

# **ISSUANCE OF AN EXEMPTED FISHING PERMIT TO FISH WITH LONGLINE GEAR IN THE WEST COAST EXCLUSIVE ECONOMIC ZONE**

## **ENVIRONMENTAL ASSESSMENT**

**PREPARED BY:**

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NATIONAL MARINE FISHERIES SERVICE  
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**❖  
PACIFIC FISHERY MANAGEMENT COUNCIL  
PORTLAND, OREGON**

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## Cover Sheet

### Longline Fishery Exempted Fishing Permit / Regulatory Amendment

Proposed Action: Issue an exempted fishing permit (EFP) to allow one vessel to conduct exploratory longline fishing in the Exclusive Economic Zone (EEZ) off of Oregon and California, which is currently prohibited, during the 2007 fishing year (April 1 2007-March 31 2008, although fishing would not begin before mid-September 2007). Under terms and conditions of the EFP, the vessel would target swordfish using shallow-set longline gear, which is also currently prohibited pursuant to the HMS FMP and Endangered Species Act (ESA) regulations for the protection of endangered sea turtles.

Type of Statement: Environmental Assessment (EA)

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## Abstract

This environmental assessment (EA) evaluates four alternatives. Three of these alternatives were evaluated in a preliminary draft EA used by the Pacific Fishery Management Council (Council) to develop their recommendation to NOAA's National Marine Fisheries Service (NMFS) on issuance of an exempted fishing permit (EFP) to allow a single vessel to use longline gear to target swordfish in the West Coast Exclusive Economic Zone (EEZ). The Council took final action at their April 1–6, 2007, meeting by choosing a preferred alternative which represents their recommendation to NMFS for issuance of the EFP. The alternative of no action is included in this EA, representing the alternative of not issuing the permit. The alternatives were developed in a collaborative and iterative process with the applicant, NMFS, Council staff, and advisory bodies. This EA analyzes the three action alternatives, each of which include various mitigation terms and conditions to reduce potentially adverse impacts to finfish, marine mammals, sea turtles, and seabirds. Alternative 2 includes limits on the total amount of fishing that would be allowed under the EFP (number of trips and sets). Alternative 3 includes all of the terms and conditions identified under alternative 2 and would impose additional mitigation measures. Alternative 4 includes all of the terms and conditions identified under alternative 3 and would further restrict fishing opportunity in the action area off Oregon and California. The principal difference among the three action alternatives is that under alternative 3 the Council would identify incidental catch/take limits (caps) for selected finfish and protected species. If any of these caps were reached the fishery would immediately cease. The Council chose a modification of alternative 3 as their preferred alternative, with the addition of specified caps for species of concern and a prohibition on EFP fishing north of 45° N. latitude and within 30 nautical miles (nmi) of the coastline. As an additional conservation measure, the applicant requested that the boundary be expanded to 40 nmi off the coastline. In this EA the preferred alternative is identified as alternative 4 with the additional conservation measures.

The purpose of the proposed action is to allow the applicant to conduct exploratory fishing off the West Coast to determine if he can effectively target swordfish with the new gear while at the same time minimizing interactions with non-target catch, including protected and sensitive species. The amount of fishing would be constrained by, among other things, EFP-imposed trip and set limits and a variety of mitigation measures to minimize adverse environmental impacts from the activity. Longline fishing with circle hooks and mackerel bait may prove to be a commercially viable means of harvesting swordfish with minimal environmental impact in terms of bycatch of non-target species. According to regulations, a NMFS Regional Administrator may authorize, "for limited testing, public display, data collection, exploratory, health and safety, environmental cleanup, and/or hazard removal purposes, the target or incidental harvest of species managed under an FMP or fishery regulations that would otherwise be prohibited" (50 CFR 600.745(b)). This requires issuance of an EFP, which is the proposed action analyzed in this EA.

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## List of Acronyms

AMSY- Average Maximum Sustainable Yield  
AVHRR- Advanced Very High Resolution Radiometer  
BFAL- Black-Footed Albatross  
BO- Biological Opinion  
CCS- California Current System  
CDFG- California Department of Fish and Game  
CFR- Code of Federal Regulations  
CITES- Convention on International Trade in Endangered Species  
CPFV- Commercial Passenger Fishing Vessels  
CPUE- Catch Per Unit of Effort  
DGN- Drift Gillnet  
DPS- Distinct Population Segments  
DSLL- Deep-set Longline  
EA- Environmental Assessment  
EEZ- Exclusive Economic Zone  
EFH- Essential Fish Habitat  
EFP- Exempted Fishing Permit  
EIS- Environmental Impact Statement  
ENP-Eastern North Pacific  
ESA- Endangered Species Act  
ESU-Evolutionarily Significant Units  
FEIS- Final Environmental Impact Statement  
FONSI- Finding of No Significant Impact  
FMP- Fishery Management Plan  
FR-Federal Register  
GAM- Generalized Adaptive Model  
HMS- Highly Migratory Species  
HMS FMP- Fishery Management Plan for U.S. West Coast Fisheries for Highly Migratory Species  
HMSAS- Highly Migratory Species Advisory Subpanel  
HMSMT- Highly Migratory Species Management Team  
IATTC- Inter-American Tropical Tuna Commission  
ISC- International Scientific Committee  
ITS- Incidental Take Statement  
IUCN- World Conservation Union  
IUU- Illegal Unreported and Unregulated  
IWC- International Whaling Commission  
LAAL- Laysan Albatross  
LOF- List of Fisheries  
MCSST- Multi-Channel Sea Surface Temperature  
MMPA- Marine Mammal Protection Act  
MSA- Magnuson-Stevens Fishery Conservation and Management Act  
NED- Northeast Distant  
NEPA- National Environmental Policy Act  
NMFS- National Marine Fisheries Service  
NOAA- National Oceanic and Atmospheric Administration  
OY- Optimum Yield  
PacFIN- Pacific Fisheries Information Network

PBR- Potential Biological Removal  
PDO- Pacific Decadal Oscillation  
Pelagics FMP- Fishery Management Plan for Pelagics Fisheries of the Western Pacific Region  
PFMC- Pacific Fishery Management Council  
PIFSC- Pacific Islands Fisheries Science Center  
POCTRP- Pacific Offshore Cetacean Take Reduction Plan  
PRD- Protected Resources Division  
RFMO-Regional Fisheries Management Organization  
RecFIN- Recreational Fisheries Information Network  
SAFE- Stock Assessment and Fishery Evaluation Report  
SAFZ- Subarctic Frontal Zone  
SAR- Stock Assessment Report  
SCB-Southern California Bight  
SSLL-Shallow-set Longline  
STAL- Short-Tailed Albatross  
STFZ- Subtropical Frontal Zone  
TDR- Time and Depth Recorder  
TRP- Take Reduction Plan  
TRT- Take Reduction Team  
USFWS- United States Fish and Wildlife Service  
WPFMC- Western Pacific Fishery Management Council  
ZRMG- Zero Mortality Rate Goal

## Glossary

**Biological Opinion:** the written documentation of a Section 7 consultation.

**Incidental take:** “take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, or collect individuals from a species listed on the ESA. Incidental take is the non-deliberate take of ESA-listed species, during an otherwise lawful activity (e.g., fishing under a FMP).

**Incidental Take Statement:** Issued as part of the ESA Section 7 consultation regulations, it is the amount of incidental take anticipated under a proposed action and analyzed in a biological opinion.

**Jeopardy:** the conclusion of a Section 7 consultation if it is determined that the proposed action would reasonably be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the numbers, reproduction, or distribution of that species.

**Mortality or serious injury:** a standard used for measuring impacts on marine mammals under the MMPA. Serious injury is defined as an injury likely to result in the mortality of a marine mammal.

**Mean annual takes:** the estimated number of marine mammals seriously injured or killed each year due to fishery interactions.

**Potential Biological Removal:** a requirement of the MMPA, it is the estimated number of individuals that can be removed from a marine mammal stock while allowing the stock to maintain or increase its population.

**Section 7 consultation:** a requirement of all discretionary Federal actions to ensure that the proposed action is not likely to jeopardize ESA-listed endangered or threatened species. Refers to Section 7(a)(2) of the ESA.



# 1.0 INTRODUCTION

## 1.1 Organization of the Document

This document provides background information about, and analysis of, a proposal for an exempted fishing permit (EFP) to allow a single longline fishing vessel to conduct exploratory longline fishing targeting swordfish (*Xiphias gladius*) in the EEZ off Oregon and California, which is currently prohibited. Management of the proposed longline fishery would be covered by the *Fishery Management Plan for U.S. West Coast Fisheries for Highly Migratory Species* (HMS FMP), which was developed by the Pacific Fishery Management Council (hereafter, the Council) in collaboration with the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS). The HMS FMP was implemented in 2004 and allows for more comprehensive Federal management of FMP fisheries, supported by decision-making through the Council process. The action must conform to the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the principal legal basis for fishery management within the EEZ, which extends from the outer boundary of State waters at three nautical miles (nmi) to a distance of 200 nmi from shore. In addition to addressing MSA mandates, this document is an environmental assessment (EA), pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended. The purpose of an EA is to disclose and evaluate the effects of the proposed action on the human environment, considered by means of a range of alternatives, and "Briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact" (40 CFR 1508.9). (Section 1.6 provides an initial screening of potentially significant effects to determine the scope of the analysis.) This document contains the analyses required under NEPA. The evaluation of adverse impacts to species listed under the Endangered Species Act (ESA) is consistent with evaluation of the action required by Section 7 of the ESA, which requires consultation with NMFS's Protected Resources Division (PRD) and the United States Fish and Wildlife Service (USFWS) to determine whether the proposed action may jeopardize the continued existence of any federally listed species.

Environmental impact analyses have four essential components: a description of the purpose and need for the proposed action, a set of alternatives that represent different ways of accomplishing the proposed action, a description of the human environment affected by the proposed action, and an evaluation of the expected direct, indirect, and cumulative impacts of the alternatives. (The human environment includes the natural and physical environment and the relationship of people with that environment, as defined at 40 CFR 1508.14). These elements allow the decision maker to look at different approaches to accomplishing a stated goal and understand the likely consequences of each choice or alternative. Based on this structure, the document is organized into six main chapters:

- Chapter 1 describes the purpose and need for the proposed action and considerations that went into the development of this EA.
- Chapter 2 outlines different alternatives that have been considered to address the purpose and need of the proposed action. The Council chose a preferred alternative from among these alternatives, which constitutes a recommendation to NMFS; based on the recommendation, NMFS makes a final determination whether to issue the EFP and what terms and conditions to apply.
- Chapter 3 describes the components of the human environment potentially affected by the proposed action (the "affected environment"). The affected environment may be considered the baseline condition, which would be potentially changed by the proposed action.

- Chapter 4 evaluates the effects of the alternatives on components of the human environment in order to provide the information necessary to determine whether such effects are significant, or potentially significant.
- Chapter 5 details how this action meets 10 National Standards set forth in the MSA (§301(a)).
- Chapter 6 provides information on those laws and Executive Orders, in addition to the MSA and NEPA, that an action must be consistent with, and how this action has satisfied those mandates.

Additional chapters (7-10) list those who contributed to this EA, information on EA distribution, the references cited list, and an appendix with public comments received and NMFS's responses to those comments.

## 1.2 The Proposed Action

*The proposed action* is to issue an exempted fishing permit (EFP) to allow one vessel to explore<sup>1</sup> the commercial viability of fishing with new and innovative longline gear in the EEZ off of Oregon and California during the 2007 fishing season. The purpose of the EFP is to initially assess whether shallow-set longline (SSL) gear using the latest gear modifications is a cost-effective alternative to potentially reducing bycatch in the California and Oregon swordfish fishery. Currently, no such information exists on how this gear, specifically designed to reduce bycatch, will operate under: 1) different environmental conditions relative to bycatch and, 2) economic conditions relative to current swordfish practices in the proposed action area. Under terms and conditions of the EFP, the vessel would target swordfish with SSL gear utilizing circle hooks and mackerel or mackerel-type bait. This combination has proven successful in existing domestic (Atlantic and Hawaii) and foreign (Italy, Brazil, and Uruguay) SSL fisheries in reducing the post-hooking mortality of sea turtles compared to traditional longline gear, while maintaining a commercially viable catch-per-unit-of-effort for the target species (Watson and Kerstetter 2006; Boggs and Swimmer 2007). Given the success of these fisheries, the applicant wishes to conduct exploratory fishing off the West Coast to determine if he can cost-effectively target swordfish with the new gear while at the same time minimizing interactions with non-target catch, including protected and sensitive species.

To target swordfish, longline gear is set at a shallower depth (<100 m) than for tunas. For this reason it is termed "shallow set" as opposed to "deep set" when targeting tunas, where the gear is set in the deeper thermocline zone (~300–400 m). Fishing with longline gear is currently prohibited in the West Coast EEZ under the HMS FMP and Federal regulation at 550 CFR 660.712(a). Furthermore, the FMP prohibits targeting swordfish with longline gear (shallow setting) west of 150° W. longitude (see 50 CFR 660.712(b)). Regulations under the Endangered Species Act (ESA) (50 CFR 223.206(d)(9)) prohibit targeting swordfish with longline gear on the high seas east of 150° W. longitude in order to prevent jeopardy to the continued existence of endangered sea turtles.

The geographic context for the proposed action includes the EEZ off the coasts of Oregon and California; although the applicant has stated that a majority of the proposed fishing activity under the EFP would most likely take place within the EEZ waters adjacent to California (section 3.3 discusses those oceanographic factors that may influence the timing and location of fishing).

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<sup>1</sup> The proposed action is not designed to conduct a formal experimental test to compare bycatch rates of protected species among gear types. To achieve that goal would require, among other things, a larger sample size of sets/vessels spread out over an appropriate spatial/temporal scale, along with control groups fishing with other swordfish gear including drift gillnet and pelagic longline gear of earlier vintage (e.g. J-hooks with squid bait).

The applicant has stated that he may decide to transit outside the EEZ to use the deep-set gear configuration to target tunas during a trip where test fishing under the EFP using the shallow-set gear configuration occurs. Although conducted during the same trip, any such activity would not be part of the EFP (because deep-setting outside the EEZ is currently permitted) and is not considered part of the proposed action evaluated in this EA. However, as a result, gear used to deep-set may be stored aboard the vessel during a trip where shallow set fishing as part of the EFP occurs. The gear would remain stowed until the vessel exits the EEZ and is in waters where deep-setting is permitted. Both fishing under the EFP and any non-EFP fishing outside the EEZ would be subject to 100 percent observer coverage.

### **1.3 Purpose of and Need for the Proposed Action**

EFPs are requested and issued under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1801 et seq.) and regulations at 50 CFR 600 concerning scientific research activity, exempted fishing, and exempted educational activity. According to regulations, a NMFS Regional Administrator may authorize, “for limited testing, public display, data collection, exploratory, health and safety, environmental cleanup, and/or hazard removal purposes, the target or incidental harvest of species managed under an FMP or fishery regulations that would otherwise be prohibited” (50 CFR 600.745(b)). This requires issuance of an EFP, which is the proposed action analyzed in this EA.

The purpose of the proposed action is to allow the applicant to make an exploratory assessment as to whether using innovative fishing gear and methods in an area where they have not been used before might be commercially viable and merit consideration as an approved method of West Coast commercial fishing in the future. Similar gear has proven effective in achieving a sizable reduction in the rate of marine turtle take and mortality per unit of fishing effort in the Hawaii pelagic longline fishery, without reducing swordfish CPUE (Gilman, *et al.* 2006b). It is currently unknown whether similar results would be obtained if this gear were used in the West Coast EEZ.

The proposed action is needed to gather preliminary data on the possibility of expanding West Coast commercial longline fishing opportunity without jeopardizing endangered sea turtles or other protected species. All longline fishing in the EEZ is currently prohibited pursuant to the HMS FMP, and shallow-set longlining (i.e. swordfish longlining) is also prohibited outside the U.S. West Coast EEZ. If a vessel is registered to a Hawaii Pelagics FMP limited-entry permit, shallow-set and deep-set longline fishing is permitted outside of the U.S. West Coast EEZ. The proposed gear configuration, which would utilize circle hooks and mackerel or mackerel-type bait, has the potential to offer a more conservative alternative to longline fishing with traditional J-hooks and squid bait, or drift gillnet (DGN) fishing for swordfish, possibly resulting in a lower level of protected marine turtle bycatch for a similar level of swordfish catch. In addition, sea turtles captured in the SSSL gear utilizing circle hooks and mackerel or mackerel-type bait have experienced a higher post-release survivorship compared to sea turtles captured in the DGN fishery and in traditional pelagic longline fisheries (Lewison and Crowder 2007; Boggs and Swimmer 2007). The amount of fishing would be strictly regulated by EFP-imposed trip and set limits, and a variety of mitigation measures would be required to minimize adverse environmental impacts from the activity.

The applicant also holds a DGN permit and wishes to begin assessing whether he could use the SSSL fishing gear instead of DGN gear, which is permitted in the West Coast EEZ under a variety of restrictions and is also used to target swordfish. The applicant, rather than NMFS, has assumed the financial risk in order to make this assessment.

A Pacific Leatherback Conservation Area was established off the West Coast to specifically address anticipated leatherback turtle interactions (i.e., “takes” as defined by the ESA) with DGN gear in the fishery. The Conservation Area was required under the biological opinion written for the DGN fishery in

2000 based upon an analysis that estimated anticipated takes and mortalities of leatherbacks. NMFS identified an area known to be utilized by leatherback turtles at certain times of the year and established this particular time/area closure between September 15 to November 15. The closure applies only to the DGN fishery based on information collected by NMFS over several years. Because NMFS has no information on how leatherbacks will interact with the latest SSSL gear innovations in the U.S. West Coast EEZ, the closure only applies to the DGN fishery.

Besides the DGN fishery, harpoons and SSSL are the only other known gears used to harvest swordfish. The U.S. harpoon fishery does not have the potential or capacity to serve as a reliable swordfish harvesting gear in the U.S. West Coast EEZ to meet current demand. Without the ability to cover the U.S. demand, imports from foreign sources, whose fleets are believed to operate under less stringent management and conservation measures, would fill the void thereby exacerbating the regional bycatch problem. The expansion limitations include, among others, a narrow band of favorable waters and time periods for sighting and harpooning swordfish (i.e., basking swordfish in the Southern California Bight), the negative economic constraints based on increased fuel consumption and operational costs for this gear type, and the narrow market niche for this higher-priced product. While not as selective as harpoon gear, NMFS finds that since the agency adopted new bycatch reduction technologies and measures, SSSL gear has become exceedingly more selective. This fact has been substantiated by NMFS's own research as well as the research of others and has been extensively published in peer-reviewed scientific journals (Boggs and Swimmer 2007; Gilman, *et al.* 2006d; Lewison and Crowder 2007).

The terms and conditions imposed on fishing under the EFP are intended to strictly contain the environmental impacts of the activity, principally related to the incidental take of protected species, to a level in compliance with current law and policies. NMFS also has an interest in encouraging the use of conservative gear alternatives to DGN gear if the gear would lead to an overall reduction in non-target bycatch and protected species interactions or "takes" while allowing the continued delivery of fresh, U.S.-caught swordfish to West Coast markets. If the outcome of the EFP suggests the potential for a commercially viable fishery, this could support design and implementation of future studies to better determine if there are benefits from encouraging the use of this longline gear as an alternative to DGN gear.

#### **1.4 Background**

Under California law, longline gear is not legally authorized within the EEZ; therefore, landing into California ports longline-caught fish from the EEZ off California is prohibited. With implementation of the HMS FMP in 2004, a prohibition on longline fishing for the entire West Coast EEZ was created in Federal regulations. In 1991, there were three longline vessels that fished beyond the EEZ targeting swordfish and bigeye tuna and unloaded their catch and re-provisioned in California ports. In 1993, a Gulf Coast fish processor set up at Ventura Harbor, California, to provide longline vessels with ice, gear, bait, and fuel, and fish offloading and transportation services (Vojkovich and Barsky 1998). Consequently, longline vessels seeking an alternative to the Gulf of Mexico longline fishery, and precluded from entering the Hawaii fishery due to lack of permits, began arriving in southern California. By 1994, 31 vessels comprised this California-based fishery, fishing beyond the EEZ, and landing swordfish and tunas into California ports. These vessels fished alongside Hawaiian vessels in the area around 135° W. longitude in the months from September through January. Historically, vessels from Hawaii had the option of returning to Hawaii to land their catch or landing their catch on the West Coast.

The Western Pacific Fishery Management Council (WPFMC) developed and implemented the Pelagics FMP in 1987. In response to the rapid influx of East Coast longliners into the Hawaiian-based fishery during the late 1980s, Amendment 4 to the Pelagics FMP extended previous emergency interim rules (56 FR 14866; 56 FR 28116) that were implemented to arrest the rapid growth of the longline fishery. This

1991 amendment established a moratorium on new participants from entering the Hawaiian longline fishery. In 1994, Amendment 7 to this FMP replaced the moratorium with a limited entry program for the Hawaiian longline fishery (59 FR 26979), limiting the fishery to 167 vessels.

By 1995, only six longline vessels made a high seas trip from a California port, although 36 vessels made at least one longline landing containing HMS (Vojkovich and Barsky 1998; table 1–1). The group of vessels that came to California from the Gulf of Mexico in 1993 and 1994 left the California-based fishery. This group of vessels either returned to the Gulf of Mexico fishery, or acquired Hawaiian longline permits in order to have fishery options for the months of February through September, when fishing within range of California ports drops off substantially. Many of the vessels that had participated in the California fishery had discovered productive swordfish fishing grounds in the fall and winter that were further east than the Hawaiian fleet usually operated. As the California fleet migrated to Hawaii, these vessels continued to move east later in the year, and operated out of California ports when these ports became closer than Hawaiian ports. These vessels fished from California until about January, when the pattern of fishing moved to the west, and operating from Hawaii became more convenient. Consequently, beginning in the latter part of 1995, a number of vessels from the Hawaiian fleet began a pattern of fishing operations that moved to California in the fall and winter and then back to Hawaii in the spring and summer.

In August 2000, as the result of the case *Center for Marine Conservation vs. NMFS*, a Federal district court issued an order directing NMFS to complete an Environmental Impact Statement (EIS) to assess the environmental impacts of fishing activities conducted under the Pelagics FMP by April 1, 2001, and ordered restrictions and closures over millions of square miles of the Hawaiian longline fishery's usual fishing grounds. These court-ordered closures effectively eliminated the Hawaii swordfish fishery. As a result, some Hawaiian longline permit holders de-registered their vessels from the permit, and proceeded to fish from California ports, as was their custom during this time of year.

NMFS completed the EIS in March, 2001, and, consistent with a biological opinion (BO) that was issued at the same time, NMFS implemented measures for the protection of endangered and threatened sea turtles. Such measures included a prohibition against targeting swordfish north of the equator by Hawaiian longline vessels, and prohibited longline fishing by Hawaiian longline vessels in waters south of the Hawaiian Islands from 15° N. latitude to the equator, and from 145° W. to 180° W. longitude during the months of April and May. This decision was challenged in a lawsuit filed by the Hawaiian Longline Association. The Court vacated the existing regulations as of April 1, 2004, with the expectation that a new regulatory regime would be implemented by that date. As a result, the WPFMC developed Regulatory Amendment 3, which was subject to a Section 7 consultation and accompanying BO. The amendment requires vessels fishing under the WPFMC's Pelagics FMP and targeting swordfish to use mackerel-type bait and 18/0 size circle hooks, among other bycatch reduction mitigation measures. (This type of hook and bait has been demonstrated to reduce incidental take of sea turtles.) The amendment also set an effort limit of 2,120 sets per year and hard caps on takes of loggerhead and leatherback sea turtles, which if reached, would close the fishery for the year. The regulations became effective April 2, 2004 (69 FR 17329) and substantially increased opportunity in the fishery. At almost the same time, April 7, 2004, (69 FR 18444) the final rule for implementing the HMS FMP was implemented (effective date, May 7, 2004), which included the regulations described above, effectively closing the West Coast high seas longline fishery for swordfish. As seen in table 1–1, the number of high seas longline vessels making HMS landings on the West Coast increased substantially in the years 1997–2004. Some of these increases were likely due to the regulatory changes discussed here.

This history of West Coast longline landings of fish caught outside the EEZ reflects this history of participation. Swordfish landings were generally a negligible share of all West Coast pelagic longline landings of HMS species up until 1991, from which time they steadily increased to a peak in 2000 of

1,885 metric tons (mt), which represented 90 percent of overall West Coast HMS pelagic longline landings of 2,084 mt (see table 1–2). Swordfish landings have declined since that time with significant reductions in 2004 and 2005. (The few vessels fishing with longline gear cannot have their 2005 landings reported since Federal regulations prohibit reporting fishery statistics for three or fewer vessels due to confidentiality reasons). Currently, the EFP applicant is the only active longline participant on the West Coast targeting tuna outside the EEZ. Vessels permitted under the WPFMC’s FMP and operating under their management regime may land swordfish on the West Coast.

Other marketable species in the longline catch include opah (*Lampris regius*), mahi mahi (*Coryphaena hippurus*), and escolar (*Lepidocybium flavobrunneum*). Relatively few sharks, in proportion to those caught, have been marketed from the high seas fishery. The major shark bycatch is blue shark, which is discarded for economic reasons because the flesh quickly deteriorates after death. Other incidental catch of concern includes striped marlin, turtles, seabirds, and marine mammals.

Longline fishing gear consists of a main line strung horizontally across up to 100 km of ocean, supported at regular intervals by vertical float lines connected to surface floats. Descending from the main line are branch lines, each ending in a single, baited hook. The main line droops in a curve from one float line to the next and usually bears some 2–25 branch lines between floats. Fishing depth is determined by the length of the floatlines and branchlines, and the amount of sag in the main line between floats (Boggs and Ito 1993). The depth of hooks affects their efficiency at catching different species (Hanamoto 1976, 1987; Suzuki, *et al.* 1977; Boggs 1992). When targeting swordfish, vessels typically deploy 24 to 72 km of 600 to 1,200 pound test monofilament mainline per set. Mainlines are rigged with 22 m branch lines at approximately 61 m intervals and buoyed every 1.6 km. Between 800 and 1,300 hooks are deployed per set. Large squid (*Illex spp.*) are a primary bait species with various colored light sticks used to attract the target species to the bait. The mainline is deployed from 4 to 7 hours and left to drift (unattached) for 7 to 10 hours with radio beacons attached to facilitate gear recovery. Retrieval typically requires seven to 10 hours depending on length of mainline and number of hooks deployed. Fishing occurs primarily during the night when more swordfish are available in surface waters. Generally, longline gear targeting tuna is set in the morning at depths below 100 m, and hauled in the evening. Longline gear targeting swordfish is set at sunset at depths less than 100 m, and hauled at sunrise. A typical longliner carries a crew of six, including the captain, although some of the smaller vessels operate with a four-man crew. Fishing trips last around three weeks. Most vessels do not have built-in refrigeration equipment, limiting their trip length. The fish are iced and sold as “fresh.” As discussed in chapter 2, a variety of conditions would be attached to fishing under the EFP in order to minimize take of protected species. As a result, fishing methods would differ somewhat from what is described here.

As previously noted, the use of large circle hooks and mackerel or mackerel-type bait has proven to be successful by increasing the post-hooking survivorship of sea turtles captured and released in domestic and international pelagic longline fisheries. Developments (2006–2007) in scientific research on the use of modified fishing gear to reduce longline bycatch of sea turtles WCPFC-SC3-EB SWG/WP-7 (Boggs and Swimmer 2007). At present, NMFS is encouraging international regional fisheries management organizations to adopt the following measures as means to reduce both sea turtle-fisheries interaction rates as well as injuries caused by fishing gear, thereby increasing survivorship of turtles after their release:

- 1) Replacing J hooks and tuna hooks with circle hooks reduces the deep ingestion of hooks by sea turtle species that tend to bite baited hooks (e.g. hard shell sea turtles).
- 2) In fisheries with bycatch of large (45–65 cm carapace length) loggerhead turtles (*Caretta caretta*) or leatherback turtles (*Dermochelys coriacea*), using large sizes of circle hooks (i.e., wider than 4.9 cm minimum width, e.g. size 18/0) can substantially reduce the bycatch of both species. It appears that larger hook size reduces capture rates of turtles that bite baited hooks (hard shell turtles), and

that circle hook shape helps prevent turtles that seldom bite (e.g. leatherbacks) from being snagged and subsequently entangled.

