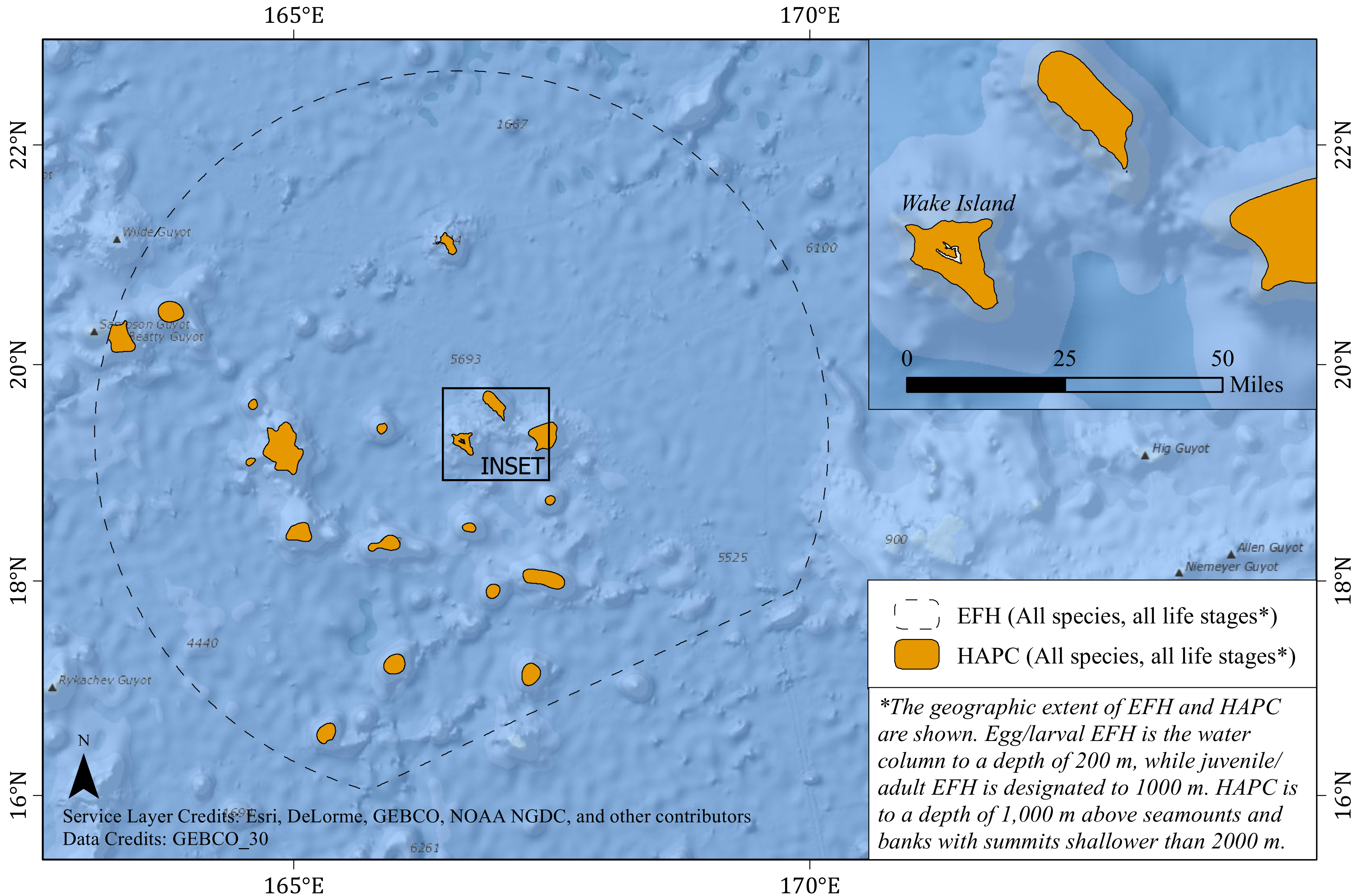
Palmyra Atoll and Kingman Reef Pelagic MUS EFH and HAPC



Johnston Atoll Pelagic MUS EFH and HAPC



Wake Island Pelagic MUS EFH and HAPC



Jarvis Island Pelagic MUS EFH and HAPC