- 3) In fisheries with bycatch of smaller turtles, using smaller sizes (e.g. size 16/0) of circle hooks can reduce capture rates of sea turtles when the circle hooks replace other hook styles with smaller widths. Circle hooks tend to be much wider than other hook styles with similar length and gape.
- 4) Using fish for bait instead of squid can reduce bycatch of both leatherback and hard shell sea turtles. Use of fish bait is especially valuable in offsetting the potential loss of swordfish from use of circle hooks.

Longline-caught fish are sold to wholesale fish dealers. Local California fisheries, distant offshore fisheries, and imports from Hawaii, Chile, and Taiwan all influence the ex-vessel price paid to local longline fishermen for swordfish. Swordfish are often graded by size and quality and the price is adjusted accordingly.

Between 1989 and 2005, the U.S. annual demand for swordfish<sup>2</sup> ranged from 10,948 mt to 23,114 mt, averaging 16,556 mt. Imports have recently comprised the majority of annual U.S. demand for swordfish. Imports increased markedly beginning in 1997 with total demand peaking in 1998, when imports accounted for 70 percent of the total (table 3–16). In 2005, U.S. imports of swordfish were 10,187 mt, valued at about \$77 million. Singapore, Panama, Canada, and Chile were the dominant suppliers of imports.

Since 1991, Pacific landings (West Coast and Hawaii) have generally accounted for between half and three-quarters of U.S. catch, or 10 to 47 percent of annual demand including imports (table 3–17). During this period, U.S. landings averaged 6,444 mt (about 39 percent of demand) and imports averaged 10,111 mt (61 percent). Landings of swordfish in the United States have shown a general pattern of decline from the early 1990s through the early 2000s, with landings in 2005 of 3,039 mt at only 28 percent of the record landings of 10,851 mt in 1993. In contrast, the share of U.S. swordfish demand supplied by imports increased from 35 percent in 1993 to 77 percent of the total in 2005. Over the entire period from 1989 through 2005, imports increased from rough parity with U.S. landings early in the period to over three times domestic landings in recent years.

## **1.5 Council Decision-making and the Scoping Process**

Scoping is “an early and open process for determining the scope of issues to be addressed and for identifying significant issues related to a proposed action” (40 CFR 1501.7). The scoping process described in NEPA regulations emphasizes public involvement, prioritization of issues so that the impact analysis may focus on potentially significant impacts, and planning the impact analysis. The Council, as much as it is an organization, is a process for coordinating involvement of the public and interested State and Federal agencies in decision making related to Federal fishery management. As such, it serves as an effective scoping mechanism. All Council meetings, and meetings of its various committees, are open to the public and opportunity for oral and written comment on issues brought before these bodies is provided.

An application to grant the EFP was originally submitted to the Council in November 2005 by U.S. West Coast HMS fishermen Mr. Pete Dupuy. At their March 2006 meeting, the Council gave preliminary approval for further consideration of the application. At a November 2–3, 2006, joint meeting of the Council’s HMS Management Team (HMSMT), composed of State and Federal fishery managers, and its HMS Advisory Subpanel (HMSAS), with representation from different fishery sectors and user groups, a range of alternatives for terms and conditions attached to the EFP was discussed and refined. These

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<sup>2</sup> Demand is defined for this discussion as the sum of a year’s domestic catches and imports.

alternatives were adopted by the Council at their November 12–17, 2006, meeting. The Council chose a preferred alternative at their April 1–6, 2007, meeting in Seattle, Washington, based in part on information contained in this EA. Subsequent to the Council’s recommendation at the April meeting, further modifications to the preferred alternative were made based on collaborative input among the applicant, NMFS, Council staff, and advisory bodies to further refine and enhance the conservation measures being proposed. As the modifications were more conservative in nature (e.g., reducing the size of the proposed action area), they were appended to the preferred alternative in lieu of creating a new alternative.

## 1.6 Determining the Scope of the Analysis

Staff began work on this EA by assessing the alternatives in order to identify likely environmental impacts and narrow the scope of the present analysis to the significant issues to be analyzed in depth and to eliminate from detailed study the issues which are not significant (40 CFR 1501.7). They used 16 factors enumerated in NOAA NEPA guidance (NAO 216-6) §6.01<sup>3</sup>, which reproduces the factors defining “significant” listed at 40 CFR 1508.27, and §6.02, specific guidance on fishery management actions, in order to screen for potentially significant impacts and determine the scope of the analysis. The §6.02 criteria are listed first below and generally focus on components of the human environment potentially affected by a fishery management action. The §6.01 criteria are related to the intensity—or severity—of the impact, which were considered in the context of the environmental components listed in §6.02.

These factors can be used to determine whether a finding of no significant impact can be made or whether it is necessary to prepare an EIS to evaluate significant impacts in more detail. This EA provides the information and analysis on which to determine the appropriateness of a Finding of No Significant Impact (FONSI). For each factor listed below a brief discussion follows, indicating in general terms the types of effects that may be reasonably expected, and an assessment of whether the potential effects are of sufficient magnitude or concern to justify analysis in this EA. Impacts evaluated in detail in this EA are summarized in section 4.7.

*1-2) Can the proposed action be reasonably expected to jeopardize the sustainability of any target or non-target species that may be affected by the action?*

Fishing mortality by the single vessel that would be authorized to fish in 2007 represents a very minor proportion of total fishing mortality on target and non-target finfish species. Swordfish catches by all vessels in the Eastern Pacific Ocean (EPO) during the years 2001-2005 were 13,000–20,000 mt annually (PFMC 2006; IATTC 2006). The U.S. West Coast catch has averaged 1,500 mt over the same period, while according to the EFP application, catches under this EFP would be 7–18 mt (15,000–40,000 lb).<sup>4</sup> Bycatch of non-target species (which is likely to be principally blue sharks) would also constitute a minor component of the larger Pacific-wide catches. The additional catch of target and non-target species that would occur under the EFP would not jeopardize their sustainability. Summary impacts of effects of the proposed alternatives on target and non-target stocks are presented in chapter 4 of the EA.

If fishing under the EFP is conducted it could form the basis for future evaluations, which could occur under conditions of additional EFPs until sufficient information had been gathered by NMFS to determine whether a regulatory change is justified. Any future fishing activities of this nature would be subject to additional rigorous environmental review to evaluate potential effects. Therefore, it is reasonable to

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<sup>3</sup> [http://www.corporateservices.noaa.gov/~ames/NAOs/Chap\\_216/naos\\_216\\_6.html#section\\_6](http://www.corporateservices.noaa.gov/~ames/NAOs/Chap_216/naos_216_6.html#section_6)

<sup>4</sup> However, distinct stocks are recognized south and north of the equator in the EPO. Catches north of the equator account for roughly one third of the EPO total.

conclude that granting the EFP for 2007 for a single vessel with explicit effort controls and protected species catch caps, would not have significant effects on target or non-target stocks. In order to inform the public and decision makers on the likely effects of the EFP on finfish, this EA includes an evaluation of such effects.

*3) Can the proposed action be reasonably expected to cause substantial damage to the ocean and coastal habitats and/or essential fish habitat (EFH) as defined under the Magnuson-Stevens Act (MSA) and identified in FMPs?*

Pelagic longline fishing operations deploy fishing gear in open water between the surface and bottom of the ocean. No fishing would be allowed within 40 nmi of the coast. Environmental safeguards are built into the EFP alternatives to reduce the risk of harm to populations of protected species which migrate across the boundary between coastal and EEZ habitats. For these reasons, it is unlikely that the proposed action would cause substantial damage to shared protected species stocks, habitats or EFH. A detailed assessment of the potential impacts of the three action alternatives on finfish, protected species and seabirds can be found in sections 4.3, 4.4 and 4.5 of this EA.

*4) Can the proposed action be reasonably expected to have a substantial adverse impact on public health or safety?*

The proposed action involves one fishing vessel fishing in open waters off California and Oregon. There are no public health implications involved. Since substantial adverse impacts on public health or safety are not expected, they are not further evaluated in this EA.

*5) Can the proposed action be reasonably expected to adversely affect endangered or threatened species, marine mammals, or critical habitat of these species?*

Longline gear is known to incidentally catch and entangle threatened and endangered marine mammals, sea turtles, and seabirds. This EA evaluates impacts to ESA-listed species and their designated critical habitat, and marine mammals, which are protected under the MMPA. A detailed assessment of the potential impacts of the three action alternatives on finfish, protected species and seabirds can be found in sections 4.3, 4.4 and 4.5 of this EA.

*6) Can the proposed action be expected to have a substantial impact on biodiversity and ecosystem function within the affected area (e.g., benthic productivity, predator-prey relationships, etc.)?*

The proposed action would potentially have a minor adverse effect on biodiversity and ecosystem function through the removal of target, non-target, and protected species. Fish removals under the proposed action would represent a very minor proportion of the biomass of these species and would have a remote likelihood of adversely affecting biodiversity and ecosystem function. Potential removals of protected species are addressed under question five and impacts evaluated in detail in this EA are summarized in section 4.7.

*7) Are significant social or economic impacts interrelated with significant natural or physical environmental effects?*

Prosecution of the EFP could generate revenue for the applicant over the short term, some of which would have community income impacts in terms of purchase of fuel, supplies and other inputs. A summary of the socioeconomic and environmental impacts of the three action alternatives can be found in section 4.7 of this EA.

8) *To what degree are the effects on the quality of the human environment likely to be highly controversial?*

The Council and NMFS received a large number of written and oral comments opposing the proposed action. Public opposition stems primarily from the perception that longline gear is indiscriminate and would cause an increase in injury and mortality of protected species, particularly endangered leatherback sea turtles. Most of the controversy centered on two main themes: 1) that removal of any Pacific leatherbacks from the population would drive the species closer to extinction; and 2) that longline gear results in high levels of marine mammal and sea turtle mortality. The majority of comments received did not establish a foundation with supporting scientific documentation and/or citations that would contribute to the analysis in the EA. The authors of the EA used the best available scientific information available in developing the analysis of impacts, including species level impacts, of the proposed action. A limited number of public comments were received that did provide substantive suggestions and data sources that were utilized to improve the analysis in the EA.

9) *Can the proposed action be reasonably expected to result in substantial impacts to unique areas, such as historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers or ecologically critical areas?*

This activity would occur in the marine environment and has little or no direct effect on the biophysical component of the terrestrial environment. No unique areas would be affected.

10) *To what degree are the effects on the human environment likely to be highly uncertain or involve unique or unknown risks?*

The risks are neither unique nor unknown; SSL fishing has previously occurred in the high seas area adjacent to the West Coast EEZ, out of Hawaii, and in the Atlantic, providing detailed and voluminous information on possible catch and bycatch of finfish and take of protected species. Actual catch or take rates within the EEZ may differ from what has been experienced outside the EEZ. Therefore, the risks are to some extent uncertain in terms of their intensity, although mitigation measures (such as limits on fishing effort and caps on protected species takes) would be expected to both reduce impacts and reduce uncertainty about their intensity. In addition, the EFP terms and conditions would include 100 percent observer coverage for the duration of the EFP, thereby quantifying the exact level of bycatch encountered.

11) *Is the proposed action related to other actions with individually insignificant, but cumulatively significant impacts?*

The EA describes past and present activities that contribute to the kinds of impacts identified for the proposed action (fishing mortality, protected species takes). Reasonably foreseeable future actions are discussed. These are considered together to arrive at the cumulative effects. Section 3.1 discusses this analytical framework.

12) *Is the proposed action likely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural or historical resources?*

The proposed action would not affect historic places or result in the loss or destruction of significant scientific, cultural, or historical resources. As noted above, the primary adverse impact of the proposed action would be the removal of target and non-target finfish species and the incidental take of protected species. To the extent these may be construed as scientific or cultural resources, the proposed action is not expected to result in a significant level of loss or destruction.

*13) Can the proposed action be reasonably expected to result in the introduction or spread of a non-indigenous species?*

The proposed action does not involve the transport of non-indigenous species. The fishing vessel participating in the proposed action is located in a local port and would not increase the risk of introduction through ballast water or hull fouling.

*14) Is the proposed action likely to establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration?*

The EFP is intended to gather information to preliminarily assess the commercial viability of new and innovative SSL fishing gear to target swordfish in the West Coast EEZ. This EA only covers an EFP for the 2007 fishing year. If the EFP is conducted and determined successful, it could provide information to form the design and development of future EFP(s), with a larger number of vessels participating as part of an experimental sampling design approach (e.g., control groups, variables catered for) with the purpose of gathering enough information to determine whether a regulatory change is justified. Any future EFP proposals of this nature would be subject to review and recommendation for approval/disapproval by the Pacific Council following guidelines established in the Council's Operating Procedure #20 for HMS EFPs. Any potential future action would be evaluated in an EA or EIS with separate decisions taken on proceeding at each step. For these reasons the action does not establish a precedent for future actions with significant effects nor does it represent a decision in principal about a future consideration.

*15) Can the proposed action be reasonably expected to threaten a violation of Federal, State, or local law requirements imposed for the protection of the environment?*

Chapter 6 describes potentially applicable cross-cutting mandates and the proposed action would be implemented to comply with these laws and executive orders for the protection of the environment. The proposed action will not threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment. Per requirements codified at Section 307(c)(3)(a) of the Coastal Zone Management Act, the EFP applicant will be submitting documentation, including this EA, at the California Coastal Commission's November 14-15, 2007, meeting to request a Consistency Certification (15 C.F.R. §D) for the proposed EFP.

*16) Can the proposed action be reasonably expected to result in beneficial impacts, not otherwise identified and described above?*

The proposed action may result in short-term beneficial impacts for West Coast processors/suppliers in the way of temporarily increased sales (e.g., fish, ice, bait, supplies), for consumers by way of access to higher-quality fresh, U.S. caught product, and for fisheries managers by way of access to pertinent fishery-dependent data that will assist in guiding future management decisions in an existing data-poor fishery.

**Table 1-1. Number of vessels with West Coast commercial HMS landings with pelagic longline gear identified on the landing tickets, 1981-2005.**

<b>Year</b>	<b>Number of Vessels</b>
1981	27
1982	28
1983	19
1984	14
1985	12
1986	6
1987	8
1988	14
1989	4
1990	5
1991	13
1992	20
1993	12
1994	44
1995	36
1996	29
1997	52
1998	70
1999	53
2000	70
2001	56
2002	36
2003	41
2004	40
2005	9

Source: PacFIN, extracted March 8, 2007. Additional processing info: Only fish tickets where at least 1 lb of any highly migratory species (except striped marlin) was landed for pelagic longline gears were used. Aquaculture fish ticket/fish ticket line information is excluded.

Table 1-2. Commercial landings (round mt) in the West Coast pelagic longline fishery, 1981-2005. (Source: Table 4-13 in the 2006 HMS SAFE).

Year	Sword-fish	Sharks					Tunas			Dorado	Ground-fish	Coastal Pelagics	Crab	Salmon	Other	Total
		Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue	Albacore	Other								
1981	<0.5				19	72	25	1		2	<0.5			1	120	
1982	<0.5	1			6	18	42	1	<0.5	<0.5	<0.5			2	70	
1983	<0.5	<0.5			1	2	6	3	<0.5	<0.5	<0.5			7	19	
1984	12	3		<0.5	2		2	2	3	2	<0.5			4	30	
1985	<0.5	1			<0.5	<0.5	<0.5			10				1	12	
1986		2			1	<0.5				6	<0.5			4	13	
1987		<0.5			3	<0.5	<0.5			43				3	49	
1988	<0.5	1			152	1		<0.5		27	<0.5			5	186	
1989					5	1				<0.5					5	
1990		<0.5			15	4	<0.5	1		<0.5	<0.5			<0.5	20	
1991	27	<0.5			23	<0.5	<0.5	2	<0.5	3				18	73	
1992	63	2		<0.5	2	<0.5	1	<0.5		21	<0.5			2	91	
1993	27	<0.5			1	<0.5	<0.5	5	1	1	1			2	38	
1994	722	19		3	20	12	49	56	32	4	<0.5			15	932	
1995	271	11		1	7	5	4	58	5	8	2			4	376	
1996	346	2			5	<0.5	3	68	9	6	<0.5			5	444	
1997	663	4		2	3	<0.5	6	83	1	32	<0.5			2	796	
1998	418	3			4	<0.5	9	96	1	9	1			20	561	
1999	1,325	5			7		66	161	17	1				4	1,586	
2000	1,885	5	<0.5	<0.5	6	<0.5	22	99	41	12		3		11	2,084	
2001	1,749	20		1	7	2	22	73	15	7	<0.5			53	1,949	
2002	1,320	2			3	41	1	12	<0.5	12	<0.5			2	1,393	
2003	1,810	<0.5			3		2	29	1	4				4	1,853	
2004	898	1		<0.5	2		2	31	1	13	<0.5			3	951	
2005	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	

\*Not reported due to data confidentiality requirements.

Source: PacFIN, extracted August 3, 2006.

Additional processing info:

Only fish tickets where at least 1 lb of any highly migratory species (except striped marlin) was landed for the pelagic longline fishery were used.

Landings in lbs are converted to round weight in mt by multiplying the landed weights by the conversion factors in each fish ticket line and then dividing by 2204.6.

Aquaculture fish ticket/fish ticket line info is excluded.



## 2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

Four alternatives are evaluated in this EA, including no action. The Council identified a preferred alternative (alternative 4) at their April 1–6, 2007, meeting in Seattle, Washington. The Council's preferred alternative represents a recommendation to NMFS on issuance of the EFP. An additional conservation measure was added to the preferred alternative after the Council's recommendation was sent to NMFS. This measure, which would further restrict the proposed action area, was developed in a collaborative process between the applicant and NMFS, and will provide positive benefits in regards to mitigating the impacts of the alternative.

### 2.1 Alternative 1 (No Action)

Under alternative 1 the EFP would not be granted and no longline fishing would occur in the West Coast EEZ. All current regulations applicable to longline fishing under the HMS FMP would continue to apply.

### 2.2 Alternative 2

Under alternative 2 the EFP would be approved with the terms and conditions proposed by the applicant. (See appendix A for the proposal submitted by the applicant.) These terms and conditions are as follows:

1. 100 percent observer coverage, paid for by NMFS
2. All observers shall carry satellite phones provided by NMFS and immediately inform NMFS of any marine mammal, sea turtle, or seabird capture or interaction
3. A single vessel participating
4. Maximum of 14 sets per trip
5. Maximum of four trips between September and December (up to 56 total sets for the entire duration of the proposed EFP)
6. Fishing is only authorized within the West Coast EEZ and no SSL gear shall cross this boundary
7. No fishing within the Southern California Bight as defined by the applicant. (See definition below.)
8. No fishing within 30 nmi of the coastline (see figure 2–2)
9. Utilizing shallow-set longline gear configuration:
  - a. 50–100 km mainline
  - b. 18 m floatline
  - c. 24 m branchlines
  - d. 2–8 hooks between floats
  - e. 400–1,200 hooks per set (up to a maximum of 67,200 hooks for the entire duration of the proposed EFP)
  - f. Set fishing gear so hooks are at a depth of 40–45 meters below the surface
10. Use 18/0 circle hooks with a 10 degree offset to fish for swordfish (as described at 50 CFR 665.33(f)).
11. Use mackerel or mackerel-type bait (as described at 50 CFR 665.33(g)).
12. Allow the use of light sticks.

#### 2.2.1 Rationale for Terms and Conditions

Under these terms and conditions the EFP would pertain to a single vessel with effort constraints defined in terms of the number of trips and sets allowed. This would allow gathering preliminary information on whether the proposed action is commercially and environmentally viable. With a single vessel participating, NMFS could financially and logistically deploy the necessary observers, which is further simplified by the limit on the number of trips to four. Having an observer on board would allow

independent verification of total catch (including bycatch), protected species take and interactions, and area of operation. The prohibition on operating more than 30 nmi from the mainland coastline and outside of the Southern California Bight (SCB, see below) is intended to reduce gear conflicts with other commercial and recreational fishing vessels. The prohibition could also reduce interactions with protected species to the degree they are more prevalent in coastal areas.

Under these terms and conditions the applicant would use the shallow-set gear incorporating large circle hooks and mackerel or mackerel-type bait to target swordfish. This gear configuration has been demonstrated to dramatically increase the post-hooking survivorship of captured sea turtles. The application states that albacore, bigeye, yellowfin, and northern bluefin tunas may be caught in addition to swordfish. The proposed shallow-set gear configuration includes longer branchlines intended to allow any hooked or entangled sea turtles to reach the surface so they will not drown before the gear is retrieved. Light sticks serve as an attractant during night fishing. Regulations for the pelagic longline fishery managed under the WPFMC's Pelagics FMP (50 CFR 665) allow the use of light sticks for targeting swordfish (shallow setting) although they are prohibited when deep-setting (targeting tunas). The limitation on the type of hooks and bait used are consistent with current Federal regulations applicable to vessels fishing under the WPFMC's Pelagics FMP. Although the EFP would exempt the applicant from the gear restrictions at 660 CFR 712(a), the other provisions of that section (b-e), covering sea turtle take mitigation measures, seabird mitigation measures, use of a vessel monitoring system if required by NMFS, and requirement for the skipper to attend a protected species workshop if so requested, would apply.

Subsequent to Council adoption of the range of alternatives, several changes were made to the description of this alternative in addition to providing the definition of the SCB, below. In general, these changes clarify that the applicant may only use shallow set gear, targeting swordfish. First, the applicant originally proposed a range of 2–25 hooks between floats. The number was narrowed to 2–8 hooks after additional consultation with members of the HMSMT. Second, the applicant had proposed using smaller circle hooks (16/0) with no offset to fish for tunas but subsequently decided against this option. Finally the specification that the gear would be set at 40–45 m was added.

### **2.2.2 Southern California Bight**

The SCB is a region including waters off the coastal areas and the Channel Islands south of Point Conception. The coastline is indented, trending to the southeast providing shelter from northwest winds that prevail during summer months. Circulation patterns and bathymetric complexity contribute to high marine biodiversity within the region. Because of its proximity to major metropolitan areas it also attracts heavy recreational use. Under the EFP terms and conditions fishing would not be allowed in this region. However, this requires delineation of a boundary line that is relatively easy to enforce. The applicant proposes a boundary line that is similar to one described in the 2003 HMS FMP FEIS (PFMC 2003) under Pelagic Longline Fishery Management Measures Alternative 4 (see page 8–31). The description in the FMP is as follows: “Prohibit fishing with longline gear north of Point Conception within 25 nmi of shore and, south of Point Conception, east of a line from Point Conception to the western tip of San Miguel Island, to the northwest tip of San Nicholas Island to the intersection of 118°00'00” W. longitude with the southern boundary of the U.S. EEZ”. The applicant proposed that the intersection with the EEZ boundary be at 118°45'00” W. longitude and that longline fishing would not occur within 30 nmi of the mainland shore. Two other adjustments have been made to the proposed line. First, the intersection of the 30 nmi buffer from the mainland and the line defining the SCB was moved west of a line drawn from Point Conception through the western tip of San Miguel Island so that this intersection occurs at the boundary of the Channel Island National Marine Sanctuary (i.e., Sanctuary waters would be excluded from the fishing area). Second, instead of setting the boundary at the western tip of San Nicholas Island, this waypoint is set at the three nmi State waters boundary off of the island. Figure 2–1 shows the

boundary line in combination with the 30 nmi mainland buffer. The coordinates for this boundary line are as follows:

- 33°57'21" N., 120°31'44" W. – Intersection with 30 nmi mainland buffer
- 33°47'24" N., 120°19'48" W. – Intersection with 40 nmi mainland buffer
- 33°15'00" N., 119°40'00" W. – State waters boundary off western tip of San Nicholas Island
- 31°06'08" N., 118°45'00" W. – Intersection with southern EEZ boundary

Figure 2–2 shows a coastwide perspective of the combined 30 nmi offshore limit and SCB boundary line.

### 2.3 Alternative 3

Under alternative 3 the EFP would be approved with all the terms and conditions listed above under alternative 2, but the following *additional* terms and conditions would also be imposed:

1. Require use of time and depth recorders (TDR) to estimate fishing depth (The number of TDR units deployed per set and per trip would be determined by NMFS in consultation with the applicant.)
2. Gear may not be set until one hour after local sunset and must be fully deployed before local sunrise<sup>5</sup>
3. Prohibit the use of a line shooter for setting the gear
4. Require use of a NMFS-approved dehooking device to maximize finfish (e.g., blue shark) bycatch survivability
5. Establish protected species take caps for marine mammals, sea turtles, seabirds, and prohibited species, such as striped marlin, that may be exposed to and adversely affected by this action

#### 2.3.1 Rationale for Additional Terms and Conditions

These additional terms and conditions are intended to further minimize potential takes of protected species and bycatch of other species of concern. Deployment of TDRs would provide more detailed information on fishing depth and provide additional data related to catch rates and gear interactions with protected species.

The requirement to set the gear at night and is intended to reduce accidental hooking and/or entanglement of seabirds. Seabirds typically get hooked when the line is being deployed. The birds dive for the baited hooks, get hooked, and are dragged underwater and drown. Because seabirds are less active at night, the night setting requirement reduces these interactions.

Sharks are a major component of longline bycatch, especially blue sharks. If handled properly, a large proportion of these animals can be released alive when the gear is retrieved. Use of a NMFS-approved dehooking device would increase bycatch survival.

<sup>5</sup> This measure is based on a condition in the USFWS biological opinion for the HMS FMP with regard to the short-tailed albatross and brown pelican (USFWS 2004), which are endangered species. The way it was originally written when the alternatives were adopted for public review (gear must be completely retrieved by sunrise) was incorrect and would not be feasible for a typical longline set (i.e., it is not possible to set and retrieve the gear in the amount of time between sunset and sunrise). For this reason the measure has been corrected to accurately reflect the condition in the biological opinion. This condition is also consistent with regulations applicable to vessels permitted under the WPFMC's Pelagics FMP, 50 CFR 665.35(a)(4) (Pelagic longline seabird mitigation measures): *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.

Species take caps would establish a limit on protected species takes or bycatch of other animals of concern. If any cap were reached fishing operations would cease pending retrieval of remaining gear in the water at which time fishing under the EFP would be terminated. NMFS would contact all relevant enforcement staff, including NOAA enforcement, the U.S. Coast Guard, and California Department of Fish and Game enforcement, to notify them of the termination of the fishing operations authorized under the EFP. Although recommended cap levels are not presented under this alternative, chapter 4 presents information that the Council used to determine the species and take levels for caps when making their recommendation (choosing the preferred alternative). The caps identified by the Council are analyzed as part of the preferred alternative in this final EA, which supports NMFS's final decision on whether to issue the EFP. Based on an exposure analysis, the following marine mammals are most likely to be affected by the EFP: California sea lion, northern elephant seal, short-beaked common dolphin, Risso's dolphin, and northern right whale dolphin. Other marine mammal species that in the past the Council has identified as of concern are: short-finned pilot whale, sperm whale, humpback whale, fin whale, gray whale, and minke whale. Of sea turtle species the leatherback is the only one for which a cap is likely appropriate, based on population status and the possibility of a take. For striped marlin, California laws and policies have identified this as a recreational-only species (commercial landings are prohibited), a policy which was reinforced under the establishment of the HMS FMP. The Council may wish to propose an incidental catch limit for this species to address concerns raised by the recreational fishing community.

In considering caps it is very important to distinguish between take or catch (some type of encounter with the fishing gear) and actual mortality because mortality rates can be significantly lower than 100 percent, depending on the species and type of encounter (lightly entangled versus a deeply ingested hook for example). A cap based on takes is easier to monitor and enforce, but in arriving at a value for the cap the difference between a take and actual mortality should be considered. For example, if the intent is limit mortality to only one animal for a given species, but the mortality rate is 25 percent, a take cap of four animals could limit mortality to the desired level. Any such computation could be complicated as multiple mortality rates can be assigned depending on the type of encounter. For example, in the biological opinion for the Hawaii SSSL fishery (NMFS 2004) four different mortality rates for sea turtles are referenced for a variety of encounter conditions (including entanglement with the turtle subsequently disentangled, various hook ingestion and subsequent release scenarios, and drowning of the turtle by the gear). For species listed under the ESA the caps are set consistent with the Incidental Take Statement (ITS) in the BO accompanying this action.

As originally adopted, this alternative had two additional conditions: (1) Prohibit the use of small circle hooks; allow only 18/0 circle hooks with a 10 degree offset to fish for swordfish (as described at 50 CFR 660.33(f)), and (2) Require 4–6 hooks between floats. However, with the modifications to alternative 2 discussed above, these conditions are redundant because they are included in alternative 2, and all those conditions are applicable under alternative 3. (The limitation on the number of hooks between the floats is effectively identical to the requirement of 2–8 hooks under alternative 2.) Therefore, those two conditions are not repeated under this alternative.

## **2.4 Alternative 4**

This alternative is essentially equivalent to alternative 3 with the addition of specific caps for certain species of concern and restrictions on the area of operation. It includes all of the terms and conditions under alternative 3 (and thus also under alternative 2). The additional features under the preferred alternative are:

- A catch cap of 12 striped marlin

- A take cap of one short-finned pilot whale (this species is not ESA-listed)
- A take cap of five leatherback turtles , or one leatherback mortality
- A cap of one short-tailed albatross
- No fishing north of 45° N. latitude
- No fishing within 40 nmi of the coastline

The terms and conditions in alternative 2 and alternative 3 that are included in alternative 4 are:

1. 100 percent observer coverage, paid for by NMFS
2. All observers shall carry satellite phones provided by NMFS and immediately inform NMFS of any marine mammal, sea turtle, or seabird capture or interaction
3. A single vessel participating
4. Maximum of 14 sets per trip
5. Maximum of four trips between September and December (up to 56 total sets for the entire duration of the proposed EFP)
6. Fishing is only authorized within the West Coast EEZ and no SSSL gear shall cross this boundary
7. No fishing within the Southern California Bight as defined by the applicant
8. Utilizing shallow-set longline gear configuration:
  - a. 50–100 km mainline
  - b. 18 m floatline
  - c. 24 m branchlines
  - d. 2–8 hooks between floats
  - e. 400–1,200 hooks per set
  - f. Set fishing gear so hooks are at a depth of 40–45 m below the surface
9. Use 18/0 circle hooks with a 10 degree offset to fish for swordfish (as described at 50 CFR 665.33(f))
10. Use mackerel or mackerel-type bait (as described at 50 CFR 665.33(g))
11. Allow the use of light sticks
12. Require use of TDRs to estimate fishing depth (The number of TDR units deployed per set and per trip would be determined by NMFS in consultation with the applicant.)
13. Gear may not be set until one hour after local sunset and must be fully deployed before local sunrise
14. Prohibit the use of a line shooter for setting the gear
15. Require use of a NMFS-approved dehooking device to maximize finfish (e.g., blue shark) bycatch survivability

#### **2.4.1 Rationale for Additional Terms and Conditions**

The cap of 12 striped marlin was chosen by the Council based on a range of 7–12 fish recommended by the HMSAS. The upper bound of this range (12) was derived by taking five percent of the average annual catch of 248 striped marlin for the period 1997–2006. These catch estimates were summarized from private logbooks submitted by members of the three major billfish clubs active in the southern California area and from California commercial passenger fishing vessel (CPFV) logbook data. Given the lack of reliable private boat catch estimates for billfish from the existing State recreational sampling program, the billfish club and CPFV data sets provide the best available approximation of catch for striped marlin. These data sets are further discussed in section 4.3.3. The lower bound of this range (7) is an estimate submitted by members of the HMSAS in consultation with the applicant based upon anticipated areas to be fished and potential encounter rates.

The Council recommended a cap of one short-finned pilot whale, due largely to concerns about the stock's population status reflected in its low PBR. Short-finned pilot whales are not ESA-listed but are subject to the MMPA. Under the MMPA an estimate is made of potential biological removal (PBR), a

level of removals the population can sustain, and maintain or reach its optimal sustainable population. The analysis in this EA (which in draft form was used to choose the preferred alternative) includes both an exposure analysis for marine mammals and a listing of marine mammal species with low PBR values. The analysis within this EA indicates that the take of a short-finned pilot whale is very unlikely in fishing operations under the proposed EFP. Nonetheless, given the stock's low PBR value of 1.2 and current estimated annual average serious injury or mortality from West Coast fisheries at one animal, the Council took a precautionary approach by capping the take of this species. Similarly, the exposure analysis indicates that, although remote, there is some chance that humpback and sperm whales may be encountered in the EFP fishery. However, because of their larger size, the likelihood of entanglement in the gear that would lead to serious injury or mortality is lower than other species of concern. Incidental takes of leatherback sea turtles are anticipated, although takes of loggerhead sea turtles are considered not likely to occur. Thus, based on the ITS prepared as part of the biological opinion, there would be a take cap of five leatherback turtles, or one leatherback mortality, for the proposed action.

The Council decided that for ESA-listed species the take caps should be based on the ITSs that are part of the biological opinion prepared in the ESA Section 7 consultation process. The ITS is an estimate of the number of ESA-listed individuals that are expected to be taken as a result of the proposed action. The consultation process is both an assessment of whether such take would jeopardize the continued existence of these species and an exemption from the take prohibitions in Section 9 and Section 4 of the ESA. NMFS Protected Resources Division has consulted with the Sustainable Fisheries Division for ESA-listed marine species that may be affected by the action.

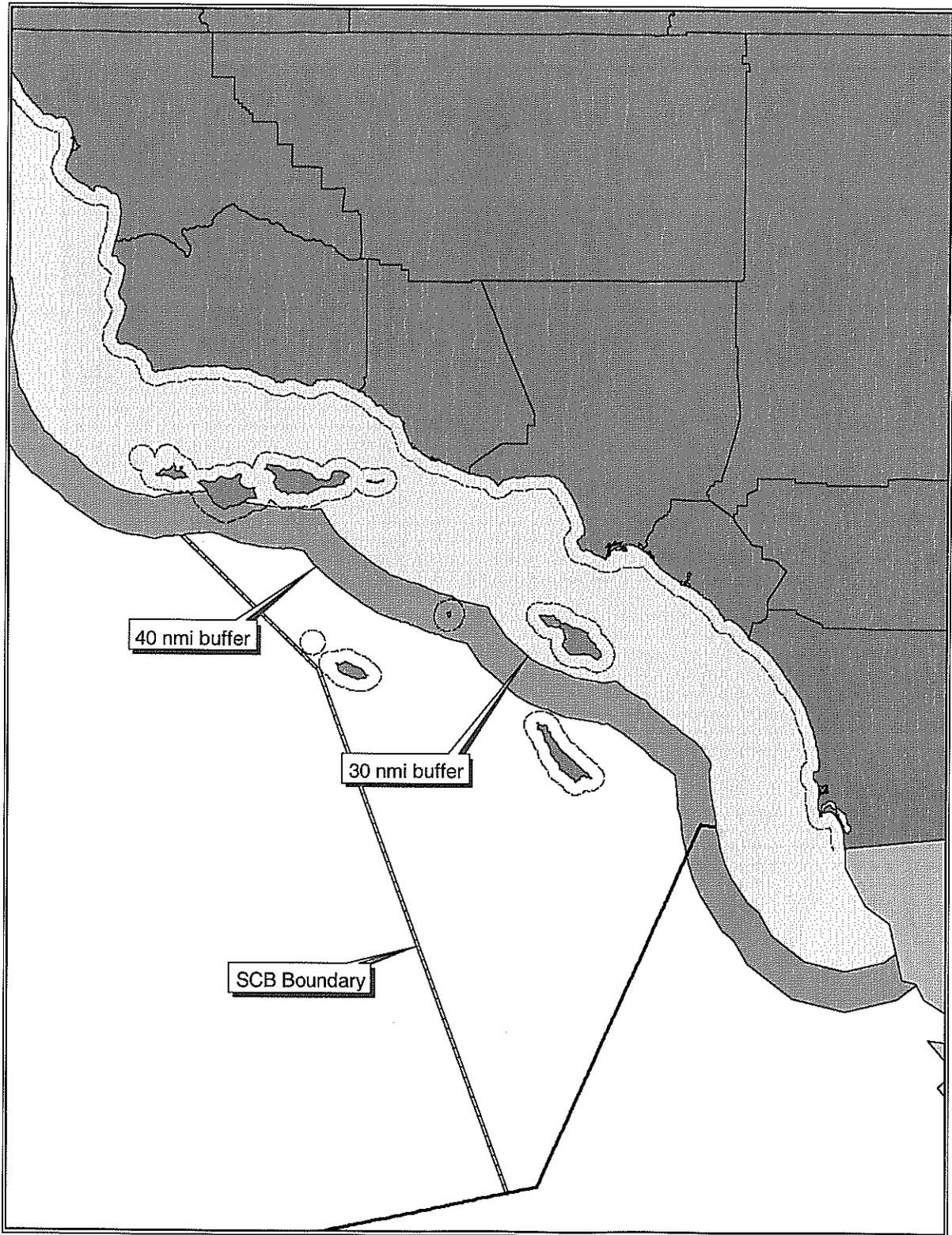
The USFWS is the responsible agency for ESA-listed seabirds. On June 8, 2007, NMFS SWR Sustainable Fisheries Division initiated informal consultation with USFWS on the effects of the proposed action on short-tailed albatross (*Phoebastria albatris*) and brown pelican (*Pelecanus occidentalis*). USFWS has made a determination that a formal consultation and preparation of a biological opinion is not necessary. The USFWS concurs with NMFS's determination that the proposed EFP is not likely to adversely affect ESA-listed seabird species. As a precautionary measure, there would be a cap of one short-tailed albatross for the proposed action.

The prohibition of fishing under this EFP north of 45° N. latitude stems from concerns raised by the Washington Department of Fish and Wildlife representative on the Council. Data from an experimental DGN fishery off of Washington in the late 1980s showed a high incidental take of leatherback sea turtles. Leatherbacks may be attracted to favorable conditions produced by the Columbia River plume, which enhances biological productivity.

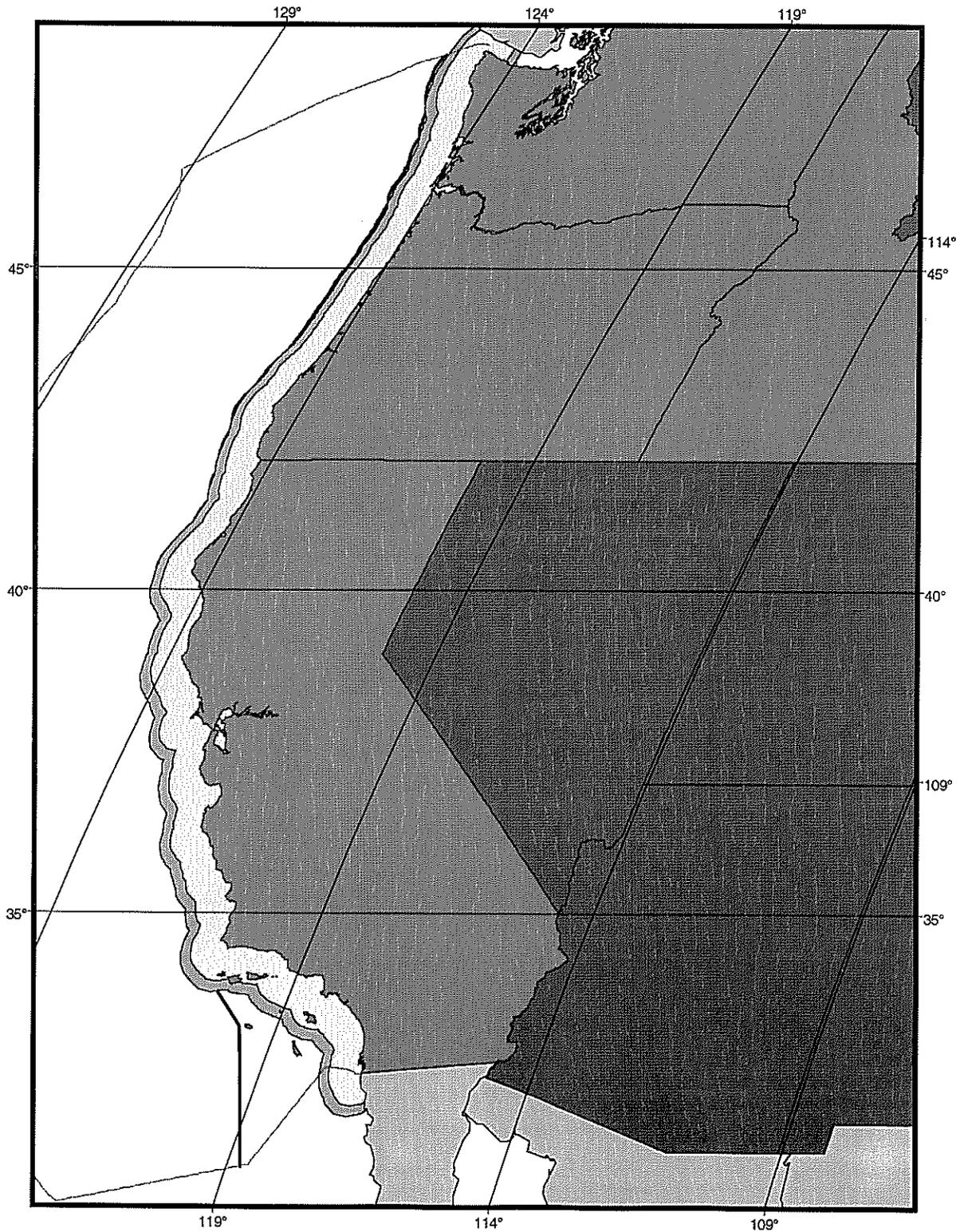
The prohibition of fishing within 40 nmi of the coastline was recommended for inclusion by the applicant as he desires to conduct his fishing operations completely outside the boundaries of any federally-designated National Marine Sanctuary. The prohibition of fishing within 30 nmi of the coastline that is contained in alternative 2 would have allowed a very minor fraction of Sanctuary waters to be included in the proposed action area.

## **2.5 Alternatives Eliminated from Detailed Study**

Given the limited scope of the action (one vessel) no other alternatives were considered. The action alternatives are considered to contain a reasonable range of mitigation measures.



**Figure 2-1. Boundary line for the Southern California Bight. The originally proposed coastwide 30 nmi buffer zone and subsequent 40 nmi recommended by the applicant are also shown.**



**Figure 2-2. Coastwide view of originally proposed 30 nmi buffer zone and applicant proposed 40 nmi buffer zone. The Southern California Bight boundary is also shown (see figure 2-1 for detail)**

## 3.0 AFFECTED ENVIRONMENT

### 3.1 Introduction

#### 3.1.1 Analytical Framework

This chapter and chapter 4 comprise the analytical portion of the EA. Basic guidance on what to analyze and how to analyze it is provided by Council on Environmental Quality (CEQ) regulations at 40 CFR Parts 1500–1508. This analysis considers the effect of the alternatives on different parts of the human environment, which in shorthand we refer to as *environmental components*. Section 1.6 presents a preliminary screening of possible effects, taking into account potential environmental components, such as target and nontarget fish, habitat, etc. Based on that preliminary screening, three environmental components have been identified for further evaluation and discussion in these chapters: target and nontarget finfish; protected species, with particular attention given to certain marine mammal, sea turtle, and seabird species; and the socioeconomic environment, which includes the EFP applicant and suppliers who may gain income from the sale of inputs (bait, fuel, fishing gear, etc.) to the applicant in the course of EFP fishing operations. The analysis can be visualized as a matrix consisting of the alternatives and the environmental components. Each cell in the matrix represents a possible effect that will be evaluated using some form of measurement, a *metric*. As shorthand we will use the term metric to refer to two related elements: the *type* of effect (e.g., change in temperature) and the *unit of measurement* for gauging the effect (e.g., degrees Fahrenheit). More often than not, metrics are more of a conceptual device because we are not able to precisely measure the effect. First, data that may be used to characterize the effect are often limited or unavailable. Second, because the action will occur in the future, there is a need to either project or infer effects based on what has occurred in the past. Third, effects may be part of a larger chain of causation that includes intermediate factors or the influence of other activities. For example, the EFP would affect certain stocks of fish through fishing mortality—catching and harvesting a certain number of fish that interact with the fishing gear. Longline fishing that has occurred in the past—and in this case other areas, since longline fishing is prohibited in the EEZ—can be used to make some inference about the likely amount of fish of a given species that will be caught by fishing under the EFP. Fishing mortality in this case is the metric, but there is some uncertainty about the precise number of fish that will be caught. Furthermore, by itself fishing mortality says little about the effect of the action; it is necessary to consider it in the context of the status of the stock and other sources of fishing mortality contributing to the removal of fish from the stock. For all these reasons, the impact assessment is presented in descriptive form.

CEQ regulations at 40 CFR§1508.25 identify three types of impacts that must be considered in an environmental impact statement (and by extension, an EA): direct, indirect, and cumulative effects. Direct and indirect effects are causally related to the proposed action: they are either directly related to the action (occurring at the same time and place) or are indirect in that there is some intermediate cause-and-effect between the proposed action and the actual effect being evaluated in the analysis (occurring at a distance in time and/or place). The regulations (40 CFR §1508.7) also define a cumulative impact as “the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such actions.” Although the regulations and guidance identify cumulative effects as a separate, third class of impacts, all effects can be viewed as cumulative to the extent they are part of some causal chain that results in an ultimate effect on an environmental component. Using this concept of cumulative effects, this EA frames the analysis in terms of an additive model. To arrive at the final, cumulative effect on an environmental component, the effects in a causal chain are traced out and measured qualitatively or quantitatively, in terms of the metrics that have been identified in this EA. The components in this additive model begin with (1) the baseline condition of the environmental component,

to the degree it can be distinguished, and identifies (2) past and (3) other present actions and their effect on baseline conditions; (4) the effect of the proposed action (considered separately for each of the alternatives), (5) reasonably foreseeable future actions, and (6) any mitigation proposed separately from the alternatives are then added to the baseline to arrive at the cumulative effect. This is then compared to a threshold, if one exists in Federal, State, or local law (1508.27(b)(10)); or in land use plans, policies or controls for the area (1502.16(c)); or can be defined in terms of an inconsistency with such laws, policies or plans (1506.2(d)). If no such threshold can be identified, then the alternatives are evaluated comparatively to identify which one has the least effect, in terms of the metric concerned. (Although this is an additive model, it should be noted that component effects can be “subtractive” to the degree that they are in fact mitigative; conceptually this can be likened to adding a negative number.)

This additive model is applied within the framework of the EA by describing in chapter 3 actions other than those of the proposed action (alternatives) and their effects; this serves as the description of the “affected environment.” The affected environment is thus a summary of current conditions, which results from the interaction between past and present actions and underlying natural phenomena, and is described in terms of the same metrics used in chapter 4. In addition, chapter 3 discusses those factors likely to alter the condition of evaluated environmental components in the future—reasonably foreseeable future actions—in terms of the metrics. This projects the affected environment, or environmental baseline, forward in time by considering the interaction of these foreseeable actions with the natural phenomena. This is also a description of the overall, or cumulative, impact of the no action alternative, which in chapter 4 can be used comparatively to describe how the alternatives would alter future baseline conditions (recognizing that the proposed action and alternatives are also future actions.) Chapter 4 evaluates the impacts of the alternatives. This includes a description of how these alternatives affect the evaluated environmental components, in terms of the metrics, and a summation of these effects in combination with a projected environmental baseline (or conditions under no action); this represents the cumulative impact assessment.

No mitigation measures are proposed separately from any mitigative effect of the alternatives. Therefore, the effect of mitigation measures is not considered further in this EA when evaluating impacts.

### **3.1.2 Data Sources**

The primary data sources utilized in this EA include NMFS Fisheries Observer records, State and Federal HMS Fishing Logbook records, catch-and-effort estimates for HMS species tallied in the Recreational Fisheries Information Network (RecFIN), and commercial landings estimates tallied in the Pacific Fisheries Information Network (PacFIN). A brief description is provided below for each of these data sets.

#### ***3.1.2.1 Hawaii and California-based Shallow-set Longline Fisheries Observer Records***

Catch-and-effort estimates utilized in this EA for target, non-target, and prohibited finfish species are based in part on NMFS Observer Program records compiled for the SSL fishery that has operated since 1994 out of Hawaii (February 1994–December 2001, April 2004–April 2006) and for a limited time out of California (October 2001–February 2004). The objectives of the NMFS Observer Program are to record, among other things, information on protected species and bycatch interactions that are not typically nor accurately reported in the fishing logbooks. The area of fishing operations for the Hawaii-based boats occurred between 16.9° N. and 44.7° N. latitude and 127.3° W. to 179.7° E. longitude. The area of fishing operations for the California-based boats occurred between 28° N. and 43° N. latitude and 165° W. to 135° W. longitude.

Prior to April, 2004, the Hawaii- and California-based SSLL fisheries utilized traditional J-hooks and squid bait that were at the time the industry standard for targeting swordfish with longline gear. From April 2004 to the present, the SSLL fishery has been operating mainly out of Hawaii utilizing large circle hooks and mackerel or mackerel-type bait, which have proven to increase the post-release survivorship for selected bycatch species, including sea turtles and sharks. The post-2004 Hawaii SSLL circle-hook data set is utilized as a proxy in the analysis of the EFP alternatives in regards to finfish impacts given the similar gear and operational characteristics.

### **California/Oregon Swordfish/Thresher Shark Observer Records<sup>6</sup>**

NMFS Southwest Region has operated an at-sea observer program in the DGN fishery since July 1990 to the present, while CDFG has operated a DGN observer program from 1980–1990. The objectives of the NMFS Observer Program are to record, among other things, information on protected species and bycatch interactions that are not typically nor accurately reported in the fishing logbooks. Information regarding DGN fishery interactions with non-target and prohibited species were drawn from Observer Program records for the years 1997–2005, with comparative breakouts for the time series 2001–04 (baseline), and 1997–2005 (reflective of current DGN gear modification regulations in effect). Observer coverage of the DGN fleet targets 20 percent of the annual sets made in the fishery, with close to 100 percent of the net retrieval monitored on observed trips for, among other things, species identification and enumeration. Since 1990, approximately 7,200 DGN sets have been monitored by at-sea observers generating a database containing more than 28,000 records.

### **Pacific Fisheries Information Network<sup>7</sup>**

Total landings of longline harvested target species and commercially-valuable non-target species were obtained from the Pacific Fisheries Information Network database (PacFIN). The PacFIN central database includes fish-ticket and vessel registration data provided by the Oregon and California State fishery agencies. The data sources supply species-composition and catch-by-area proportions developed from port sampling and logbook data systems.

### **Recreational Fisheries Information Network<sup>8</sup>**

Established in 1992, the Recreational Fishery Information Network (RecFIN) is designed to integrate State and Federal marine recreational fishery sampling efforts into a single database to provide important biological, social, and economic data for Pacific coast recreational fishery biologists, managers and anglers.

### **State and Federal HMS Daily Fishing Logbooks**

State HMS logbooks were utilized for DGN, harpoon, and charter recreational fishing vessels. Federal HMS logbooks were utilized for surface hook-and-line (albacore troll and baitboat), purse seine and pelagic longline. The State HMS logbooks have been deemed acceptable by NMFS in meeting the reporting and record-keeping requirements codified in the HMS FMP implementing regulations. Therefore, separate (duplicate) Federal logbooks are not required. The NMFS Southwest Fishery Science Center staff in La Jolla, California, handles the data entry and database management for the HMS logbooks.

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<sup>6</sup> <http://swr.nmfs.noaa.gov/psd/codgftac.htm>

<sup>7</sup> <http://www.psmfc.org/pacfin/>

<sup>8</sup> <http://www.recfin.org/recfin.html>

## **3.2 Climate and Biophysical Factors Contributing to Baseline Effects**

### **3.2.1 West Coast Oceanography**

The West Coast of North America from the Strait of Juan De Fuca to the tip of Baja California is part of an eastern boundary current complex known as the California Current System (Hickey 1988). The U.S. West Coast EEZ encompasses one of the major coastal upwelling areas of the world, where waters provide a nutrient-rich environment and high densities of forage for HMS species, especially from the Columbia River Plume south to the SCB. During summer months northerly winds set up Ekman transport of surface waters offshore causing colder, nutrient rich waters to upwell in nearshore areas, enhancing primary production as nutrients become available in the photic zone. The region is influenced by various currents and water masses, the shifting nature of which affects the occurrence and distribution of HMS at particular times of the year and from year to year. Large-scale currents within this region include the surface-flowing California Current and the Inshore Countercurrent (Davidson Current), and the subsurface California Undercurrent (figure 3-1). The region includes two major river plumes (Columbia River and San Francisco Bay), several smaller estuaries, numerous submarine canyons, and the complex borderland of the SCB with its offshore islands, undersea ridges and deep basins.

Physical oceanographic features of the environment change seasonally and also during periods of large-scale, oceanic regime shifts such as El Niño (see below). The California Current represents an extension of the North Pacific Gyre, which splits upon reaching the North American continental margin at approximately Vancouver Island, forming a northern limb, the Alaska Current, and a southern limb, the California Current. The California Current generally flows southward year round, with strongest flows in spring and summer. Inshore, these flows may be reversed by the seasonal appearance in fall and winter of the subsurface poleward-flowing Inshore Countercurrent. The California Undercurrent primarily intensifies in late spring and summer as a narrow ribbon of high-speed flow which presses northward at depth against the continental slope, generally beneath the equator-ward flowing upper layers (Lynn and Simpson 1987). Coastal upwelling of cold, salty and nutrient-rich water to the surface occurs primarily in spring and summer in California and into early fall off Oregon, driven by prevailing seasonal winds. Upwelling is often most intense near such promontories as Cape Mendocino and Point Conception. During El Niño events, flow in the California Current is anomalously weak, the California Undercurrent is anomalously strong, and the water in the upper 500 m of the water column is anomalously warm (Chelton and Davis 1982).

The SCB differs dramatically from the regions to the north and south. The shelves in this area are generally very narrow (<10 km) and the sea bed offshore is cut by a number of deep (>500m) basins (figure 3-2). The ocean is generally warmer and more protected here than areas to the north, especially inshore of a line roughly drawn from San Miguel Island to San Clemente Island. From Point Conception northward to off Cape Flattery, Washington, the coastline is relatively unprotected from the force of the sea and prevailing northwest winds. In contrast to the SCB, rugged waters and sea state conditions are common north of Point Conception.

### **3.2.2 Oceanic Fronts**

The occurrence and behavior of pelagic species is strongly influenced by the thermal structure of the open ocean environment. Although swordfish, the principal target species in this EFP, occur widely in the Pacific, and tolerate a wide range of water temperature (5-27 degrees C), they concentrate at oceanic fronts. These fronts are areas of steeper temperature and salinity gradient. In the North Pacific two major frontal regions important to swordfish fisheries occur, the subarctic frontal zone (SAFZ) occurring between 40° N. and 43° N. latitude and the subtropical frontal zone (STFZ) occurring between 27° N. and 33° N. latitude. The STFZ occurs variously as a temperature front from late fall to summer and all year

as a salinity front (Bigelow, *et al.* 1999). Within these zones, fronts develop, persist, and shift seasonally in complex patterns (Seki, *et al.* 2002). Seki, *et al.* (2002) identified two prominent semi-permanent fronts within the STFZ, the Subtropical Front (STF) located between 32° N. and 34° N. latitude and the South Subtropical Front (SSTF) located between 28° N. and 30° N. latitude. The STF is identifiable by the 17 degrees C sea surface temperature (SST) isotherm and 34.8 isohaline (line of equal salinity) while the SSTF can be identified by the 20 degrees C isotherm and 35.0 isohaline and 24.8 isopycnal (line of equal density) (Seki, *et al.* 2002). Fronts also affect vertical structure as the thermocline and stability layer shoals to the upper euphotic zone on the cold side of the STF. This structure has an important effect on primary production. Production may be further enhanced by meander-induced upwelling at the front. Enhanced primary production affects system productivity; forage species are concentrated along fronts and account for the concentration of large pelagic species along these fronts. Bigelow, *et al.* (1999) used a Generalized Additive Model (GAM) to examine the relation between fishery performance (swordfish and blue shark CPUE) in the Hawaii longline fishery and spatial, temporal, and oceanographic factors, including indicators of these fronts. Spatial distribution of effort in the Hawaii fishery shows a concentration in the STFZ north of Hawaii and to a lesser extent the SAFZ. Although basic spatio-temporal factors (latitude, time, longitude) were most important in explaining CPUE variance, front indicators (SST and SST frontal energy, a calculation of the change in SST by distance) were intermediate. GAM outputs showed swordfish CPUE was highest in 15 degrees C water and decreased at higher temperatures. Increasing SST frontal energy had a positive effect on swordfish CPUE. Formation of fronts will also be affected by major current systems and near the continental margin by bathymetry. Atlantic longline fisheries concentrate on a shelf-break front where CPUE is higher (Podestá, *et al.* 1993). On the West Coast, the California Current and coastal upwelling affect the formation of fronts.

Figures 3–2 to 3–5 are monthly composite SST plots for September-December 2004 from the NOAA CoastWatch high resolution (1.1 km/pixel) Advanced Very High Resolution Radiometer (AVHRR) data sets for the southern California region (Region L)<sup>9</sup>. The data were processed using the CoastWatch Data Analysis Tool to constrain color steps to 1 degree C increments between 10 and 20 degrees C. Figures 3–6 to 3–9 are low resolution (5 km/pixel) AVHRR plots for the West Coast region (Region Z)<sup>10</sup> processed in the same way. The intent is to give a general idea of seasonal temperature regimes that may occur during the prosecution of the EFP. The literature discussed above suggests that temperatures in the range of 15 to 18 degrees C would indicate areas of swordfish abundance. On the plots this temperature range is indicated by the green-yellow-orange shades. The West Coast plots also show the 200 m and 2,000 m isobaths, which indicate the shelf break and slope. This may be another area of frontal activity.

Etnoyer, *et al.* (2004) identify areas of persistent pelagic habitat by analyzing AVHRR and Miami Multi-channel Sea Surface Temperature (MCSST) data with edge detection algorithms to identify temperature gradients indicative of fronts. Using time series data they also estimated the persistence of such fronts. They identified an area they call the Baja California Frontal System, located off the West Coast of Mexico, as exhibiting the highest concentration of persistent fronts. Other important areas include the North Pacific Transition Zone (the area between the SAFZ and STFZ) north and west of Hawaii, and the Channel Islands pelagic region off of southern California.

Frontal zones are also important to protected species that may be vulnerable to the longline EFP. Polovina, *et al.* (2000) compared the tracks of nine loggerhead turtles equipped with satellite transmitters and satellite derived information on SST (MCSST), chlorophyll (Sea-viewing Wide Field-of-view sensor, SeaWiFS), and geostrophic currents computed from satellite altimetry data (TOPEX/Poseidon). The turtles were initially taken in the Hawaii longline fishery in the STF north of Hawaii. Two groups of turtles could be discriminated, one associated with the 17 degrees C isotherm and the second with the 20

<sup>9</sup> [http://coastwatch.pfel.noaa.gov/sst\\_comp\\_high.html](http://coastwatch.pfel.noaa.gov/sst_comp_high.html)

<sup>10</sup> [http://coastwatch.pfel.noaa.gov/sst\\_comp\\_low.html](http://coastwatch.pfel.noaa.gov/sst_comp_low.html)

degrees C isotherm. These are the STF and SSTF identified by Seki, *et al.* (2002) and discussed above. Etnoyer, *et al.* (2004) link areas of high frontal activity (Baja California Frontal System, Channel Islands) to large pelagics, such as blue whales. They cite satellite telemetry data from four blue whales to show individual whale movements overlapped frontal features or the whales maintained positions between frontal features in the Baja California Frontal System.

Although the large open ocean frontal zones discussed above do not extend to the West Coast, localized frontal systems are set up within the California Current System in response to coastal upwelling and interaction with coastal geometry (Castelao, *et al.* 2006). Fronts develop close to the coast in the spring, particularly south of Cape Blanco, and increase over the summer, extending farther offshore. Etnoyer, *et al.* (2004) show areas where persistent fronts occur along much of the West Coast. Limited data indicate concentrations of leatherback sea turtles associated with the freshwater plume generated by the Columbia River (discussed in section 3.4). The Columbia River plume has regional effects by causing intense mixing that contributes nutrients to surface layers and consequent primary production (Orton and Jay 2005). Leatherback sea turtles may be attracted to the region as prey species are either attracted to or entrained in the plume front.

### **3.2.3 Climate Variability**

Two meso-scale climate phenomena likely affect frontal activity and the distribution of swordfish, other target and non-target finfish, and protected species that may be caught in the longline EFP. The first is El Niño-Southern Oscillation (ENSO), which is characterized by a relaxation of the Indonesian Low and subsequent weakening or reversal of westerly trade winds, causing warm surface waters in the Western Pacific to shift eastward. Although the effects can be global, especially during an intense event, off the West Coast an El Niño event brings warm waters and a weakening of coastal upwelling. Tropical species, such as tuna and billfish are found farther north; for example striped marlin were recorded off the Oregon coast during the strong 1997-99 El Niño event (Field and Ralston 2005). A related condition is termed La Niña and results in inverse conditions (i.e., intensified Indonesian Low, strengthened westerly trade winds, pooling of warm water in the Western Pacific, and relatively cooler water in the Eastern Tropical Pacific and California Current System). Etnoyer, *et al.* (2004) found the Eastern North Pacific was less active in terms of front concentration and persistence during El Niño and relatively more active during La Niña. The current prediction (September 24, 2007) from the National Weather Service Climate Prediction Center<sup>11</sup> indicates mild La Niña conditions are expected to develop over the next few months and continue into early 2008.

Longer period cycles, which are partially identified by an index termed the Pacific Decadal Oscillation (PDO), also have important ecological effects in the California Current System (CCS). Regime shifts indicated by the PDO have a periodicity operating at both a 15-25 and 50-70 year intervals (Schwing 2005). The PDO indicates shifts between warm and cool phases. The warm phase is characterized by warmer temperatures in the Northeast Pacific (including the West Coast) and cooler-than-average sea surface temperatures and lower-than-average sea level air pressure in the Central North Pacific; opposite conditions prevail during cool phases. Rapid phase shifts occurred in 1925, 1947, 1977, and 1989. A regime change has been detected as occurring in 1998. The 1977 shift, from a cool to warm phase in the CCS, produced less productive ocean conditions off the West Coast and more favorable conditions around Alaska. Hare, *et al.* (1999) documented the inverse relationship between salmon production in Alaska and the Pacific Northwest and related this to PDO-influenced ocean conditions. Researchers have identified similar relationships between meso-scale climate regimes and the productivity of other fish populations (see Francis, *et al.* 1998 for a review). However, both the 1989 and 1998 shifts have different characteristics from previous shifts. The 1989 shift did not bring cooler water and enhanced upwelling to

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<sup>11</sup> [http://www.cpc.ncep.noaa.gov/products/analysis\\_monitoring/enso\\_advisory/ensodisc.html](http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.html)

the West Coast. This has apparently resulted in a further decline in the productivity of some fish populations in the Eastern North Pacific (McFarlane, *et al.* 2000). The 1998 shift resulted in dramatic cooling of West Coast waters, but the characteristics of this phase are obscured by the short time series since onset, and the development of El Niños in 1998-99 and 2002-03. The cooling trend was interrupted or may have ended in 2003 (Schwing 2005).

Because the effects are similar, “in-phase” ENSO events (e.g., an El Niño during a PDO warm phase) can result in intensified conditions. However, aside from these phase effects, regime conditions identified by the PDO index, although of much longer duration than ENSO events, are milder. It is also important to note that—while the fundamental causes of PDO are not fully understood—they are known to be different from those driving ENSO events. And while ENSO has its primary effect on the tropical Pacific, with secondary effects in colder regions, the opposite is true of PDO; its primary effects occur in the Eastern North Pacific.

The ecosystem effects of PDO conditions are pervasive. Climate conditions directly affect primary production (phytoplankton abundance), but ecosystem linkages ensure these changes influence the abundance of higher trophic level organisms, including fish populations targeted by fishers (Francis, *et al.* 1998; MacCall 2005).

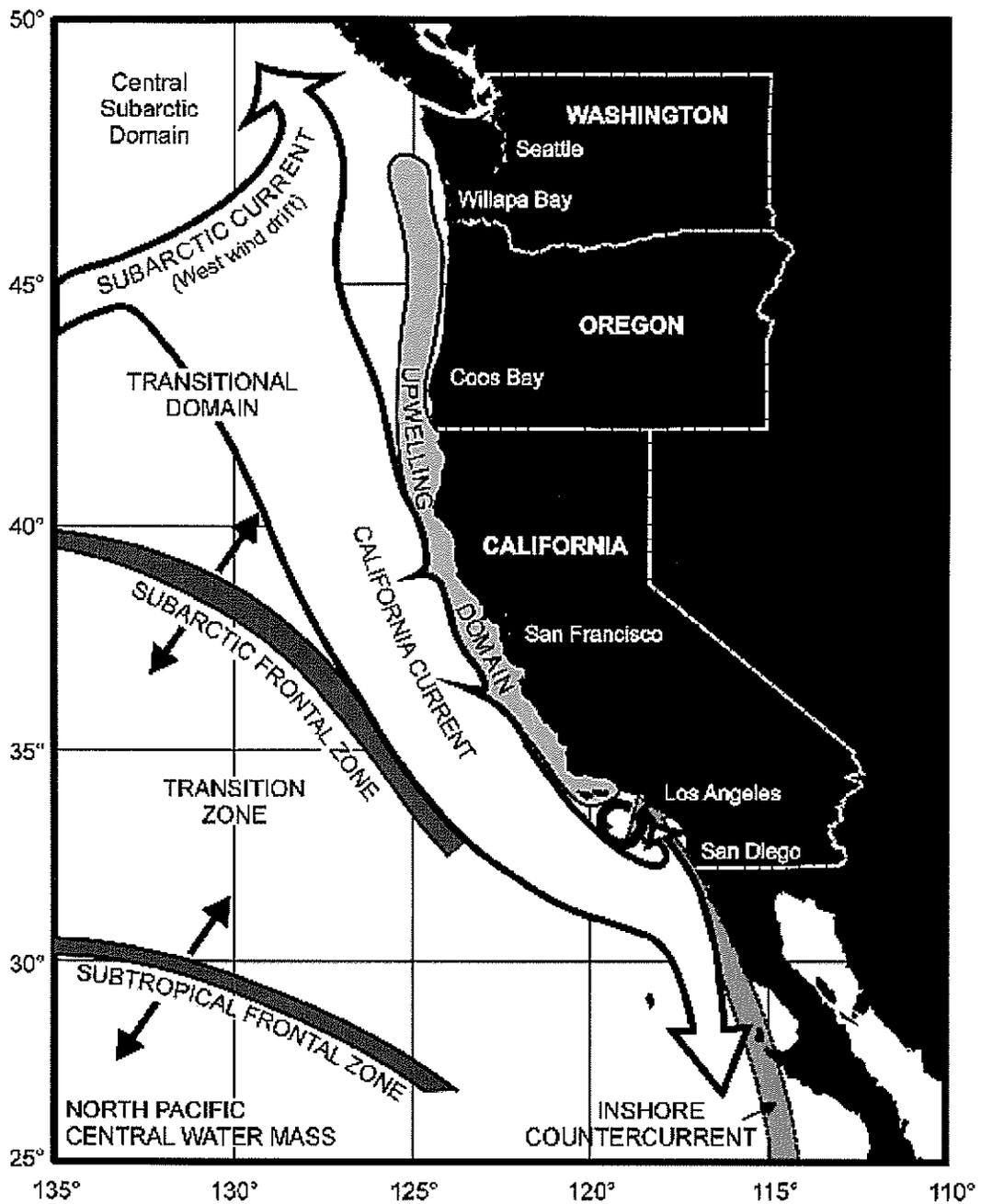


Figure 3-1. Major current and water mass systems that influence essential fish habitat of highly migratory management unit species in the U.S. West Coast EEZ.

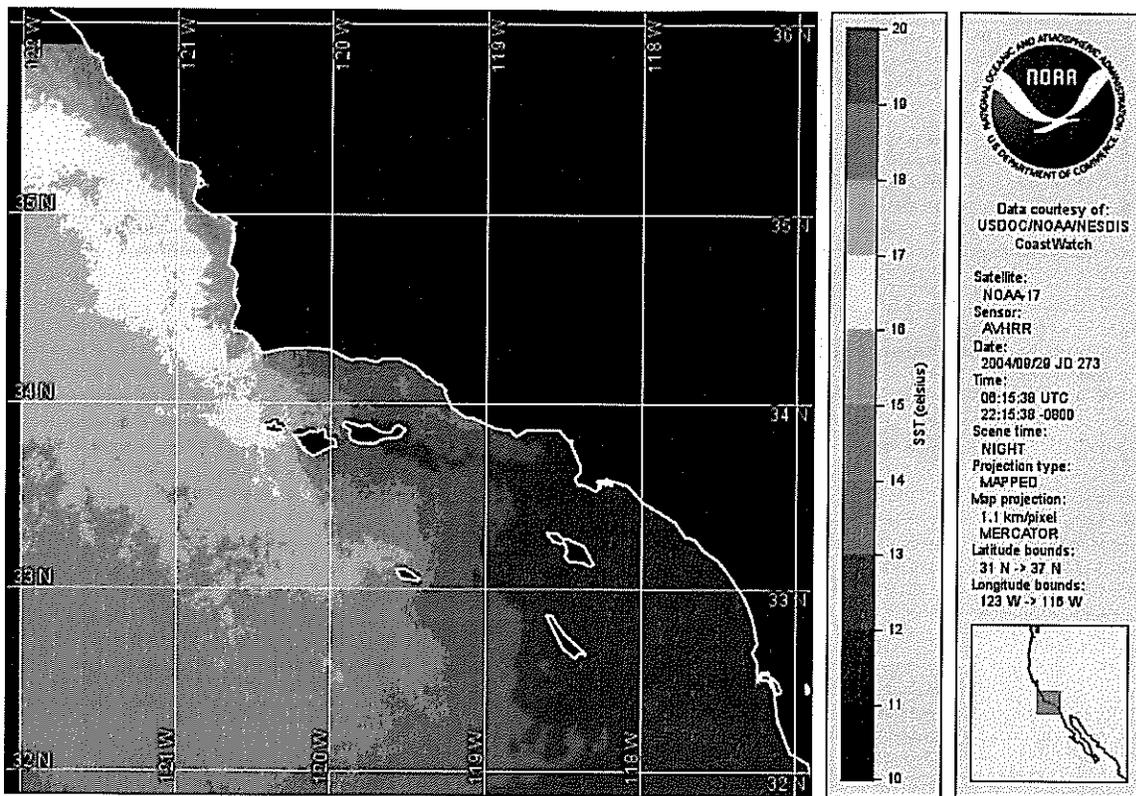


Figure 3-2. Monthly SST composite, southern California region, September 2004.

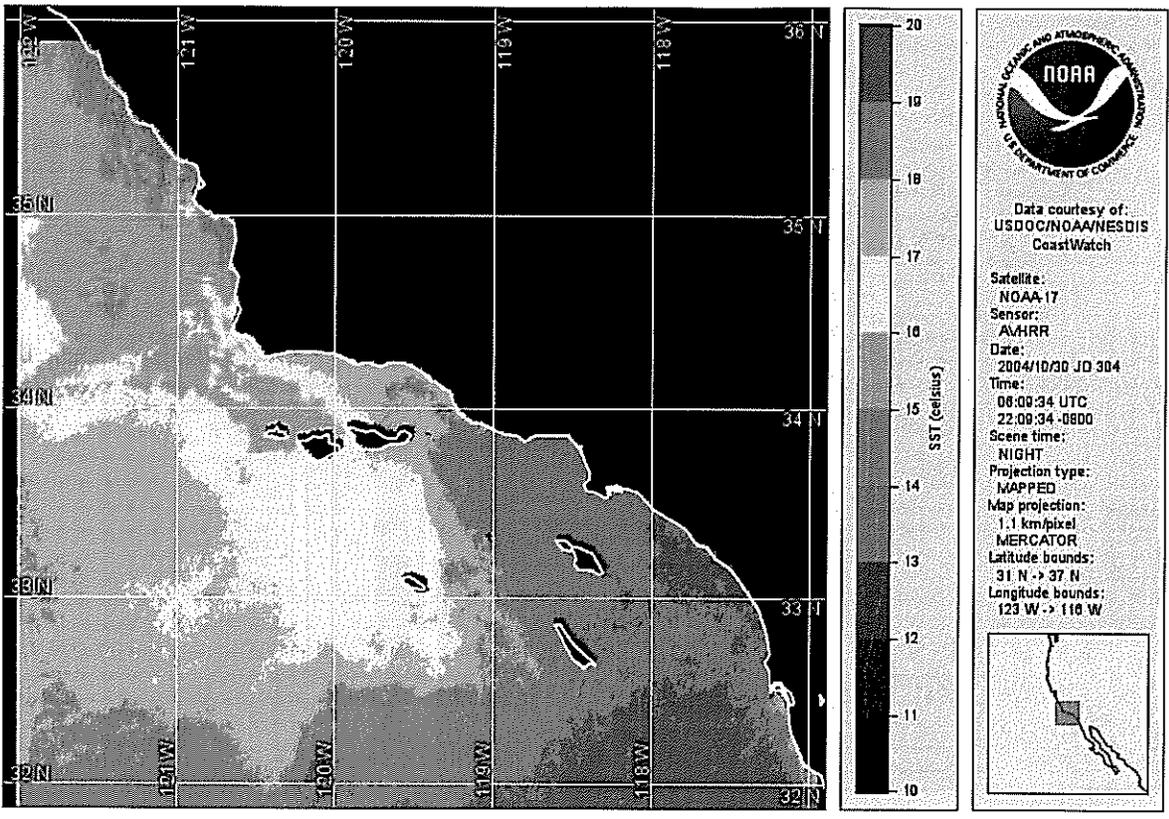


Figure 3-3. Monthly SST composite, southern California region October 2004.

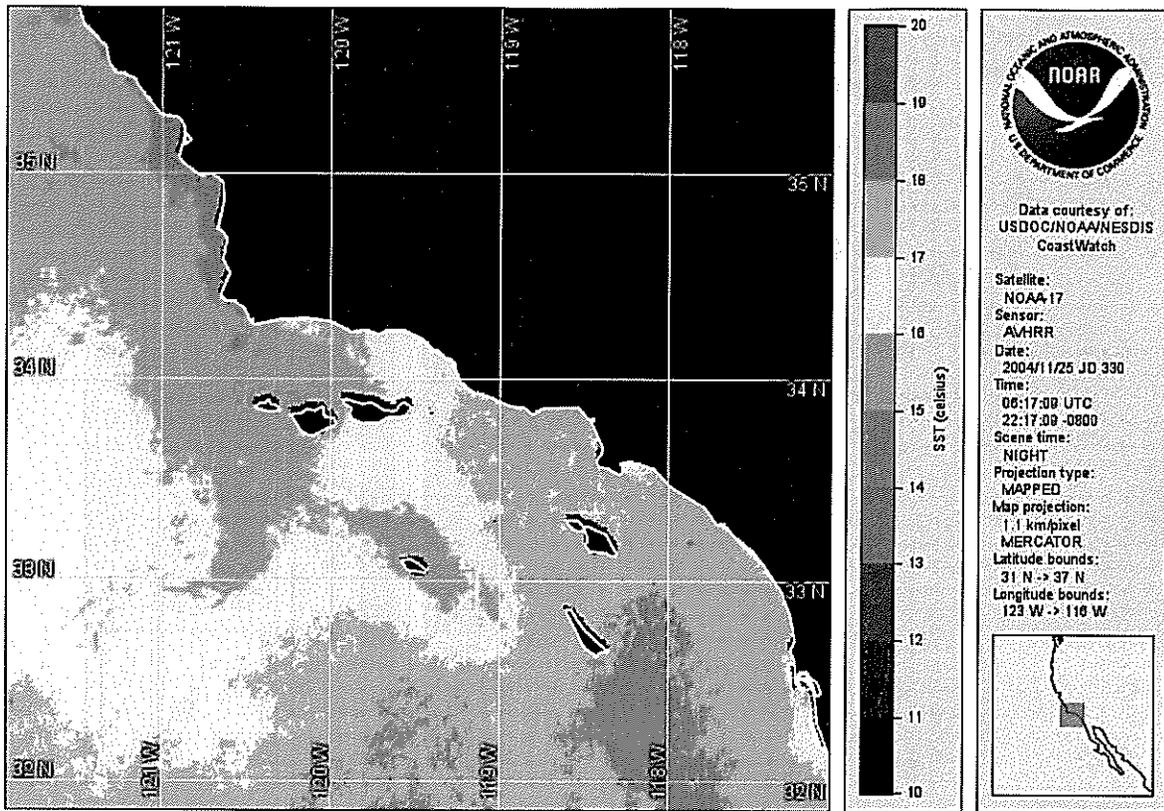


Figure 3-4. Monthly SST composite, southern California region November 2004.

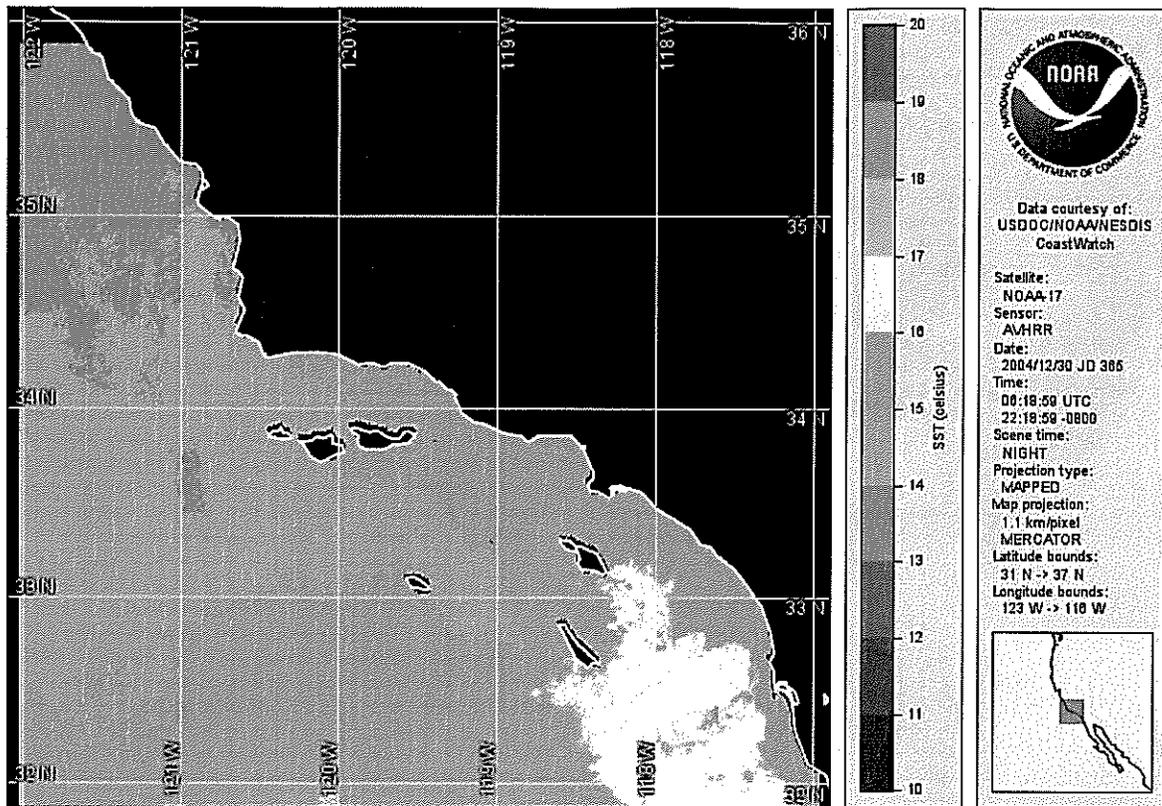


Figure 3-5. Monthly SST composite, southern California region December 2004.

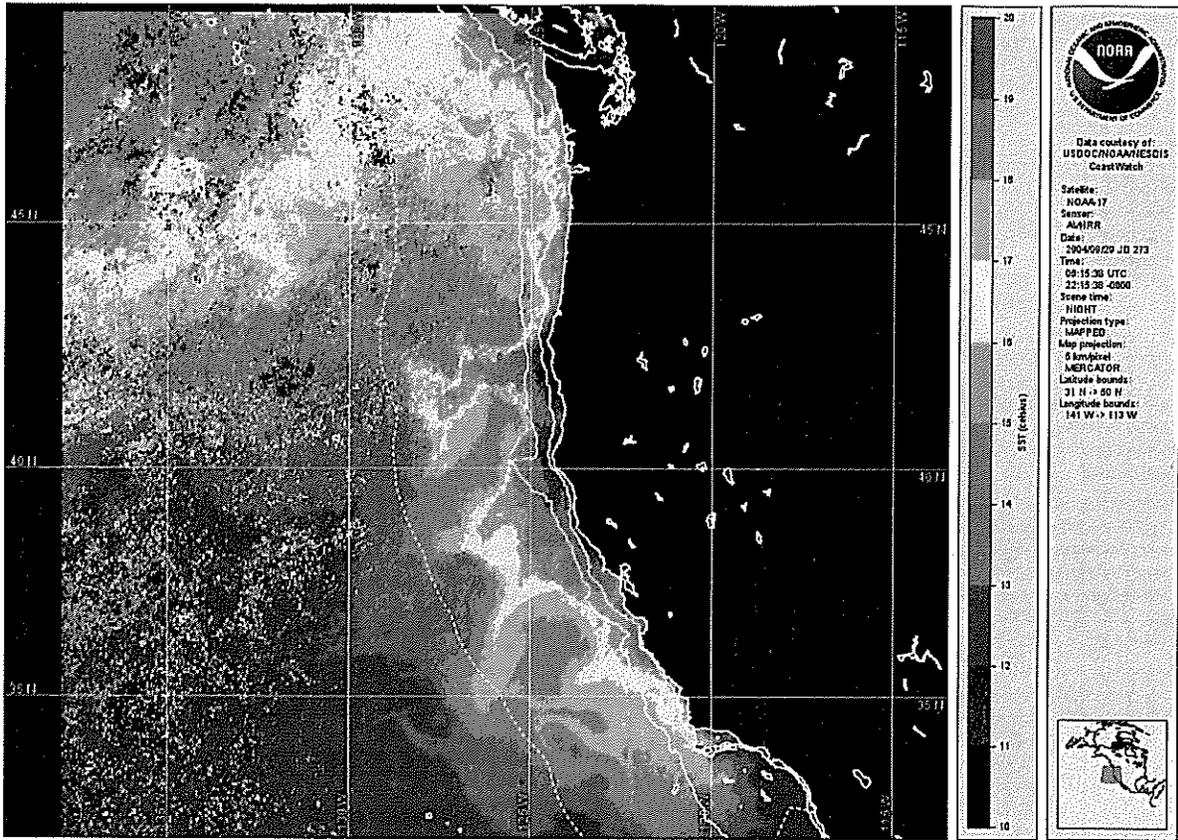


Figure 3-6. Monthly SST composite, West Coast region September 2004.

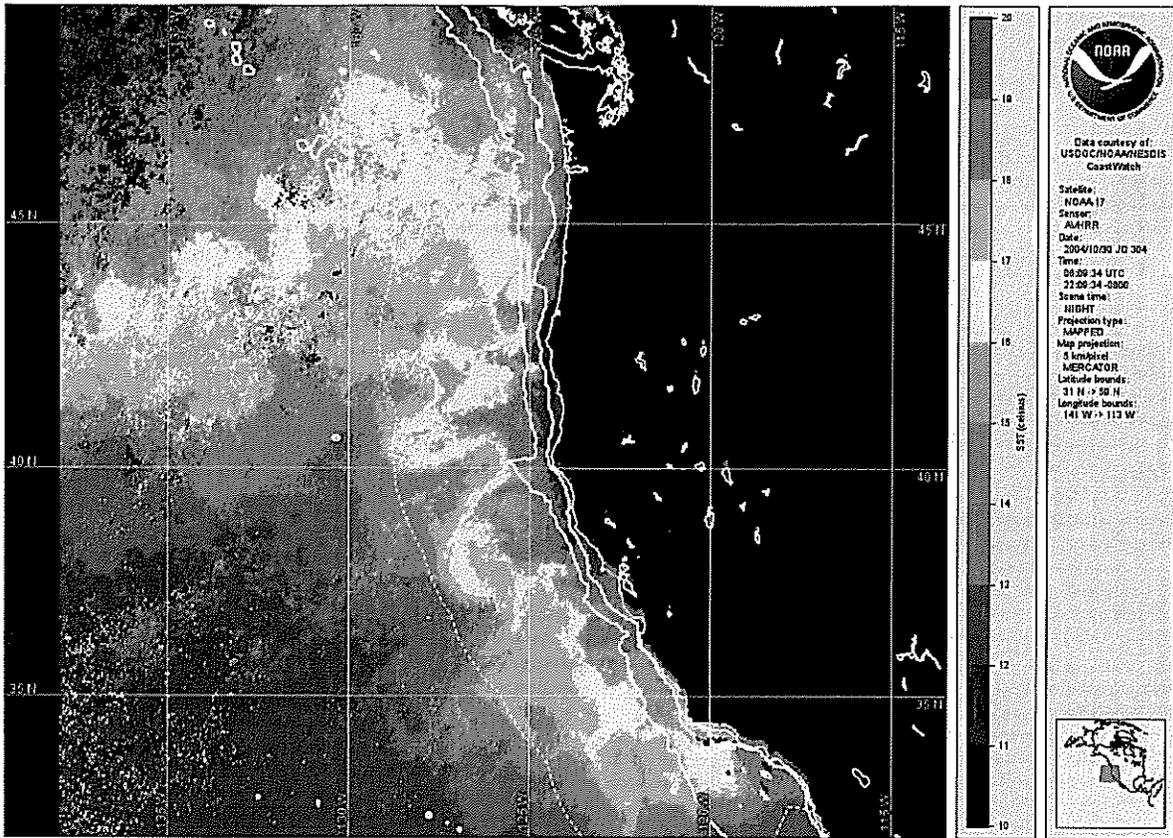


Figure 3-7. Monthly SST composite, West Coast region October 2004.

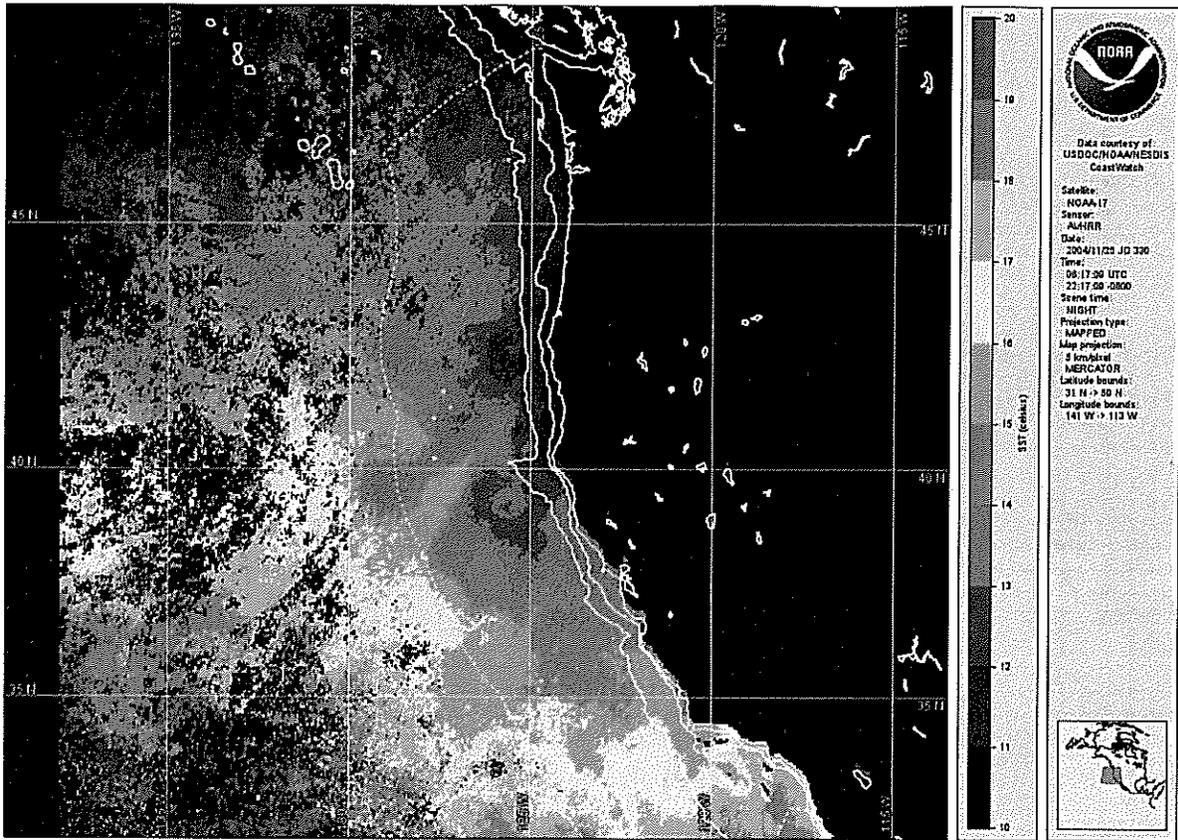


Figure 3-8. Monthly SST composite, West Coast region November 2004.

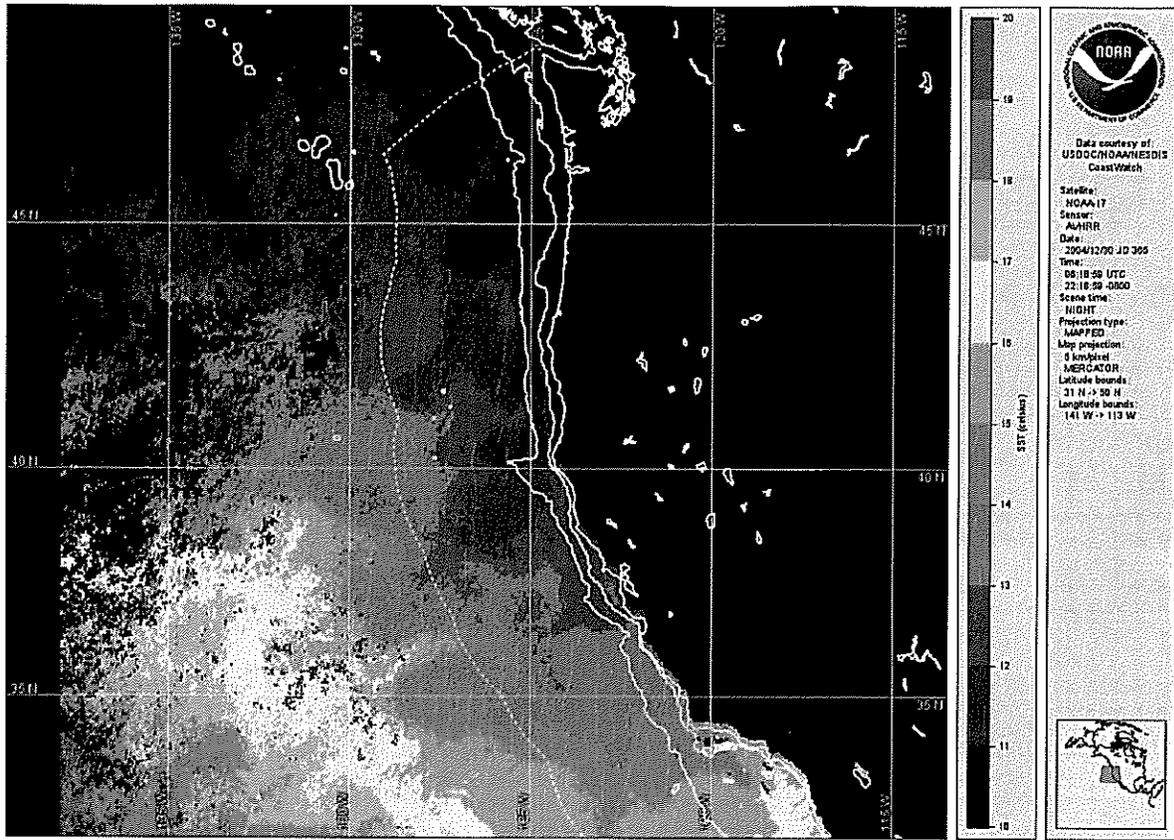


Figure 3-9. Monthly SST composite, West Coast region December 2004.

### 3.3 Finfish

This section describes the baseline conditions of the finfish species likely to be caught in the longline EFP that is the subject of this EA. The baseline conditions include the range of fisheries contributing mortality of the stocks, review fishery catches on a stock basis, and summarize what is currently known about stock status.

#### 3.3.1 *Baseline Description of Past, Present, or Future Fisheries in the Proposed Action Area*

The target species for the proposed action, the broadbill swordfish, as well as several of the major non-target finfish species such as blue and shortfin mako sharks, are included as HMS management unit species (table 3-1) under the HMS FMP (PFMC 2003, Ch. 3 Pg.4). The HMS FMP further designates a complex of fish species as “prohibited species”, meaning that they cannot be retained, or can be retained only under specified conditions, by persons fishing for management unit species (PFMC 2003, Ch.3-Pg.6). These FMP categories are used to organize the discussion of the current condition of finfish stocks that may be affected by the longline EFP.

The review of fisheries below has two purposes. First, the review provides a summary of actions contributing to cumulative effects of the proposed action. Second, because pelagic longline fishing has never been permitted within the EEZ waters adjacent to California, there are no longline fishery dependent records to draw upon to estimate the effects of the proposed action. For that reason, catch rates in similar fisheries in adjacent areas such as the Hawaii-based shallow-set swordfish longline fishery or, in the case of the California/Oregon Swordfish/Thresher Shark DGN fishery, a different gear type targeting swordfish within the action area, are reviewed to help inform the analysis of the effects of the alternatives in chapter 4. The HMS FMP provides a detailed description of the baseline environment for all HMS fisheries and the reader is referred to that document for further insight (PFMC 2003).

There are numerous foreign fisheries that operate throughout the Pacific Ocean using, among other gears, pelagic longline, pole-and-line, purse seine, gillnet, and troll gears. By comparison, U.S. West Coast-based fisheries generally harvest a small fraction of the total Pan-Pacific harvest of HMS. The U.S. North Pacific albacore troll fleet is one of two significant U.S. fisheries in this regard landing an estimated annual average of 13 percent of the total harvest of North Pacific albacore for the period 2001-2005 with Japanese fleets landing an estimated annual average of 66 percent (Childers and Aalbers 2006).

The combined U.S. swordfish fishery is the other fishery of significance landing approximately 13 percent of the North Pacific-wide swordfish landings based on the latest tables produced by the ISC (ISC 2007). The DGN fishery lands roughly 13 percent of the U.S. swordfish catch based on Pacific Fishery Information Network (PacFIN) records for the same time period (PFMC 2006).

Major Pacific fishing areas for swordfish include the waters off Japan, the North Pacific Transition Zone north of Hawaii, the West Coast of the United States, Mexico, Ecuador, Peru, Chile, and off Australia and New Zealand. Much of the Pacific catch is taken incidentally in longline fisheries targeting tunas. Japan, Taiwan, and the United States account for about 70 percent of current reported production, with Mexico, Ecuador, and Chile providing the remainder. In the Eastern Pacific, swordfish are primarily harvested using longlines, drift nets, and hand-held harpoons (PFMC 2006).

The HMS FMP requires that all commercial and recreational charter fishing vessel operators maintain and submit to NMFS logbook records of catch and effort statistics, including bycatch. These measures, together with existing data collection and reporting requirements (e.g., observer records), are intended to provide a comprehensive standardized bycatch reporting system. However, HMS logbook bycatch

records suffer from under-reporting and non-reporting biases, a common shortcoming in regards to accuracy of bycatch estimates from most fishery logbook programs. When available, estimates of bycatch reported in HMS logbooks are presented, but the limitations of the data should be kept in mind.

Commercial pelagic longline fishing has never been permitted within the California EEZ and as such there are no longline fishery dependent records to draw upon for describing the potential baseline condition within the proposed action area (U.S. West Coast EEZ off California and Oregon).<sup>12</sup> The State of Oregon approved and offered permits for a pelagic longline fishery beginning in 1995, and up until the time of the HMS FMP implemented longline prohibition in 2004, no participants have applied for the permit (Schmitt 2007). There is, however, an existing U.S. domestic pelagic SSSL fishery based in Hawaii that will allow some comparisons to be drawn for the proposed action. The suite of potential species and magnitude of interactions will differ to some degree, given the more temperate and coastal areas that will be targeted under the proposed action.

Description of past and present longline fisheries taking place outside the U.S. West Coast EEZ are presented followed by a description of pertinent non-longline fisheries that interact and harvest HMS species. Given the lack of longline fishing history inside the EEZ, the U.S. domestic DGN fishery operating primarily off the coast of California provides the closest approximation to the spatial and temporal scope for the proposed EFP action area. Observer records from the DGN fishery provide some indication of the potential suite of target, non-target, and prohibited finfish species that may interact with the SSSL longline gear. Given the similarity in gear and techniques, the California- and Hawaii-based SSSL fishery provides the best, albeit tenuous approximation given the disparate fishing areas, of the potential CPUE for the target, non-target, and prohibited finfish species that may be taken under the proposed action. Observer records from the California-Hawaii SSSL fishery are used to compute CPUE estimates as a proxy for the expected take under the proposed action.

**Table 3–1 HMS FMP management unit species.**

<b>Common Name</b>	<b>Scientific Name</b>
Striped marlin	<i>Tetrapturus audax</i>
Swordfish	<i>Xiphias gladius</i>
Common thresher shark	<i>Alopias vulpinus</i>
Pelagic thresher shark	<i>A. pelagicus</i>
Bigeye thresher shark	<i>A. superciliosus</i>
Shortfin mako shark	<i>Isurus oxyrinchus</i>
Blue shark	<i>Prionace glauca</i>
North Pacific albacore	<i>Thunnus alalunga</i>
Yellowfin tuna	<i>T. albacares</i>
Bigeye tuna	<i>T. obesus</i>
Skipjack tuna	<i>Katsuwonus pelamis</i>
Northern bluefin tuna	<i>T. orientalis</i>
Dorado	<i>Coryphaena hippurus</i>

<sup>12</sup> A limited experimental shark longline fishery was conducted within the EEZ off the coast of California during the period 1988-1991 (see section 3.3.1.1, p.26). The experiment did not lead to commercial-scale fishing and was abandoned.

### 3.3.1.1 Longline Fisheries

#### Southern California Experimental Drift Longline Fishery for Sharks, 1988–1991

A small-scale experimental drift longline fishery for sharks, ranging from 6–10 vessels per year, was conducted in 1988–1991 within the EEZ off the coast of California. The target species for this fishery were shortfin mako and blue sharks with gear consisting of heavy gauge steel leaders and short steel cable mainlines (~5 miles in length), to maximize retention. Target fishing depth was estimated to be 10–20 m with daytime soak times averaging about five hours. The catch records from this experimental fishery indicate a low rate of interaction with non-target species, which would be somewhat expected given the heavy gear and probable avoidance by visually perceptive pelagic predators such as marlins and tunas. Due to concerns with the incidental take of striped marlin, approximately 19 percent of all fishing operations were monitored by California Department of Fish and Game (CDFG) observers (O'Brien and Sunada 1994) and no striped marlin were observed taken. Landings data based on CDFG landing receipts for the target sharks are presented in table 3–2.

**Table 3–2 Shortfin mako shark and blue shark landings (pounds) for the experimental drift longline fishery for sharks, 1988–1991.**

	1988 (10 vessels with 609,026 hook effort)	1989 (10 vessels with 377,382 hook effort)	1990 (6 vessels with 461,524 hook effort)	1991 (8 vessels with 157,720 hook effort)
Shortfin mako shark	269,604	177,928	174,215	110,513
Blue shark	2,462	10,818	42,818	0
<b>Total</b>	<b>272,066</b>	<b>188,746</b>	<b>217,033</b>	<b>110,513</b>

The observed catch was similar among years with blue sharks comprising 62 percent of the total catch, shortfin mako sharks 29 percent, and pelagic stingrays nearly 9 percent. Observers noted that 52 percent and 88 percent of the blue sharks released in 1988 and 1989 were in good condition and likely to survive. The marked survival increase was attributed to the use of long-handled hook removal pliers beginning in 1989. Five sea lions were caught and released alive (no condition status noted).

**Table 3–3. Number and percentage of total catch for species captured during the experimental drift longline fishery for sharks, 1988 and 1989.**

Species	1988		1989	
	No.	%	No.	%
Blue shark	1,900	62.1	1,320	62.0
Shortfin mako shark	883	28.9	610	28.7
Pelagic stingray	265	8.7	194	9.1
Ocean sunfish	1	---	2	0.1
California sea lion	3	0.1	2	0.1
Hammerhead shark	2	0.1	0	0
Finescale triggerfish	1	---	0	0
Giant Sea bass	1	---	0	0
Pacific mackerel	2	0.1	0	0

### **California-based Deep-set Tuna Longline Fishery, 2005–Present**

A single West Coast-based pelagic longline vessel has been operating out of southern California ports for the past several years. This vessel primarily targets tuna using deep-set longline (DSL) gear with a percentage of swordfish and other HMS taken incidentally. At the present time, any longline fishing by West Coast-based vessels must take place on the high seas outside of the U.S. EEZ. A significant increase in participation for this fishery is not expected. Even if participation were to increase, the maximum number of vessels fishing would be small given, among other things, the high operational costs for fishing outside the EEZ coupled with potential protected species interactions and the need for a high rate of observer coverage. NMFS SWR observer records, based on six observed trips and 73 sets of effort, demonstrate that tuna catches made up 94 percent by number of the total catch with swordfish comprising 0.2 percent and thresher shark 0.3 percent.

### **California- and Hawaii-based Shallow-set Longline Swordfish Fishery, 1994–Present**

The target species of the Hawaii-based SSL fishery are the broadbill swordfish and tunas (*Thunnus spp.*). A host of other marine species with market value are captured incidentally in this fishery. The NMFS Pacific Islands Fisheries Science Center (PIFSC) provides logbook summaries for all longline vessels, including shallow-set and deep-set vessels landing products in Hawaii.<sup>13</sup> For the time period of January 2005 through December 2005, a total of 124 longline vessels landed HMS, based on logbook records submitted to the PIFSC. These vessels completed 1,549 trips with 18,191 recorded sets. A total of 24,350 swordfish were harvested of which 21,665 were kept. The thresher shark catch, which is predominantly made up of bigeye thresher, totaled 3,611 sharks of which only 382 were recorded as kept.

Observer catch estimates for target, non-target, and prohibited finfish species are presented below and are based in part on observer records compiled for the SSL fishery that has operated since 1994 out of Hawaii (February 1994–December 2001, April 2004–April 2006) and for a limited time out of California (October 2001–February 2004). The area of fishing operations for the Hawaii-based boats occurred between 16.9° N. and 44.7° N. latitude and 127.3° W. to 179.7° E. longitude. The area of fishing operations for the California-based boats occurred between 28° N. and 43° N. latitude and 165° W. to 135° W. longitude.

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<sup>13</sup> Data source: <http://www.pifsc.noaa.gov/fmsd/reports/hlreports/2005.pdf>

Table 3-4. Total observed catch (numbers) and catch-per-unit-effort (numbers/ 1,000 hooks of effort) for California- and Hawaii-based shallow-set longline fishery (NMFS SWR Observer Program unpublished data; NMFS PIRO Observer Program unpublished data).

	Total Observed Catch for CA- based SSL	CPUE (No. per 1,000 hooks)	Total Observed Catch for HI- based SSL	CPUE (No. per 1,000 hooks)
Swordfish	7,512	21.530	56,995	16.651
Albacore tuna	460	1.318	11,108	3.245
Bigeye tuna	223	0.639	6,085	1.778
Yellowfin tuna	18	0.052	1,575	0.460
Pacific Bluefin tuna	11	0.032	60	0.018
Skipjack tuna	10	0.029	249	0.073
Unid. tunas and mackerels	5	0.014	107	0.031
Blue shark	5,575	15.978	53,947	15.761
Shortfin mako shark	249	0.714	2,313	0.676
Unid mako sharks	33	0.095	123	0.036
Bigeye thresher shark	8	0.023	116	0.034
Pelagic thresher shark	0	0.000	6	0.002
Unid thresher sharks	0	0.000	23	0.007
Oceanic White-tip shark	0	0.000	559	0.163
Unid sharks	998	2.860	471	0.138
Striped marlin	12	0.034	2,747	0.803
Blue Marlin	4	0.011	633	0.185
Black Marlin	1	0.003	7	0.002
Shortbill spearfish	0	0.000	435	0.127
Unid billfishes	12	0.034	66	0.019
Pelagic stingray	125	0.358	2,259	0.660
Remora	21	0.060	4,397	1.285
Longnose Lancetfish	235	0.674	4,509	1.317
Snake mackerel	29	0.083	1,632	0.477
Escolar	194	0.556	4,472	1.307
Dorado	65	0.186	18,793	5.490
Oilfish	86	0.246	935	0.273
Wahoo	7	0.020	412	0.120
Sickle Pomfret	0	0.000	365	0.107
Pacific Pomfret	30	0.086	58	0.017
Common Mola	51	0.146	157	0.046
Opah	36	0.103	232	0.068
Unid. fish	34	0.097	288	0.084

For the period February 1994 to January 2004, the SSL fishery utilized pelagic longline gear consisting of, among other things, size 9/0 J-hooks with a mixture of squid, mackerel, and other bait types. For the period January 2004 to the present, new regulatory measures were put in place as bycatch mitigation measures (69 FR 17329) and the SSL fishery utilized gear consisting of, among other things, large 18/0 circle hooks and mackerel-type bait. These gear differences should be kept in mind when considering the interaction and catch rate estimates presented for the species that may be taken in the proposed action.

Table 3-5. Total observed catch and CPUE for SSL vessels using circle hooks and mackerel bait (after February, 2004) and those vessels using non-circle hooks and mixed baits (prior to February, 2004) (NMFS SWR Observer Program unpublished data; NMFS PIRO Observer Program unpublished data).

	<b>Total Observed Catch for circle hook SSL trips</b>	<b>Circle hook CPUE (No. per 1,000 hooks)</b>	<b>Total Observed Catch for non- circle hook SSL trips</b>	<b>Non-circle hook CPUE (No. per 1,000 hooks)</b>
Swordfish	36,595	17.156	20,167	15.637
Albacore	2,255	1.057	8,651	6.708
Bigeye tuna	3,342	1.567	2,741	2.125
Yellowfin tuna	348	0.163	1,227	0.951
Pacific Bluefin tuna	1	0.000	59	0.046
Skipjack tuna	140	0.066	107	0.083
Tunas and mackerels	32	0.015	75	0.058
Blue shark	26,965	12.641	26,532	20.572
Shortfin mako shark	1,867	0.875	399	0.309
Unid mako shark	115	0.054	7	0.005
Unid shark		0.000	705	0.547
Bigeye thresher shark	52	0.024	64	0.050
Pelagic thresher shark	3	0.001	3	0.002
Unid thresher shark	12	0.006	10	0.008
Oceanic whitetip shark	352	0.165	207	0.160
Striped marlin	1,810	0.849	936	0.726
Blue marlin	389	0.182	244	0.189
Black marlin	1	0.000	8	0.006
Shortbill spearfish	245	0.115	190	0.147
Unid billfishes	38	0.018	28	0.022
Pelagic stingray	202	0.095	2,035	1.578
Remora	920	0.431	3,474	2.694
Longnose lancetfish	2,702	1.267	1,786	1.385
Snake mackerel	685	0.321	946	0.733
Unid. fish	49	0.023	3	0.002
Escolar	3,539	1.659	913	0.708
Dorado	7,467	3.501	11,319	8.776
Oilfish	488	0.229	443	0.343
Wahoo	159	0.075	253	0.196
Sickle pomfret	285	0.134	76	0.059
Pacific pomfret	0	0.000	58	0.045
Common Mola	21	0.010	134	0.104
Opah	176	0.083	51	0.040

## Distant Water Foreign Longline Fisheries

Currently, Japan, Korea, Taiwan, and to a lesser extent China, operate large, specialized, industrial longline fisheries for catching tunas and billfish, including swordfish throughout the Pacific Ocean. The HMS FMP/FEIS (PFMC 2003) provides an in-depth description of the areas fished and gear specifications for these fisheries. Catch and effort data for these fisheries, including logbook and some limited observer data, is maintained by the Regional Fisheries Management Organizations (RFMO) operating in the Pacific Ocean, the IATTC<sup>14</sup> and the Western and Central Pacific Fisheries Commission<sup>15</sup>. The majority of the catch and effort from these fisheries is significantly displaced from the proposed action area for the EFP and for the most part quantifiable bycatch information is not available for review.

### 3.3.1.2 Non-longline Fisheries

#### California/Oregon Swordfish/Thresher Shark DGN Fishery

Detailed descriptions of the DGN fishery can be found in the HMS FMP (PFMC 2003, Ch. 2 Pg. 13–Ch. 2 Pg.17), in the Environmental Assessment for the Implementation of the Reasonable and Prudent Alternative on the Issuance of the Marine Mammal Permit under Section 101(a)(5)(e) of the MMPA for the California/Oregon DGN, and in the Biological Opinion on the Authorization to Take Listed Marine Mammals Incidental to Commercial Fishing Operations.<sup>16</sup>

Currently, the DGN fishery is one of six West Coast HMS fisheries managed by the Pacific Council through the HMS FMP, with many of the existing State regulations and laws pertaining to the fishery adopted into the FMP. In 2005, 42 DGN vessels landed 182 mt of swordfish and 155 mt of common thresher shark (table 3.6). Historically, the California DGN fleet has operated within EEZ waters adjacent to the State to about 150 nmi offshore, ranging from the United States–Mexico border in the south to as far north as the Columbia River during El Niño years.

Since 2001, an annual August 15–November 15 time/area closure (Drift Gillnet Pacific Leatherback Conservation Area) has been applied to the DGN fishery. This seasonal closure extends from the waters off of Monterey, California, to the mid-Oregon coast and westward beyond the Exclusive Economic Zone (EEZ) to 129° W. longitude (figure 3–10). NMFS established the Drift Gillnet Pacific Leatherback Conservation Area because of the projected incidental take of leatherback sea turtles (*Dermochelys coriacea*), listed as endangered under the ESA. As a result of the closure, the majority of the current DGN fishing effort is concentrated in the Southern California Bight (figure 2–1).

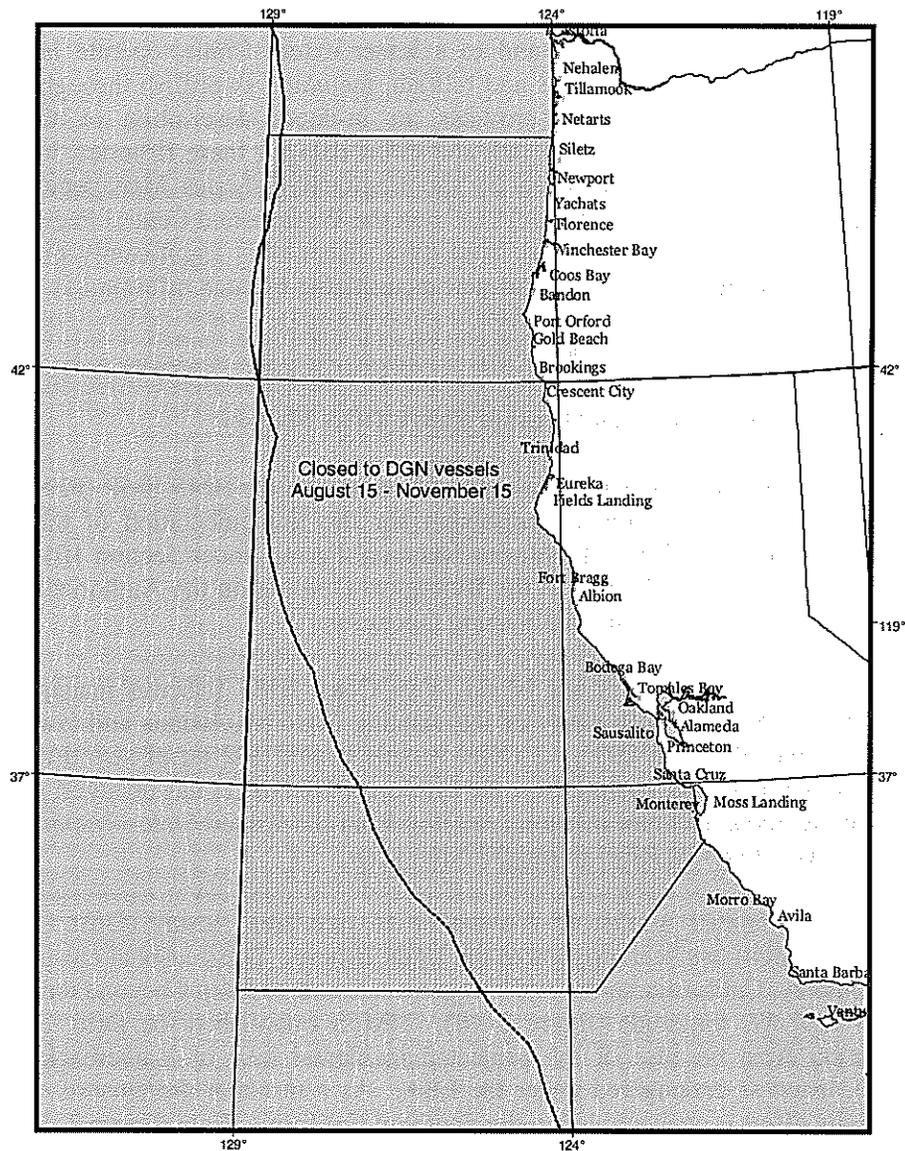
There are three general fishing areas, which are segregated by latitude and occupy areas of similar bottom depths, targeted by the DGN fishery along the California coast. The southern area is centered off San Diego and is characterized by relatively shallow water in depths of less than 1,000 fathoms. This area is within the SCB and fairly close to the coast. The central area off of San Francisco is in deep waters in depths of 1,500–2,000 fathoms, with the northern area off the California/Oregon border in moderate depths of 1,600 fathoms. Fishing activity is highly dependent on seasonal oceanographic conditions that create temperature fronts that concentrate feed for swordfish. Because of the seasonal migratory pattern of swordfish and seasonal fishing restrictions, about 90 percent of the fishing effort occurs August 15 to December 31.

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<sup>14</sup> [www.iattc.org](http://www.iattc.org)

<sup>15</sup> [www.wcpfc.int](http://www.wcpfc.int)

<sup>16</sup> <http://swr.nmfs.noaa.gov/psd/codeftac.htm>



**Figure 3–10. The Drift Gillnet Pacific Leatherback Conservation Area closed to DGN vessels, August 15 to November 15.**

The DGN fishery typically begins in late May and continues through the end of January, although 90 percent of the fishing effort typically occurs from mid-August to the end of December. Effort in the fishery is initially concentrated in the southern portion of the fishing grounds, expanding to its full range by October before retreating back to the south because of the dissipation of oceanographic water temperature breaks caused by storm systems moving down from the north. However, the majority of fishing effort is concentrated south of Point Conception due to the leatherback time/area closure. Some limited effort does take place to the south and west of the closure, in international waters off of Mexico and the U.S. EEZs, and north of the closure (figure 3–10).

The highest catch of target swordfish occurs 15–150 km off the California coast. Fishing effort within 15 km of the coast or near the Channel Islands usually targets pelagic sharks. In higher latitudes, swordfish

catch and effort tend to be further offshore based on logbook and observer data. There are various time and area restrictions in place that limit the geographic extent of the fishery in addition to the leatherback time/area closure. These include State and Federal marine sanctuary boundaries and near-shore coastal zone restrictions. The near-shore restrictions address catches of species of concern, such as thresher sharks and gray whales, and mitigate recreational fishing industry concerns of excessive marlin bycatch in the DGN fishery.

The California DGN fishery is closed within 200 nmi of the coastline from February 1–April 30, inclusive, and DGNs are not permitted to take swordfish and shark within 75 nmi of the California coastline from May 1–August 14 between the westerly extension of Oregon-California boundary and the western extension of the United States–Mexico boundary. From August 15–January 31, swordfish can be taken within 75 nmi, pursuant to area restrictions specified in the CDFG Code and respective of any Federal protected species closures in place.

**Table 3–6. Annual number of vessels, limited entry permits, and landings (round mt) for swordfish and common thresher shark in the DGN fishery (source: PFMC 2006).**

Year	Vessels (number)	Permits (number)	Swordfish Landings (mt)	Common Thresher Shark Landings (mt)
1981	118	-	270	917
1982	166	-	208	650
1983	193	-	242	421
1984	214	226	286	915
1985	228	229	197	1,095
1986	204	251	78	451
1987	185	218	6	393
1988	154	207	1	393
1989	144	189	-	460
1990	134	183	-	335
1991	114	165	51	569
1992	119	149	60	285
1993	123	117	162	245
1994	138	162	760	272
1995	117	185	682	207
1996	111	167	708	241
1997	108	120	655	249
1998	98	148	847	281
1999	84	136	585	152
2000	78	127	631	155
2001	69	114	351	273
2002	50	106	298	216
2003	43	99	198	241
2004	40	96	175	66
2005	42	90	182	155

**Table 3–7. Catch rates (animals-per-100 sets) for the target and major non-target species observed in the DGN fishery (north and south of Point Conception).**

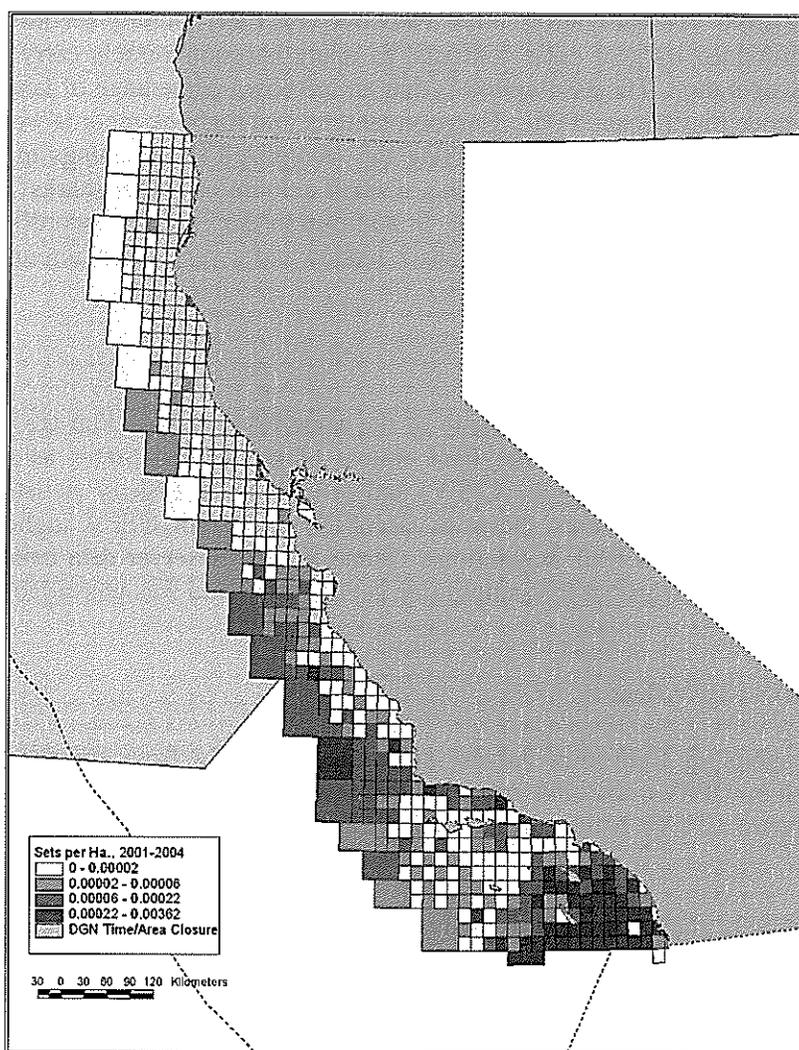
Data source: NMFS SWR observer records 1990–2005<sup>17</sup>.

	Catch in numbers per 100 sets			
	All Years <sup>a</sup> North PC	All Years South PC	2001-2004 <sup>b</sup> North PC	2001-2004 South PC
Bonito, Pacific	0.45	16.9	0	34.2
Fish, Unidentified	7.2	5.2	0	1
Hake, Pacific	7.9	0.69	1	0.3
Louvar	14.2	7	41.8	12.8
Mackerel, Bullet	1.8	66.1	0	4.5
Mackerel, Pacific	59.6	82.7	23.5	47.5
Marlin, Blue	0.04	1.1	0	1
Marlin, Striped	0.59	8.2	0	5.9
Mola, Common	453.8	664.3	878.6	745.6
Opah	36.7	64.9	30.6	61.8
Pomfret Pacific	15.2	1	39.8	1.4
Remora	2.5	0.9	0	0.8
Shark, Bigeye Thresher	7.1	6.1	0	6
Shark, Blue	461.4	176.6	312.2	129.5
Shark, Common Thresher	53.1	84.5	63.8	73.6
Shark, Pelagic Thresher	0	1.8	0	0
Shark, Shortfin Mako	42.6	121	18.4	149.6
Stingray, Pelagic	1.5	6.3	0	6.5
Swordfish	292	142.5	298.9	156
Tuna, Albacore	487.6	49.5	1,189.8	60.4
Tuna, Bigeye	0.3	0.3	0	0
Tuna, Bluefin	83.7	29.2	235.7	26.8
Tuna, Skipjack	121.8	122	27.6	149.4
Tuna, Yellowfin	1.2	10	0	19.4
Yellowtail	0.04	1.6	0	2.3

<sup>a</sup> For all years (1990-2005), the observed sets south of Point Conception equal 4,344 and north of Point Conception equal 2,862.

<sup>b</sup> For the time series 2001-2004, the observed sets south of Pt. Conception equal 1,121 and north of Pt. Conception equal 98.

<sup>17</sup> <http://swr.nmfs.noaa.gov/psd/codgftac.htm>



**Figure 3–11. Spatial distribution of average annual DGN fishing effort (sets) for the years 2001–2004.**

Source: CDFG fishing logbooks standardized by fishing blocks (sets/hectare). NOTE: The logbook data presented in this figure show only California fishing location information; however, there was some limited fishing effort north of California in Oregon and Washington during this time period (~7 percent of total sets).

### **West Coast harpoon fishery**

The California harpoon fishery dates back to the early 1900s. The harpoon fishery used to account for the bulk of swordfish landings into California but was supplanted by the DGN fishery in the 1980s. Participation in the harpoon fishery peaked in 1978 with 309 vessels landing over 11,000 mt before being largely displaced by the more efficient DGN fishery (Leet, *et al.* 2001). Since that time, the harpoon fleet has declined substantially with 24 vessels landing 74 mt of swordfish in 2005. Fishing effort is concentrated in the coastal waters off San Diego and Orange Counties with peak landings in August (PFMC 2006). This fishery is highly dependent on suitable environmental conditions to be able to locate and harpoon swordfish on the surface, and participation is not expected to change. Given the selective gear used in this fishery, bycatch is practically non-existent.

However, the Pacific Fisheries Information Network (PacFIN) landing records for harpoon-permitted vessels are confounded by gear code conflicts, as many harpoon vessels carry DGN gear as part of a multiple fishery operation. The assumption is that an unknown percentage of landings may be inaccurate due to the gear code bias (Coan 2006). Harpoon landing and logbook records were analyzed for the time period 1969–1993 (Coan, *et al.* 1998). Noting the recognized shortcomings in logbook data estimates (e.g., reporting biases and gear code conflicts), a small amount of “other sharks” are reported as taken in the harpoon fishery, including mako sharks. In addition to the 74 mt of swordfish, PacFIN landings for harpoon gear in 2005 reported no thresher shark landed and a very small amount of mako shark landed (1,278 lb).

### **West Coast HMS recreational fisheries**

Recreational anglers in California take many of the same HMS species that are caught in the SSSL and DGN fisheries. Fishing occurs in the EEZ waters of the United States as well as Mexico aboard commercial passenger fishing vessels (CPFV) and private boats. Fishery statistics are compiled by the Recreational Fisheries Information Network (RecFIN) and from CPFV logbooks required by State regulations and/or per HMS FMP regulations. Some limited observer data exists for HMS bycatch on recreational charter boat trips but the sample size is very small and was unavailable for review at the time of this assessment.

### **West Coast HMS CPFV fleet**

Recreational anglers in California harvest swordfish primarily from private fishing boats with the occasional catch on CPFVs. In 2004, approximately two swordfish were caught and kept by recreational fishermen on board CPFVs fishing in the U.S. EEZ, whereas in 2005 there was no catch reported for swordfish.<sup>18</sup>

With the exception of sharks, most HMS and non-target finfish are caught by anglers fishing from CPFVs based in southern California and fishing primarily in the Mexican EEZ. In 2005, CPFV anglers fishing in Mexican waters landed 82,603 albacore, 4,949 bluefin, and 3,496 skipjack tuna based on CPFV logbook records. A total of 40 mako sharks and 14 unidentified marlin were also landed. In 2005, CPFV anglers fishing in the U.S. EEZ off California landed 15,625 albacore, 722 bluefin, and 2,212 skipjack tuna based on CPFV logbook records. A total of 121 mako sharks, 26 blue sharks, and four striped marlin were also landed.

### **West Coast HMS private boat fleet**

For recreational anglers fishing in the U.S. EEZ, Title 14 of the CDFG Code limits the take of a number of HMS: thresher, mako, and blue sharks, 000 and swordfish - two per day; marlin – one per day. For other HMS, there are either no limits or there is an overall bag limit of 20 fish of mixed species with no more than 10 fish of any one specie. Anglers may possess more than the limit depending on the length of the fishing trip. Fishing occurs in the EEZ waters of the United States, primarily off the southern California coast, as well as in Mexico. A typical fishing season for HMS begins in the spring and continues to late fall depending on the oceanographic conditions present in a given year. Private anglers are not required to keep a daily fishing log on their vessels so catch estimates are based on California Recreational Fisheries Survey interviews of anglers returning to port. Generally, it is recognized that catch and effort estimates for the private anglers are underestimated due to the lack of sampler access to private marinas where many private vessels are berthed.

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<sup>18</sup> Data source: California Commercial Fisheries Information System, CPFV logbook data.

Catch estimates for private boats are for vessels fishing exclusively in the U.S. EEZ. Many private vessels fish in the EEZ of Mexico but the number and catch by these vessels is unknown. In 2005, private boat anglers fishing in the U.S. EEZ off California landed approximately 5,000 albacore, 85 bluefin, and four skipjack tuna.<sup>19</sup> According to RecFIN estimates, a total of 14,000 mako sharks and 15 blue sharks were caught with over 50 percent of the mako sharks released alive. In 2004, recreational anglers fishing from private boats in the U.S. EEZ caught approximately 4,000 thresher sharks, while in 2005 the catch dropped to 216.

The average private boat recreational catch of common thresher for the period 2001–2004 is approximately 2,500 sharks (PFMC 2006). The average weight for thresher shark captured in the recreational fishery was estimated to be 68 kg (Sepulveda 2006). Therefore, the estimated take of thresher shark by the recreational fishery would equal approximately 170 mt (2,500 sharks x 68 kg/shark). A growing catch-and-release ethic has been practiced amongst private boat anglers and an unknown number of sharks are released alive back to the water. Estimates of post-release mortality are not known and additional research and monitoring efforts are needed.

The average recreational catch (numbers) of shortfin mako shark for the period 2001–04 is approximately 4,250 sharks (PFMC 2006). Of this total, it is estimated that roughly half were released alive with an unknown survival rate. For the purposes of this EA, a conservative catch-and-release mortality estimate of 20 percent was applied to derive a total estimated take in the recreational fishery. For the time period 2001 to 2004, an average of 2,125 mako sharks per year were released alive (RecFIN data, PFMC 2006). Applying a 20 percent mortality factor to those mako sharks released results in an estimated take equal to 425 animals. The average weight for mako shark captured in the recreational fishery during the 2001 to 2004 time period was estimated to be approximately 20 kgs (Sepulveda 2006). The estimated tonnage of mako shark taken by the California recreational fishery will therefore be reported as the sum of the landed tonnage (2,125 animals x 20 kgs. = 42.5 mt) and the estimate of mortality in the released catch (425 animals x 20 kgs. = 8.5 mt) for a total of 51 mt.

Blue sharks are targeted by private boat anglers using light tackle and captured incidentally by private anglers fishing for other HMS sharks. Most of the recreational shark trips are based out of southern California and catch small blue sharks that average ~7 pounds. Since blue shark meat quickly ammoniates when killed, most if not all are caught and released with high survivorship assumed (Sepulveda 2006).

### **California small mesh set net fishery**

The small mesh set net fishery utilizes monofilament gillnets designed to capture halibut and Pacific angel shark. Incidental catches include thresher and mako shark and a host of benthic marine organisms. Vessels used in the fishery are generally 25–40 ft in length, which is suited for inshore coastal operations. Fishing effort is concentrated off Santa Barbara and Ventura counties and around the northern Channel Islands, especially Santa Cruz and Santa Rosa Islands. A decline in landings occurred in 1991 when a voter initiative was passed banning the use of gill and trammel nets within three miles of the southern California mainland coast and within one mile around the Channel Islands. Many gillnetters switched to other fisheries and a few dropped out entirely or retired (Leet, *et al.* 2001). In 1990, a total of 144 vessels landed angel shark and by 1994, the number was reduced 50 percent to 72 vessels. These boats landed 23,000 pounds, a decline of 91 percent from the catch in 1990. For the period 2001–2004, an average of 76 vessels participated in the fishery averaging 4,782 days of combined effort. Logbook records indicate

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<sup>19</sup> RecFIN estimates of fewer than 1,000 fish are reported as less than 1,000 in the HMS SAFE documents due to the extrapolation uncertainty with the estimates (e.g., high percent error).

that 3,343 thresher shark (836/year) and 13 swordfish (3.3/year) were caught. Logbook records show 2 basking sharks and 16 great white sharks were captured.

Logbook records of non-target catch for that time period are presented below in table 3–8.

**Table 3–8. Small mesh set gillnet logbook records for non-target finfish catch, 2001–2005.**

Species	Total No. Reported	Avg. Reported/Year
Mako shark	1,520	304
Blue shark	12 (2003 data only)	
Unid. shark	542	108
Albacore tuna	99 (98 in 2001, 1 in 2002)	
Bluefin tuna	35	9
Pacific mackerel	1,058	353
Unid. Mackerel	3,997	799
Louvar	9	3
Opah	20	4.5
Pomfret	4 (2001 data only)	
Common mola	2 (2003 data only)	

During the 2005-2006 fishing season, NMFS observers monitored 4 set gillnet trips totaling 12 sets of effort. The catch of non-target HMS species included 10 common thresher sharks (all kept), 24 pacific mackerel (all discarded dead), 1 yellowtail (kept), and 1 bonito (kept).

#### **California small mesh DGN fishery**

This fishery primarily targets white seabass, California barracuda, and yellowtail. Incidental catches include thresher, mako and blue sharks, and albacore, bluefin, and skipjack tuna. Except for a few directed tuna trips, which are now banned under the HMS FMP regulations, thresher and mako sharks make-up the majority of the incidental catch.

With the implementation of the HMS FMP, the small mesh DGN and set gillnet fleets are not permitted to land swordfish as they did prior to the FMP. They are, however, permitted to land other HMS, with the restriction of 10 fish per landing of each non-swordfish HMS, including thresher and mako sharks.

#### **United States tuna purse seine fishery**

There are two components to this fishery sector: large vessels (> 400 short tons (st)<sup>20</sup> carrying capacity) and small vessels (equal to or less than 400 st carrying capacity). The large vessels usually fish outside U.S. waters and deliver their catch to foreign ports or transship to processors outside the mainland United States. The fleet of large vessels based on the West Coast and fishing in the Eastern Pacific has been greatly reduced over the past 20+ years with a single U.S. flagged vessel participating in the EPO fishery in 2005 (Rouff 2007). This vessel did not fish in the U.S. EEZ and bycatch data were not available for review.

The small vessel tuna purse seine fleet, based primarily in southern California ports, is a multi-fishery fleet reliant primarily on coastal pelagic species (sardines, mackerel, and squid) and shifts to tuna when they are seasonally available. There are approximately 61 small purse seiners with limited entry permits under the Pacific Council's Coastal Pelagic Species (CPS) FMP.<sup>21</sup> The coastal pelagic species fishery is

<sup>20</sup> The IATTC uses short tons in its stock status reports. 1 short ton is equal to 0.9072 metric ton.

<sup>21</sup> <http://www.pcouncil.org/cps/cpsback.html>

under a limited entry program when operating south of 39° N. latitude pursuant to the Council's CPS FMP. Alternatively, vessels could enter the purse seine fishery to target tunas as there is currently no limited entry program for purse seine vessels operating under the HMS FMP. A few vessels also may be able to arrange to catch bluefin for transfer to Mexican vessels for "grow out" facilities that have been established off Baja California. The ability of this market to handle large quantities is unknown. Thus significant growth in the U.S. purse seine fishery is not expected and declines seem more likely.

The landings of HMS in the small vessel tuna purse seine fishery have been declining for many years, and the recent closure of the last cannery that processed whole fish in California suggests that this trend will continue. Large effort shifts into the purse seine fishery for HMS are not anticipated. A total of 10 HMS permitted tuna purse seine vessels operated in 2005 landing 283 mt of yellowfin tuna, 522 mt of skipjack tuna, and 201 mt of bluefin tuna to southern California ports (PFMC 2006). Logbook data for this fishery have not been collected nor analyzed prior to the implementation of the HMS FMP; therefore, bycatch records from this reporting source are non-existent.

A CPS observer pilot program was instituted by NMFS in July 2004 for the small vessel purse seine fleet (catch consists of CPS and tuna species). The objective of the pilot program is to gather preliminary bycatch data and to derive an estimate of an appropriate future percent coverage, if warranted, for these fisheries. Prior to this pilot, anecdotal accounts indicate bycatch levels in both fisheries were relatively low. For the period July 2004–January 2006, NMFS observers monitored 9 tuna purse seine targeted trips providing 15 sets of observed effort. A total of four blue sharks (one released alive, three discarded dead), and one common mola (released alive), were noted as catch of major non-target finfish species. For the period July 2004–January 2006, a total of 107 CPS trips carried NMFS observers with 228 sets of effort monitored. A total of two blue sharks (released alive), one common mola (released alive), three unidentified sharks (one released alive; two discarded dead), and one unidentified thresher shark (released alive) were noted for bycatch species that are also taken by the DGN fishery.

### **HMS albacore troll and baitboat fleet**

U.S. troll and baitboat vessels have fished for albacore in the North Pacific since the early 1900s using artificial lures with barbless hooks. A total of approximately 64,000 mt of albacore were harvested throughout the North Pacific in 2005, which is below the average annual catch of approximately 75,000 mt since 1952 (Childers and Aalbers 2006). Japanese fisheries have traditionally caught the greatest amount of albacore within the North Pacific and account for approximately 73 percent of the total albacore landed by all fisheries since 1952. During the same period, the U.S. albacore fisheries have annually caught approximately 21 percent of the total North Pacific albacore catch. An estimated 652 U.S. troll vessels fished in the 2005 North Pacific albacore fishery logging 25,252 days of fishing effort and landing 9,122 mt of albacore.

In recent years, the North Pacific albacore troll season started as early as mid-April in areas northwest of Midway Atoll. In July and August, fishing effort expands to the east, towards the West Coast of North America (160° W. longitude to 120° W. longitude), extending from southern California to Vancouver Island (32° N. latitude to 55° N. latitude). Fishing can continue into November if weather permits and sufficient amounts of albacore remain available to troll gear.

The HMS FMP requires all U.S. fishing vessels targeting albacore in the Pacific to submit copies of their daily fishing logbook to NMFS at the conclusion of each trip. Review of albacore troll logbook records for the time period 2001–05, reveals minor amounts of HMS non-target species reported with 126 non-target catch records (table 3–9) in comparison to an average yearly landing of target albacore of 1,711,805 fish. Most of the skipjack and other more tropical HMS species were caught by the offshore vessels while in transit from Samoa or Hawaii to the North Pacific fishing grounds (Aalbers 2006). The logbook

reporting rate was 39 percent for the years 2001–04 (i.e., prior to the implementation of the HMS FMP mandatory reporting requirement).

**Table 3–9. Non-target finfish catch reported in albacore troll logbooks for the period 2001-2005.**

Species	# Reported	# Kept	# Released
Bluefin tuna	26	21	5
Blue Shark	21	0	21
Mako Shark	10	4	6
White Shark	1	0	1
Skipjack tuna	1,421	555	866
Bigeye tuna	6	6	0
Swordfish	2	2	0
Pomfret	9	9	0

NMFS recently instituted an albacore troll pilot observer program for the West Coast and for the period January 2005–May 2006, 7 trips and 69 days of fishing effort were observed by on-board government fisheries observers. The catch of major non-target finfish included 2 blue shark (one released alive, one unknown), 1 dorado (kept), 3 skipjack (all kept), and 18 unknown fish (most likely target albacore known as “poppers,” which are fish that hit the jigs and are hooked but “pop off” prior to being landed).

#### **Trawl and pot fisheries and other non-HMS fisheries**

The HMS FMP final rule authorizes incidental commercial landings of HMS, within limits, for non-HMS gear such as bottom longline, trawl, pot gear, small mesh DGN, set/trammel gillnets, and others.

For bottom longline (set line) fishery, landings are restricted to 3 HMS sharks, or 20 percent of total landings by weight of HMS sharks, whichever is greater. For trawl, pot gear, and other non-HMS gear, a maximum of one percent of total weight per landing for all HMS shark species combined is allowed (i.e., blue shark, shortfin mako sharks, and bigeye, pelagic, and common thresher sharks) or two HMS sharks, whichever is greater.

The amount of HMS bycatch is assumed to be negligible in ocean salmon and groundfish fisheries based on anecdotal accounts and a cursory review of available observer records by target trip type. There have been some mixed landings of HMS and groundfish by commercial trawl vessels as well as HMS in commercial salmon troll fisheries, but evidence indicates these were probably mixed target trips. There is also evidence that most significant landings of HMS in the salmon troll fishery are also mixed target trips. These seem to occur when albacore are close in and available to the salmon troll fleet. There have also been accounts of recreational salmon fishermen incidentally catching albacore, but these are rare events (DeVore 2006).

#### **Illegal, unreported, and unregulated (IUU) fishing fleets**

Despite the ban on large-scale high-seas driftnet fishing in the North Pacific imposed beginning in the early 1990s, fishing effort by IUU foreign fishing vessels continues to occur in the high seas throughout the Pacific Ocean. Anecdotal evidence, including photographs submitted by U.S. fishermen showing albacore tuna with net scars, demonstrate that albacore and possibly other HMS species are probably interacting with net gear deployed by IUU vessels. For most of these fishing fleets, little or no data exist regarding fishing effort or catch of marine species, including HMS. Without such information, it is impossible to assess the impacts of these fisheries on the major bycatch species included in this EA.

As part of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (Public Law 109-479), which was signed in January 2007, the Moratorium Protect Act (Public Law 104-43) was amended to require actions by the United States to strengthen international fishery management organizations and address IUU fishing and bycatch of protected living marine resources. NMFS published an Advanced Notice of proposed rulemaking on June 11, 2007 (72 FR 32052) to announce development of certification procedures to address IUU fishing activities.

### *3.3.1.3 Fluctuations in the Ocean Environment*

Large-scale environmental fluctuations are characteristic of all oceanic ecosystems and have significant affects on the distribution, movement, and habitat of all HMS-related species. Significant sources of inter-annual physical and biological variation are El Niño and La Niña events in the Pacific. Regime shifts (e.g., in the North Pacific) have also been identified as having impacts on both the physical and biological systems, with concurrent impact on the distribution of oceanic species. There is no evidence to suggest that populations of Eastern Pacific HMS are immune to these shifts. In fact, emerging evidence suggests that these environmental and climatological perturbations may have greater influence on the relative abundance of HMS (especially tuna) and related species (PFMC 2003).

While changes in the ocean environment affect HMS, implementation of the EFP is not expected to create a resource conservation concern for the major finfish target and non-target species projected to be taken as part of the EFP. The condition of the stocks and the major finfish bycatch species will be monitored continuously, and necessary actions will be taken to promote conservation and management through the Council and NMFS oversight.

### *3.3.1.4 Current and Future Regulatory Regimes*

There are a variety of evolving national and international legal instruments in force for the conservation and management of HMS. To a great extent these regulatory regimes are representative of species-directed fishery management policies which, more recently, are being questioned as effective at preventing undesirable changes in the marine ecosystem structure and function. General principles for oceanic ecosystem management tend to be theoretical at this juncture. The extent to which they can be implemented is unclear. Regardless, members of the IATTC and the newly established Western and Central Pacific Fisheries Commission are involved in implementation of a new international conservation arrangement for HMS in the Pacific. These arrangements will be intended to conserve the targeted species (mainly tuna) and related species, but if they fail, there could be adverse impacts on U.S. West Coast fisheries. At this point, there are no apparent conflicts between international management measures and the domestic measures proposed in this SSSL EFP.

The States of Washington, Oregon, and California have managed HMS fisheries in the past, continue to do so at the present time, and it is expected that these States will play a role in management of these fisheries in the future. NMFS anticipates that most of these regulations will continue to remain in effect and will be consistent with the goals and objectives of the EFP. In some cases, the FMP defers to the States' management programs, for example in the setting of recreational bag limits, licensing, and reporting provisions. California has the most extensive set of HMS regulations on the West Coast due to the diversity of HMS fisheries based there.

The Western Pacific and North Pacific Fishery Management Councils have a management responsibility for U.S. HMS fisheries in other areas of the Pacific. Actions by these councils would impact HMS stocks and fisheries on the West Coast. There is a need to ensure coordination among the councils to achieve comprehensive management of HMS.

### **3.3.2 Current Stock Status of Target and Non-target Species**

The HMS FMP (PFMC 2003, Ch.3, p.13) provides an overview of stock status for HMS management unit species up to the 2002 fishing season. The 2005 HMS Stock Assessment and Fishery Evaluation Report (SAFE) provides an updated status of the HMS management unit species, including target swordfish (PFMC 2006, Ch. 5, p.103). Given the highly migratory nature of many of the HMS FMP management unit species, effective management can only be achieved with coordinated cooperation in the international arena. HMS stock assessments are periodically carried out by scientists from Pacific-based regional fisheries management organizations such as the IATTC and by the International Scientific Committee (ISC) for Tuna and Tuna-like Species in the North Pacific.

Stock status refers to the condition or health of the species (or stock) in the management unit. Status is usually determined by estimating the abundance (or biomass, or yield) of the stock throughout its range and comparing the estimate of abundance with an adopted acceptable level of abundance (reference point). The HMS FMP (PFMC 2003, Pg. ES-5), as required by the MSA, establishes a level of biomass (or proxy) below which a stock is defined as being in an “overfished” condition, and a level of fishing mortality above which “overfishing” is occurring. If overfishing is occurring, fishing levels must be reduced. Stocks that are overfished must be rebuilt to certain biomass levels within a certain time period. As required by the MSA, HMS stocks are to be managed to achieve optimum yield (OY). The HMS FMP (PFMC 2003, Ch. 3, pp. 9-32) provides a detailed description of overfishing criteria and default control rules.

#### **3.3.2.1 Target Species: Swordfish (*Xiphias gladius*)**

Swordfish occur throughout the Pacific Ocean between about 50° N. latitude and 50° S. latitude. They are caught mostly by the longline fisheries of Far East and Western Hemisphere nations. Lesser amounts are caught by gillnet and harpoon fisheries, and infrequently by recreational fishermen. The stock structure of swordfish is not well known in the Pacific. There are indications that there is only a limited exchange of swordfish between the EPO and the Central and Western Pacific Ocean. Hinton and Maunder (2003) concluded that there are northern and southern stocks of swordfish in the EPO, with the boundary between the stock distributions occurring at 5° S. latitude, and there may at times be some mixing of stocks from the Central Pacific with the northeastern stock. The northeastern stock appears to be centered off California and Baja California, Mexico, recognizing that there may be movement of a Western North Pacific stock of swordfish into the EPO at various times.

The lack of contrast in the standardized catch and effort series in the northern and southern regions of the EPO suggests that the fisheries that have been taking swordfish in these regions have not been of a magnitude sufficient to cause significant responses in the populations. In addition, catches in the region have been fairly stable since 1989, averaging about 3,700 mt in the northern region and 8,400 mt in the southern region annually. Based on these considerations, it appears that swordfish are not overfished in the northern and southern regions of the EPO (Hinton, *et al.* 2004). Swordfish stocks have not been declared overfished or undergoing overfishing, nor are there currently quotas or harvest guidelines in place under the HMS FMP.

Recent ISC analyses of swordfish stocks in the North Pacific (north of 10° N. latitude and west of 130° W. longitude), based on CPUE indices from Japanese longline vessels, show declining trends (ISC 2004). These trends are mainly driven by declines in the northwest portion of the study area (north of 10° N. latitude and west of 170° E. longitude) and their proximate cause is not known at present (e.g., changes in stock abundance, environmental variability, and/or fishing practices).

### 3.3.2.2 Current Stock Status for Major Non-Target Species Catch

#### Overview

For the purposes of this EA, non-target catch includes incidental catch retained for personal use and/or sale, and catch that is discarded, whether it is dead or alive. These discards, also referred to as bycatch, include both economic discards (e.g., blue sharks) and/or regulatory discards (e.g., protected species). Although the MSA defines terms such as bycatch, discards, and incidental take for practical use, the definitions for these terms are not standardized. For the purpose of this EA, NMFS will use the umbrella term “non-target catch” to avoid confusion.

The stewardship responsibilities of NMFS to lead and coordinate the nation’s collaborative effort to monitor and reduce the bycatch of living marine resources are identified in the MSA, ESA, MMPA, Migratory Bird Treaty Act, and in international agreements. As part of its efforts to meet these responsibilities, NMFS reports on the scope and complexity of bycatch in the United States and approaches to addressing bycatch problems. In early 2003, NMFS developed a National Bycatch Strategy to monitor and mitigate bycatch within the Nation’s fisheries. As part of this strategy, a National Working Group on Bycatch was appointed to formulate procedures for monitoring bycatch; in particular, it provides information that could be used to develop standardized bycatch reporting methodologies (NMFS 2004a).

#### Major versus Minor Non-Target Finfish Species

For the purposes of this EA, the assessment of catch rates and impacts are reported and analyzed for those species that were captured in quantities greater than 0.05 animals per 1,000 hooks observed and/or likely to be encountered in the proposed action area (i.e., some of the tropical species like oceanic whitetip sharks, lancet fish, snake mackerels, blue and black marlins, and wahoo are not included). Species referred to as major non-target species include, among others, blue, mako, and thresher sharks, escolar, pelagic stingrays, dorado (mahi-mahi), striped marlin, pomfrets, remoras, and tunas (tables 3–4 and 3–5). The species captured in quantities less than 0.05 animals per 1,000 hooks observed did not, for the most part, involve species for which there are pressing resource conservation concerns, given their infrequent capture in the SLL fishery. These are referred to as minor non-target species. This tabulation is based on SLL fishery observer records from 1994–2006, which include the baseline period under review here. Several minor non-target finfish are included for review under the major non-target category due to their status as HMS management unit species or their likelihood of being captured in the proposed action area based on DGN observer records (e.g. striped marlin, common thresher shark, common mola and dorado).

#### Status of Major Non-target Tunas

Five commercially important tuna species (albacore, yellowfin, bigeye, skipjack, and bluefin tuna) are taken as non-target tuna catch in the SLL fishery operating outside of the U.S. EEZ. With the exception of albacore, the tropical tunas are not considered a major non-target catch but are reviewed here given their economic importance and relevance to domestic and international fisheries and resource management.

##### North Pacific albacore (*Thunnus alalunga*) (ISC 2007)

Stock status of North Pacific albacore is reviewed at one- to two-year intervals by ISC Albacore Working Group (formerly the North Pacific Albacore Workshop) with participating members from the United States, Mexico, Canada, Japan, and Taiwan. The latest assessment was finalized by the working group in July 2007. Spawning stock biomass (SSB) estimates for the period 1966-2006 show fluctuations around

an estimated time series average of roughly 100,000 mt. The assessment demonstrates a recent increase in SSB from 73,500 mt in 2002 to 153,300 mt in 2006 with a projected further increase to 165,800 mt in 2007. The recent increases are likely due to strong year classes in 2001 and 2003. Despite the high SSB estimates relative to the time series average, fishing mortality rates are high relative to most commonly used reference points. The population is being fished at roughly  $F_{17\%}$  (i.e. at a rate resulting in a reduction of the spawning potential ratio to 17 percent of the maximum spawning potential ratio in the absence of fishing). If fishing continues at the current level, and all else being equal, then SSB is projected to decline to an equilibrium level of 92,000 mt by 2015. Considering the high fishing mortality rates, and the fact that total catch has been in decline since 2002, the ISC recommended that all nations practice precautionary-based fishing practices.

Since the mid-1970s, the U.S. component of the overall pan-Pacific Ocean catch is estimated at roughly 15 percent. Albacore troll boats account for nearly all the West Coast catch. Currently there are no quotas or harvest guidelines established for North Pacific albacore catch under the HMS FMP.

#### Pacific bluefin (*Thunnus orientalis*) (ISC 2006a)

Stock status of Pacific bluefin is reviewed at one to two year intervals by the Bluefin Working Group of the ISC. The latest assessment was conducted in January 2006, but the results were not sufficient to determine stock status without high uncertainty. Nevertheless, results from the multiple models provided some common conclusions: (1) biomass has local peaks in the late 1970s and late 1990s, with a decline after the second peak; (2) recruitment in recent decades has varied considerably, and the 2001 year class appears to be strong; and (3) there is no evidence of recruitment failure in recent years (ISC 2006a). The latest assessment, consistent with the 2004 assessment, demonstrates that current fishing mortality rates likely exceed  $F_{max}$ . Noting the uncertainty in the assessments, the ISC Plenary recommended that bluefin tuna fishing mortality not be increased above recent levels as a precautionary measure.

North Pacific bluefin probably constitute a single North Pacific-wide stock with trans-Pacific migratory patterns. Most of the Pacific-wide catch occurs in the Western Pacific. The U.S. West Coast catch is taken primarily by purse-seiners operating off southern California and Baja California, Mexico, mainly between spring and fall and within 100 mi of shore. In the Eastern Pacific, bluefin taken are nearly always immature (ages 1–2) (PFMC 2003, appendix A). Catch by U.S. West Coast fisheries constitutes 2–3 percent of the Pacific-wide catch.

#### Skipjack (*Katsuwonus pelamis*) (Maunder and Harley 2004)

Stock status of skipjack tuna in the Eastern Pacific is assessed every 1–2 years if deemed necessary by the IATTC. The latest assessment was conducted in 2004. The assessment was considered preliminary because of uncertainties about stock structure, the vulnerabilities of all age classes, and how well fishery catch/effort data tracks abundance. The analysis indicated that a group of relatively strong cohorts entered the fishery in 2002–2003 (but not as strong as those of 1998) and that these cohorts increased the biomass and catches during 2003. There is an indication that more recent recruitments are average, which may lead to lower biomass and catches. Unfortunately, it was not possible to estimate the status of the stock relative to average maximum sustainable yield (AMSY), a commonly used reference point for management, because of uncertainties in estimates of natural mortality and growth.

In 2006, a full assessment was not conducted; however, an analysis of skipjack CPUE was performed which was consistent with the previous assessment (Maunder and Hoyle 2006). Thus, the IATTC concluded that there was not a conservation concern for skipjack in the Eastern Pacific and did not recommend that management was necessary.

Skipjack tuna are taken throughout the Pacific, primarily by purse-seiners, but also by baitboat fishers. In the Eastern Pacific, there are two major fisheries, one off Central and South America, and one off North America in the waters off Baja California, Mexico, the Revillagigedos Islands, and near Clipperton Island. The U.S. West Coast catch constitutes less than one percent of the total Eastern Pacific catch.

#### Yellowfin (*Thunnus albacares*) (Maunder 2007)

Stock status of yellowfin tuna in the Eastern Pacific is assessed every 1–2 years by the IATTC. The latest assessment was conducted in 2007 and is based on the assumption that there is a single stock of yellowfin tuna in the EPO, although it is likely that there is a continuous stock throughout the Pacific Ocean. Based in part on the most recent stock assessment results, NMFS has determined that EPO and WCPO yellowfin tuna stocks are subject to overfishing. Fishing is concentrated in the east and west, making separate consideration of the EPO stock relevant for management purposes.

The 2007 base case assessment, which does not include a stock-recruitment relationship, indicates that the spawning stock size has been in decline during 2002-2006 from a high point in 2001 to about the level corresponding to the AMSY. The recent fishing mortality rate ( $F$ ), an average of  $F$  for 2004-2005, is near to that corresponding AMSY. Recent catches are significantly below AMSY.

In general, the recruitment of yellowfin tuna in the Eastern Pacific has experienced two, or possibly three recruitment regimes: a period of low recruitment during 1975-1982; a period of high recruitment during 1983-2001; and now a period of intermediate or low recruitment during 2000-2006. Based on the latest assessment, under the recent lower productivity regime, the spawning biomass ratio is estimated to be below AMSY and effort levels above those which would support AMSY.

Based in part on the previous IATTC yellowfin assessment, NMFS determined that the yellowfin tuna stock in the Eastern Pacific is subject to overfishing. The PFMC is working with the IATTC to end yellowfin tuna overfishing in the EPO. Catch of yellowfin tuna by U.S. West Coast fisheries constitutes less than one percent of the Eastern Pacific-wide catch.

#### Bigeye (*T. obesus*) (Aires-da-Silva and Maunder, 2007)

Stock status of bigeye tuna in the Eastern Pacific is assessed every 1–2 years by the IATTC. The latest assessment was conducted in 2007 and is based on the assumption that there is a single stock of bigeye tuna in the EPO.

The results of the base-case stock assessment, which assumes no stock-recruitment relationship, demonstrate a continuing trend seen in the previous assessments: the biomass of 3 quarter-plus age fish was at a peak level of 614,898 mt in 1986, and has been in decline to a recent low level of 278,962 mt. Current biomass is below that corresponding to AMSY. There was a brief interruption in the biomass decline by above-average recruitment in 2001 and 2002. Recent catches are estimated to have been at about the AMSY level. Under current fishing mortality levels and patterns of age-specific selectivity, the level of fishing effort ( $F$ ) corresponding to the AMSY is about 83 percent of the current (2004-2006) level of effort.

The floating object fishery that began in 1993 catches small fish below the critical size; however, the AMSY of bigeye in the EPO could be maximized if the age-specific selectivity pattern of the fishery were similar to that for the longline fishery, which catches larger individuals. The two most recent estimates indicate that the bigeye stock in the EPO is overfished (Spawning biomass,  $S < S_{AMSY}$ ) and that overfishing is taking place ( $F > F_{AMSY}$ ). Based in part on the previous IATTC bigeye tuna stock assessment, NMFS

determined that the bigeye tuna stocks are subject to overfishing. The PFMCC is working with the IATTC to end bigeye tuna overfishing in the EPO. Catch of bigeye tuna by U.S. West Coast fisheries constitutes less than one percent of the Eastern Pacific-wide catch.

### **Status of Major Non-Target Sharks**

As with the rationale presented for delineating between major and minor non-target tuna catch, a similar approach is applied here for the shark species taken in the SSSL fishery. The focus of the analysis will be on the major non-target shark species, namely blue sharks and shortfin mako sharks. For all sharks in the management unit, the HMS FMP establishes that OY be set at 75 percent of MSY, because these species have low productivities and are vulnerable to overfishing. Status of the common thresher shark will be included in this section even though this species is considered a minor non-target species; stocks of the common thresher shark and shortfin mako shark are being managed using precautionary harvest guidelines under the HMS FMP. Basic population dynamic parameters for these shark species are poorly known, and they are considered vulnerable given their life history characteristics (slow growth, late maturing, and low fecundity). A harvest guideline is a numerical harvest level that is a general objective and is not a quota. A quota is a specified numerical harvest objective, the attainment of which triggers the closure of the fishery or fisheries for that species. If a harvest guideline is reached, NMFS initiates review of the species' status according to provisions in the HMS FMP and in consideration of the Council recommendations. Annual estimates for catch levels of common thresher shark and shortfin mako shark have been at about the level of the harvest guidelines for the time period 2001–2005.

#### Blue shark (*Prionace glauca*) (Kleiber, *et al.* 2001)

Blue sharks are found world-wide in temperate and tropical pelagic waters, but have been known to frequent inshore areas around oceanic islands and locations where the continental shelf is narrow. In the Eastern Pacific, blue sharks range from the Gulf of Alaska down to Chile, migrating to higher latitudes during the summer, and lower latitudes during the winter.

Within the U.S. West Coast EEZ, blue sharks are entangled in pelagic DGN gear, but rarely taken by other commercial HMS gears. On the high-seas, blue sharks have been caught with longline gear in the Hawaii-based SSSL fishery and the California-based SSSL fishery prior to its closure. In addition, blue sharks are caught in the deeper-set tuna longline fisheries. Most commercially-caught blue sharks are considered undesirable bycatch, since the meat quickly ammoniates, reducing marketability. As with several other shark species, the fins of blue sharks are sold to Asian markets for use in shark-fin soup. However, since implementation of the U.S. Shark Finning Prohibition Act which prohibits landing shark fins without accompanying carcasses, blue sharks are rarely landed or marketed when taken in U.S. commercial fisheries. Recreationally, blue sharks are considered a sport fish and larger individuals provide a challenge for fishermen using light tackle. Because most of the recreational shark trips are based out of southern California, and the average size of blue sharks taken is small (7 lb), blue sharks are often caught and released in this fishery. The blue shark is currently listed as “near threatened” by The World Conservation Union (IUCN).

For the North Pacific blue shark population, a range of examples of what might be considered “plausible” Maximum Sustainable Yield (MSY) were calculated in 2001 (Kleiber, *et al.* 2001). The data on which the analysis was based consisted of catch, effort, and size composition data collected during the period 1971–1998 from commercial fisheries operating in the North Pacific west of 130° W. longitude; primarily the Japan- and Hawaii-based pelagic longline fisheries, which catch significant numbers of blue sharks. The results indicated that the blue shark stock, under the fishing regime present at that time in the North Pacific, appeared to be in no danger of collapse. An updated analysis covering the same spatial area and which included data through 2003 was recently completed and produced results similar to the previous

assessment, namely that blue sharks in the North Pacific are neither suffering overfishing nor approaching an overfished state (Sibert, *et al.* 2006).

#### Shortfin mako shark (*Isurus oxyrinchus*) (PFMC 2003)

The shortfin mako shark occurs throughout the tropical and temperate Pacific, but is not managed internationally. The mako is widely distributed in pelagic waters, and the population fished off the West Coast is likely part of a stock that extends considerably to the south and west. Although makos are most frequently found above the mixed layer, they have been recorded down to depths of 740 m. Tagging and fishery catch data show makos prefer water temperatures between 17–20 degrees C, and it has been hypothesized that this species migrates seasonally from the coast of California along the Baja peninsula following favorable seasonal water conditions (Cailliet and Bedford 1983). This movement pattern has been supported by tag and release studies. West Coast commercial fisheries take mainly juveniles, with an average dressed weight of 34 lb (Leet, *et al.* 2001). Shortfin mako constitutes an important incidental catch whose market quality and ex-vessel value make it an important component of the landed catch of the DGN fishery (Cailliet and Bedford 1983; Holts and Sosa-Nishizaki 1998).

Shortfin mako is an important component of California's ocean recreational fishery. The majority are caught by anglers fishing with rod-and-reel gear from private vessels in the Southern California Bight from June through October, with a peak in August. Historically, makos have been esteemed as a prized game fish along the east coast of the United States. During the early 1980s, they increased in prominence as a popular game fish on the U.S. West Coast as well, with annual West Coast catches peaking in 1987 at 22,000 fish. Since 2001, annual catch estimates have ranged from 2,000–6,000 fish, with a percentage of sharks successfully released by southern California fishermen favoring catch-and-release versus harvest (Sepulveda 2006).

Because basic population dynamic parameters for this species of shark are unknown, it is being managed under the HMS FMP with a precautionary harvest guideline of 150 mt. Catch statistics from the CA/OR DGN fishery suggest that the shortfin mako was not overexploited through the 1990s; however, CPUE rates indicated a possible overall decrease (PFMC 2003). Clear effects of exploitation have not been shown, and it is tentatively assumed that overfishing of the local stock is not occurring. The IUCN currently lists the shortfin mako as "Near Threatened" due to a lack of evidence that population levels have been sufficiently depleted.

#### Common thresher shark (*Alopias vulpinus*)

The common thresher shark is a pelagic species inhabiting both coastal and oceanic waters throughout the tropical and temperate Pacific. Most West Coast commercial landings of common thresher are presently taken in the DGN fishery, but some are also caught by set nets and the small-mesh drift nets. Adults are predominantly taken in the DGN fishery, while the inshore net fisheries land predominantly juveniles. Although temporal and regional closures have resulted in the take of fewer adults than in previous years, the common thresher remains an important component of the DGN fishery. Common thresher populations off Baja California are thought to be of the same population as those fished off the U.S. West Coast (Hanan, *et al.* 1993). Common thresher sharks are not commonly taken in the shallow set longline fisheries outside the U.S. EEZ; however, they have occasionally been caught during fishery independent longline surveys and in a small scale longline fishery for mako sharks which operated within the U.S. EEZ from 1988-91 (O'Brien and Sunada 1994), demonstrating that they are vulnerable to longline gear.

Common thresher sharks are harvested in California's recreational fishery, but are a relatively minor component of the overall total catch. Private boaters catch thresher sharks as they migrate from Baja California, Mexico, to Oregon and Washington in the spring and early summer months. From 1982–

2004, private boaters caught on average 2,000 fish annually. Since 2001, annual RecFIN catch estimates have ranged from 2,000–4,000 fish; however, some uncertainty exists with these catch estimates due to a low number of sampler contacts with fishers.

Thresher sharks are often hooked on the upper lobe of the caudal fin, which is used to stun prey. Catch-and-release mortality is assumed higher for sharks hooked and fought in this fashion (Sepulveda 2006). The estimates of fishing mortality on recreational landings for the common thresher shark in California are considered underestimated and additional monitoring is needed. Similarly, little is known about the take of common thresher sharks in fisheries off Mexico because shark landings are not routinely reported by species, and the pelagic thresher shark is also common off Mexico.

The thresher shark is considered a “data deficient” species by IUCN worldwide. However, because of population depletion by the U.S. West Coast DGN fishery in the 1980s, the California population is considered “near-threatened” (Goldman 2005).

With State-imposed time and area restrictions in place for the DGN fishery since 1990, the population appears to be in recovery; however, because this stock is also harvested by the adjacent Mexican fishery, total annual landings are not well understood for this species. A regional harvest guideline of 340 mt is in place under the HMS FMP. Average annual commercial catch levels for the common thresher shark during the time period 2001–2005 averaged 254 mt.

### **Status of Major Non-Target Billfish**

#### Striped marlin (*Tetrapturus audax*)

Stock status of striped marlin in the Eastern Pacific has been assessed regularly by the IATTC. The latest EPO assessment was conducted in 2003. The Marlin Working Group of the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC) also recently conducted an assessment of the North Pacific striped marlin population status (ISC 2006b). The stock structure of striped marlin in the Pacific Ocean is not well known. An analysis of trends in catches per unit of effort in several sub areas suggest that the fish in the EPO constitute a single stock thus that is an assumption of the IATTC assessments.

Striped marlin are found throughout the Pacific Ocean between about 45° N. and 45° S. latitude. They are caught mostly by the longline fisheries of the Far East and Western Hemisphere nations. Lesser amounts are caught by recreational, gillnet, and other fisheries. The HMS FMP prohibits commercial take of striped marlin, however there is a small seasonal recreational fishery for striped marlin in the Southern California Bight in the late summer months. Similarly, in Mexico, commercial take of striped marlin is prohibited within 50 nmi of the coast to provide opportunities for recreational anglers.

For the EPO assessment, standardized catch rates were obtained from a general linear model and from a statistical habitat-based standardization method. Analyses of stock status were made using two production models, taking into account the time period when billfish were targeted by longline fishing in the EPO, that were considered the most plausible. A Pella-Tomlinson model yielded estimates of the AMSY in the range of 3,700–4,100 short tons (st)<sup>22</sup> with a current biomass being about 47 percent of the unfished biomass. The current biomass is estimated to be greater than the biomass that would produce the AMSY. An analysis, using the Deriso-Schnute delay-difference model, yielded estimates of AMSY in the range of 8,700–9,200 st, with the current biomass greater than that needed to produce the AMSY, and about 70 percent of the size of the unexploited biomass.

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<sup>22</sup> The IATTC uses short tons in its stock status reports. 1 short ton is equal to 0.9072 metric ton.

The catches and standardized fishing effort for striped marlin decreased in the EPO from 1990–1991 through 1998, and this decline has continued, with the annual catches during 2000–2003 between about 2,000–2,100 st, well below estimated AMSY. This may result in a continued increase in the biomass of the stock in the EPO.

The status of a hypothesized stock of striped marlin spanning the North Pacific was conducted by the ISC in 2007. The status is difficult to determine due to a range of uncertainties in the fishery data as well as biological uncertainties (e.g. maturity schedule, growth rates, stock structure, etc.). Nonetheless, the results of the two models demonstrate that biomass has declined to levels that are 6 to 16 percent of their level in 1952. In addition, landings and indices of abundance have declined markedly, and recruitment has been steadily declining with no evidence that strong year-classes have or are about to enter the fishery. There appears to be inconsistency in the indices developed for the Western Pacific and the Eastern Pacific, and it was recommended that future modeling efforts include spatial segregation. The ISC Plenary recognized that current levels of fishing effort across the North Pacific are not likely to be sustainable, and recommended that fishing effort not be increased above current levels. Catch of striped marlin by U.S. West Coast fisheries constitutes about one percent of the Eastern Pacific-wide catch.

### **Status of Major Non-target Finfish**

#### Dorado (*Coryphaena hippurus*)

Dorado are predominantly a warm water tropical species that are seasonally abundant in the SCB most likely from populations reproducing off Baja California, Mexico. Catch estimates from international fisheries are poorly documented due in part to the artisanal fishing nature of this fishery, and due to the lack of bycatch monitoring programs. West Coast fishermen access the northern range of the species; there are no HMS FMP harvest guidelines recommended at this time (PFMC 2003). The total landings for all of the West Coast commercial fisheries in 2003 and 2004 were 6 and 1 round mt, respectively. This species is more important in the recreational fishery with an average of 912 fish caught annually along the Pacific coast (PFMC 2006).

Dorado are fast-growing and highly productive species with a short life span of 2–4 years and the ability to rebound relatively quickly from exploitation. Females mature at 4–7 months and spawning can occur all year long in the tropics. The high adult mortality rates may limit the resiliency of this species (PFMC 2003). Dorado from the Eastern Pacific Ocean feed during both day and night, and dominant prey species vary by location (Olson and Galvan-Magana 2002).

#### Pelagic stingray (*Pteroplatytrygon (Dasyatis) violacea*)

The pelagic stingray is found worldwide in latitudes spanning tropical to temperate waters. This species is small, reaching a maximum size of 80 cm (disc width), and sexual maturity occurs at an average 37.5 cm in males and an average of 50 cm in females. There is evidence suggesting that the Eastern Pacific population migrates to the warmer waters off Central America during the winter. Females give birth in the warmer waters before migrating to higher coastal latitudes such as along the Southern California Bight. This species is commonly found within the top 100 m in deep, blue water zones and are often caught as bycatch in longline and DGN fisheries targeting HMS (Mollet 2002).

#### Escolar (*Lepidocybium flavobrunneum*)

The black escolar occurs throughout the world's oceans and are distributed between 40° N. and 40° S. latitude. Biological information is lacking for the Pacific populations. Daily catch and fishing effort data was used to determine escolar population structure for the Southwestern Atlantic Ocean (SAO). In the SAO, black escolar are taken as incidental catch when longlining for tuna and swordfish. It was found that the intra-annual catch patterns for the black escolar were similar to those of the target species. This suggests that escolar have similar trophic and reproductive behavior as tuna and swordfish. Highly productive oceanic fronts that are developed in winter and spring attract pelagic species that feed on squid and anchovy. Catches are lower in the summer when presumably escolar are migrating to lower latitudes to reproduce (Milessi and Defeo 2002). In California, escolar were the third most frequently caught species in the pelagic longline fishery with 132 total fish, along with 504 swordfish, and 459 blue sharks in 2001-2002. Catches of escolar declined slightly throughout 2002-2004 (PFMC 2006).

#### Common mola (*Mola mola*)

Common mola, also known as ocean sunfish, are a seasonally common inhabitant of southern Californian waters. Presently, very little is known about the habitat preferences or behavior of ocean sunfish, but prevailing thought is that molas associate with frontal and stratified water masses rather than in cooler, mixed water (Cartamil and Lowe 2004; Sims and Southall 2002). Key aspects of their biology are largely unknown, such as annual movements and the mode and location of breeding. With respect to mola migrations into the SCB, peak abundance occurs off of Catalina Island in late September and early October, coinciding with peak water temperatures (Cartamil 2006).

Research in the Atlantic suggests that the larger part of their lives may be spent in deep water, although they are thought to undertake seasonal inshore migrations (Fraser-Bruner 1951; Lee 1986). This is especially important in some regions, like the Mediterranean, where molas can constitute 70-95 percent by number of driftnet catches (Silvani, *et al.* 1999). Mola catches in the DGN fishery for the years 2001-2004 make up 30 and 44 percent of the total catches by number, north and south of Point Conception, respectively. There is scant information available on the population dynamics of this species.

#### Pacific pomfret (*Brama japonica*)

The Pacific pomfret is an oceanic species distributed from southern California to the Gulf of Alaska, Aleutian Islands, and to the Pacific Coast of Japan. The southern limit to their distribution appears to be about 20° N. latitude where surface water temperatures exceed 70 degrees F. They are pelagic and found in near-surface waters to depths of 50 fathoms. Distribution (north-south as well as vertical) seems to be strongly controlled by temperature; they are usually found in water temperatures between 50-66 degrees F (McCrae 1994). Squid, fish and crustaceans are the most common food items. Sharks and some species of whales may be the major predators of Pacific pomfret. Maximum size is about 62 cm with most fish caught in the 30-50 cm length range and estimated to be 4-6 years old. Large fish are generally found farther north than smaller fish that stay in the more southerly waters during the summer and do not migrate north. Pomfret have been a large component of the bycatch in the Asian DGN fisheries for flying squid, and gillnet and purse-seine fisheries for salmon in Alaska. The estimated catch of Pacific pomfret in the squid fisheries in 1990 and 1991 was 1,329 million and 82 million fish, respectively (McCrae 1994). There is no recreational fishery for pomfret.

### **3.3.3 Status of Prohibited Species**

Any HMS stocks managed under the HMS FMP for which quotas have been achieved and the fishery closed are deemed prohibited species. In addition, table 3-10 lists the prohibited non-HMS finfish species designated under the HMS FMP. In general, prohibited species must be released immediately if caught, unless other provisions for their disposition are established, including for scientific study.

**Table 3–10. HMS FMP Prohibited Species.**

<b>Common Name</b>	<b>Scientific Name</b>
Great white shark	<i>Carcharodon carcharias</i>
Basking shark	<i>Cetorhinus maximus</i>
Megamouth shark	<i>Megachasma pelagio</i>
Pacific halibut	<i>Hippoglossus stenolepis</i>
Pink salmon	<i>Onchorhynchus gorbuscha</i>
Chinook salmon	<i>O. tshawytscha</i>
Chum salmon	<i>O. keta</i>
Sockeye salmon	<i>O. nerka</i>
Coho salmon	<i>O. kisutch</i>

### 3.3.3.1 Salmon

The chinook (king) and coho (silver) salmon are the major salmon species taken mainly with troll gear in California, Oregon, and Washington fisheries. Sockeye, chum, and steelhead are rarely caught in these fisheries. Distribution of the prohibited salmon species range from Japan to the Bering Sea and south to San Diego, California; although, most occur north of Santa Cruz, California. In recent years, because of the critically low population sizes of some salmon stocks and threats to their continued existence, certain stocks in California and Oregon have been listed as endangered or threatened species under the ESA. There have been no recorded interactions of listed or non-listed salmon stocks with the SSL fishery or the DGN fishery. The proposed action should also not have any interactions.

### 3.3.3.2 Great White Shark

The great white shark is an oceanic and coastal inhabitant ranging in the Eastern Pacific from the Gulf of Alaska to the Gulf of California, although it appears to prefer temperate waters (Eschmeyer, *et al.* 1983). As a large, true apex predator, this species is relatively rare. This shark commonly patrols small coastal archipelagos inhabited by pinnipeds (seal, sea lions, and walruses); offshore reefs, banks, and shoals; and rocky headlands where deepwater lies close to shore. Its low productivity and accessibility in certain localized areas make it especially vulnerable. Overall population estimates for this species are unknown and even regional and localized estimates are questionable.

Adult great whites sighted off northern California most likely originate from southern California. The northward migration may be triggered by a shift in dietary preference toward seals and sea lions as the sharks grow large (Klimley 1994). Large males and females tend to be captured along the northern coast, while juveniles as well as large females are generally found to the south. This species has been prohibited by the State of California since 1995; it may not be taken except for scientific and educational purposes under permit. The HMS FMP adopts the State measures across the board. At present, the great white shark is listed as “vulnerable” by the IUCN throughout its range, and is now protected in some regions.

In 2004, the Convention on International Trade in Endangered Species (CITES) placed this shark on its Appendix II list, which demands tighter regulations and requires a series of permits that will control the trade in great white shark products.

There have been three recorded interactions with the DGN fishery: one in December 1996, and two in September 1997. Two were retained as incidental catch and one was discarded dead. There has been one recorded interaction of a great white shark in the Hawaii-based SSL fishery based on observer records.

The animal was captured on February 10, 1997 and was retained for sale. The proposed SSLL EFP may potentially have a higher degree of interaction with great white sharks given the larger number of animals that have been observed in the proposed action area. As a prohibited species under the HMS FMP, any great white shark captured during the EFP will need to be immediately released.

### 3.3.3.3 *Basking Shark*

The basking shark is a coastal pelagic species inhabiting the Eastern Pacific from the Gulf of Alaska to the Gulf of California. The basking shark is typically seen swimming slowly at the surface, mouth agape in open water near shore. This species is known to enter bays and estuaries as well as venturing offshore. Basking sharks are often seen traveling in pairs and in larger schools of up to 100 or more. Basking sharks are highly migratory. Sightings of groups of individuals of the same size and sex suggest that there is pronounced sexual and population segregation in migrating basking sharks.

In the past, basking sharks were hunted worldwide for their oil, meat, fins, and vitamin-rich livers. Today, most fishing has ceased except in China and Japan. The fins are sold as the base ingredient for shark fin soup. A small fishery took place off Monterey Bay during the period from 1924 to the 1950s for fish meal and liver oil; it is still taken as bycatch in the area. Basking sharks occur in greatest numbers during the autumn and winter months off California, but may shift to northern latitudes in spring and summer along the coasts of Washington and British Columbia. The harvest of this species has not been allowed by California since 2000, and the HMS FMP adopted the same State measures. It is thought to be the least productive of shark species. The basking shark is also currently categorized as “vulnerable” throughout its range and “endangered” in the Northeast Atlantic Ocean and North Pacific Ocean regions by the IUCN. There have been two recorded captures of basking shark in the DGN fishery (December 1993, May 2002); one was released alive and one was released assumed dead. There has been one recorded interaction of a basking shark in the Hawaii-based SSLL fishery based on observer records. The shark was captured December 3, 2003, and was discarded dead.

### 3.3.3.4 *Megamouth Shark*

The megamouth shark is a very unique animal that lives in the upper part of the water column in open ocean areas. There have been only a few sightings of megamouth, including a specimen that was tagged and followed for two days, allowing insight into its habitat preference and behavior. The shark remained at a depth of 15 m during the night, then dove to 150 m at dawn and returned to shallow waters at dusk. The megamouth is presumed to be a vertical migrator on a diel cycle, spending the daytime in deep waters and ascending to midwater depths at night. This vertical migration may be a response to the movements of the small animals on which it feeds. The krill that make up part of megamouth’s diet are known to migrate from deep waters to the surface.

The HMS FMP provides protection as a prohibited species because of extreme rarity and uniqueness. Due to the lack of information concerning distribution and population status, the megamouth is considered “data deficient” by the IUCN.

Incidentally-caught specimens that would not survive if released are made available to recognized scientific and educational organizations for research or display purposes. Four specimens of this rare species have been taken in the DGN fishery; all but one was released alive (November 1984, October 1990, October 1999, and October 2001). (A review of world-wide megamouth captures, including the four DGN interactions, can be found at Florida Museum of Natural History 2006)<sup>23</sup>. There have been no recorded interactions of megamouth sharks in the SSLL fishery based on observer records.

<sup>23</sup> <http://www.flmnh.ufl.edu/fish/Sharks/Megamouth/mega.htm>.

### 3.3.3.5 Pacific Halibut

Pacific halibut occur from the Sea of Japan to the Bering Sea and south to Santa Rosa Island, southern California. Pacific halibut is an important commercial and sport species in the Pacific Northwest, and fished commercially by longline, set gillnet and recreational hook-and-line fisheries. There have been no recorded interactions of Pacific halibut in the SSSL fishery.

## 3.4 Protected Species

The West Coast EEZ nearly encompasses the California Current and as described above hosts a wide array of species including marine mammals, sea turtles, threatened and endangered fish species, and seabirds. These animals are protected under the MMPA (all marine mammals), the ESA (if listed as threatened or endangered), and the MBTA (within three nautical miles of the coast). This section will address effects on marine mammals and sea turtles. Seabirds are addressed in section 3.5. As described above in section 3.3.3.1, no ESA-listed salmon species are expected to be affected by the proposed action. Similarly, no listed species of steelhead, white abalone or green sturgeon are likely to be affected. A full description of all marine mammal species likely to occur in the proposed action area can be found in the U.S. Pacific Marine Mammal Stock Assessments (SARs): 2006 (Carretta, *et al.* 2007) and the Alaska Marine Mammal SARs: 2006 (Angliss and Outlaw 2007). A comprehensive review of the status of leatherback sea turtles can be found in the Biological Opinion for the DGN EFP (NMFS 2006c) and a review of all sea turtles in the area can be found in the HMS FMP Biological Opinion (NMFS 2004c).

This section provides information about the current environmental baseline for protected species in two ways. First, an exposure analysis is presented, utilizing historical data from the DGN fishery and observer data from longline fisheries in various parts of the United States, along with information on the biology and distribution of the various species within the proposed action area. Because there has been no longline fishery within the West Coast EEZ and therefore no direct data from which to project likely impacts on protected species, the exposure analysis serves to screen for those protected species most likely to be affected by the proposed action. Second, other past, present and reasonably foreseeable actions are reviewed in order to provide information about the cumulative effects of the proposed action; these cumulative effects are considered in the summary evaluation in section 4.4.

### 3.4.1 Marine Mammals

All marine mammals that may be found in the action area are listed below. A description of all marine mammals that may be found within the proposed action area can be found in the Pacific SARs (Carretta, *et al.* 2007); the Alaska SARs (Angliss and Outlaw 2006); and the draft Environmental Assessment prepared for the 2006 DGN EFP (NMFS and PFMC 2006). All marine mammals are protected under the MMPA and managed under that statute on a stock basis.

#### Cetaceans

Dall's porpoise (*Phocoenoides dalli*) – CA/OR/WA stock

Harbor porpoise (*Phocoena phocoena*) - Morro Bay stock, Monterey Bay stock, San Francisco-Russian River stock, northern CA/southern OR stock, OR/WA stock.

Pacific white-sided dolphin (*Lagenorhynchus obliquidens*) – CA/OR/WA stock, northern and southern stocks

Risso's dolphin (*Grampus griseus*) – CA/OR/WA stock

Bottlenose dolphin offshore stock (*Tursiops truncatus*) – CA/OR/WA stock

Short-beaked (*Delphinus delphis*) – CA/OR/WA stock

Long-beaked common dolphins (*Delphinus capensis*) – CA stock

Northern right whale dolphin (*Lissodelphis borealis*) – CA/OR/WA stock  
Striped dolphin (*Stenella coeruleoalba*) – CA/OR/WA stock  
Short-finned pilot whale (*Globicephala macrorhynchus*) – CA/OR/WA stock  
Sperm whale (*Physeter macrocephalus*) – CA/OR/WA stock  
Dwarf sperm whale (*Kogia sima*) - CA/OR/WA stock  
Pygmy sperm whale (*Kogia breviceps*) - CA/OR/WA stock  
Killer whale (*Orcinus orca*) – Eastern North Pacific offshore stock, Eastern North Pacific southern resident stock  
Mesoplodont beaked whales (*Mesoplodon* spp.) - CA/OR/WA stock  
     Hubbs' beaked whales  
     Ginkgo-toothed whale  
     Stejneger's beaked whales  
     Blainville's beaked whales  
     Pygmy beaked whale or lesser beaked whale  
     Perrin's beaked whale  
     *Due to the difficulties involved with identifying different species, as well as the rarity of these species, the SAR for these species designated all Mesoplodont beaked whales as one stock in the EEZ waters off the coasts of CA/OR/WA*  
Cuvier's beaked whale (*Ziphius cavirostris*) - CA/OR/WA stock  
Baird's beaked whale (*Berardius bairdii*) – CA/OR/WA stock  
Blue whale (*Balaenoptera musculus*) – Eastern North Pacific stock  
Fin whale (*Balaenoptera physalus*) - CA/OR/WA stock  
Gray whale (*Eschrichtius robustus*) - Eastern North Pacific  
Humpback whale (*Megaptera novaeangliae*) - Eastern North Pacific stock  
Minke whale (*Balaenoptera acutorostrata*) - CA/OR/WA stock  
Northern right whale (*Eubalaena glacialis*) - North Pacific  
Sei whale (*Balaenoptera borealis*) - Eastern North Pacific stock

### **Pinnipeds**

Steller sea lions (*Eumetopias jubatus*) – Eastern U.S. stock  
California sea lion (*Zalophus californianus*) – U.S. stock  
Guadalupe fur seal (*Arctocephalus townsendi*) – Only one extant population  
Harbor seal (*Phoca vitulina richardsi*) – CA stock, OR and WA stock  
Northern elephant seal (*Mirounga angustirostris*) – CA breeding stock  
Northern fur seal: (*Callorhinus ursinus*) – San Miguel Island stock

Some marine mammals within the area are also listed under the ESA (table 3–11). ESA-listed marine mammals under NMFS's jurisdiction are listed below. Under the ESA, marine mammals are generally listed based upon the global population, not by stocks (as under the MMPA), although some distinct population segments (DPS) are listed (e.g., the Eastern North Pacific (ENP) resident killer whale DPS).

**Table 3–11. Threatened or endangered under the ESA, under NMFS’s jurisdiction, and occurring in the waters off California, Oregon, and Washington.**

Marine Mammals	Status
Blue whale ( <i>Balaenoptera musculus</i> )	Endangered
Fin whale ( <i>Balaenoptera physalus</i> )	Endangered
Humpback whale ( <i>Megaptera novaeangliae</i> )	Endangered
Sei whale ( <i>Balaenoptera borealis</i> )	Endangered
Sperm whale ( <i>Physeter macrocephalus</i> )	Endangered
Steller sea lion - eastern distinct population segment (DPS) ( <i>Eumetopias jubatus</i> )	Threatened
Killer whales - southern resident DPS ( <i>Orcinus orca</i> )	Endangered
Northern Right Whale ( <i>Eubalaena glacialis</i> )	Endangered
Guadalupe fur seal ( <i>Arctocephalus townsendi</i> )	Threatened

#### 3.4.1.1 Marine Mammal Species Most Likely to be Affected by the Action

In order to determine which species are most likely to be affected by the proposed EFP fishery the following data were reviewed: observer records from the DGN fishery; the California-based SLL and DSLL fisheries (both prosecuted outside the EEZ, thus outside the action area); the Hawaii SLL and DSLL fisheries; and other U.S. longline fisheries for which observer information was available and applicable to this analysis. The Hawaii SLL fishery is the only fishery that currently utilizes gear (e.g., circle hooks and mackerel bait) similar to the proposed action (Atlantic longliners use circle hooks with mackerel or squid bait). In addition, patterns of distribution and abundance of various species within the proposed action area were reviewed. When considered together, these data provide the basis of an exposure analysis to determine which marine mammals are most likely to be exposed to the longline fishery and affected by its prosecution as proposed in the alternatives.

As previously described, there has not been a longline fishery in the West Coast EEZ, so there are no records from such a fishery to assist in predicting the effect of the proposed action on marine mammals. However, within the proposed time and area, a DGN fishery has occurred and observer records dating back to 1990 are available. These records were reviewed as a first step in understanding marine mammal exposure to the proposed fishery. In both the historic DGN and proposed longline fishery, gear is set at night and allowed to soak overnight and both gears are fished to target primarily swordfish. The two fisheries overlap temporally, with most DGN activity occurring from September 1 through December 31, the same time period as the proposed longline EFP fishery.

There are, however, two key differences between the two fisheries that should be considered. First, fishing under the preferred alternative for the longline EFP would occur at least 40 nmi offshore of the West Coast in waters north of Point Conception and west of the SCB south of Point Conception and includes the EEZ off California and Oregon south of 45° N. latitude (under the preferred alternative). It should be noted that this area does not precisely match the area of historic DGN effort, some of which occurred within 40 nmi of shore (see Carretta, *et al.* 2005 for a map of the distribution of DGN effort from 1996 to 2002). Second, the DGN observer records likely do not reflect likely takes in the proposed longline EFP, since the nature of the interactions with marine mammals are different, as described in the following paragraphs.

Gillnet gear has been identified as a major source of anthropogenic mortality for marine mammals species globally (Perrin, *et al.* 1994). The cause of entanglements in gillnets is usually attributed to marine mammals being unable to detect the net and becoming entangled. This is supported by the substantial decline of marine mammal entanglements in the DGN fishery during field testing of pingers (Barlow and Cameron 2003) and following the implementation of the Pacific Offshore Cetacean Take Reduction Plan

(POCTRP) (NMFS SWR Observer Program unpublished data) which includes a requirement that acoustic pingers be attached to DGN nets (62 FR 51805). By contrast, marine mammal takes in longlines are generally attributed to odontocetes (toothed whales) either feeding on the bait, or fish caught on the hooks, a behavior referred to as depredation; less frequently, marine mammals are entangled in longline gear (Gilman, *et al.* 2006a). Entanglements of large baleen whales have been recorded in the Hawaii-based SSSL fishery although they are not common (Forney 2004). A direct comparison of gillnet and longline marine mammal CPUEs could not be made for this EA as no comparable fishery records could be found of gillnets and longline occurring in the same area, time, and target species. Although a review of the observer records from California, Hawaii, and the Atlantic suggest that marine mammal entanglements of most species are generally quite low in longline fisheries.

**Table 3–12. Marine mammals observed taken in the DGN fishery.**

<b>Species</b>	<b>Number observed taken</b>
Beaked Whale, Baird's	1
Beaked Whale, Cuviers	21
Beaked Whale, Hubbs'	5
Beaked Whale, Mesoplodont	2
Beaked Whale, Stejneger's	1
Beaked Whale, Unidentified	3
Dolphin, Bottlenose	3
Dolphin, Long-Beaked Common	14
Dolphin, Northern Right Whale	65
Dolphin, Pacific White-sided	28
Dolphin, Risso's	33
Dolphin, Short-Beaked Common	327
Dolphin, Striped	1
Dolphin, Unidentified Common	21
Porpoise Dall's	22
Sea Lion, California	153
<i>Sea Lion, Steller</i>	2
Seal, Northern Elephant	112
<i>Whale, Fin</i>	1
Whale, Gray	3
<i>Whale, Humpback</i>	3
Whale, Killer	1
Whale, Minke	3
Whale, Pygmy Sperm	2
Whale, Short-finned Pilot	12
<i>Whale, Sperm</i>	8

While the DGN and SSSL gears likely have different CPUEs and may result in different probabilities of marine mammal takes, the DGN data present a useful starting point from which to identify species that may be exposed to longline gear fished under the proposed EFP. Table 3–12 provides the number of marine mammals observed taken in 7,221 sets from 1990-2005 (NMFS SWR Observer Program unpublished data). Species in italics are also listed under the ESA.

In the EFP proposal received by the Council, the applicant suggested utilizing CPUEs developed from the DGN records and applying that rate to 56 sets (assuming that effort could be standardized and that one set of a DGN gear would equal one set of a SSSL gear). While this approach must be viewed with caution due to the differences between the DGN fishery and the proposed longline fishery, it does suggest a low probability that most marine mammal species will be taken in the longline EFP fishery. As can be seen in table 3–12, takes of some species are very rare (e.g., one fin whale observed taken in 16 years).

Quantifying likelihoods of takes based upon such rare events is difficult and may not allow for reasonable projections of future takes, particularly in instances where so little is known about the nature of the interaction and the cause for entanglements. For this reason and the difficulty in using the DGN fishery as a proxy for likely takes under the longline EFP, a review of the biology and known distribution of various marine mammals was conducted along with a review of other SSLL fisheries to provide a more qualitative probability of exposure and effects to marine mammal species.

### **ESA-listed Marine Mammals**

Several species of ESA-listed large baleen whales (blue, fin, and humpback whales), spend the summer and fall feeding in waters off California within the EEZ which places them in the area of the proposed action. Feeding aggregations have been observed in the summer and fall in central California and the waters around the Channel Islands (Carretta, *et al.* 2007). A number of listed whales migrate through the action area in the fall (including humpbacks that spend their summers feeding off Oregon, Washington, and British Columbia, Canada). One ESA-listed baleen whale, the sei whale, is not expected to be affected by the action as this species has rarely been observed in the West Coast EEZ and has not been observed incidentally taken in the DGN fishery that operated within the proposed action area of the SSLL EFP. For the species that utilize the action area for feeding and as a migratory corridor, exposure to and entanglement in longline gear is possible. Because there is no direct information on interactions between ESA-listed whales and a longline fishery within the EEZ, other sources of information were used to evaluate the likelihood of interaction with these species.

The first source of information is the historical DGN fishery observer records. As noted in table 3–12 , over the course of 16 years and 20 percent observer coverage, very few ESA-listed baleen whales were observed entangled in DGN gear; three humpbacks, one fin, and no blue whales were observed entangled in DGN gear, suggesting that interactions between fishing gear and these whales are rare. For humpback and fin whales, utilizing the applicant’s method of using the CPUEs developed for the DGN fishery and applying them to the potential SSLL EFP effort yield projected incidental take rates much lower than one (two and three orders of magnitude less than one) suggesting an extremely low likelihood of interactions. Also, all observed takes of humpback and fin whales occurred within the SCB, which is not a part of the proposed action area. When considering the DGN observer data it must be remembered that it is possible that these large species (up to 100 foot long blue whales) may have interacted with gear, but were able to “burst” through the gear before becoming entangled. In order to further consider the assumption that the likelihood of interaction with ESA-listed baleen whales is low, observer data from the California-based SSLL outside the EEZ were reviewed and indicated that none of these species were observed taken during that fishery. This data may not directly reflect the likelihood of interactions with these listed species, since they do not include the nearshore migratory corridors or summer feeding areas utilized during the summer and fall by listed whales.

In order to assess the likelihood of interactions within a similar environment (i.e., baleen whale feeding area and migratory corridor), information from the Atlantic HMS observer program was reviewed. In twelve years of observing the Atlantic HMS fishery (at approximately five percent annually) there are no records of entanglements between ESA-listed whales commonly found in the area (e.g., sei, blue, humpback, fin) and the commercial pelagic longline fishery along the Atlantic coast (NMFS 2004d). There was one account of an unidentified large whale entangled in gear during the Northeast Distant (NED) experiments testing modified longline gear (circle hooks) and methods. While the animal could not be positively identified, it was likely a listed species based upon the known distribution of whale species in the NED. The animal was released unharmed without any trailing gear (NMFS 2004d). In the Hawaii SSLL fishery, only one humpback whale has been observed entangled in gear (in 2006) during 2,631 observed sets (2,150,681 hooks) since 2004 (NMFS PIRO Observer Program unpublished data). The whale entangled in 2006 was released alive, although final assessment of its condition (i.e., seriously

injured or not) has not been made (Yates 2007). In the SSSL fishery from 1994-2002, there were no observed takes of ESA-listed baleen whales (Forney 2004). However, one incidental take of a humpback did occur in 2006 in the Hawaii-based SSSL fishery.

In order to attempt to quantify likely effects of the proposed SSSL EFP on ESA-listed whales, CPUEs for three ESA-listed marine mammal species that have been observed taken in the DGN fishery were calculated (no blue whales have been observed taken, so the CPUE is zero). The CPUEs were applied to the anticipated number of sets, 56, and estimated whale takes were extremely low. The incidental take of large whales is quite rare in SSSL gear; therefore there is limited utility in applying CPUE rates to the proposed action, since takes may be too rare to make this a meaningful way of predicting take. Nonetheless, a CPUE per 100 sets in the Hawaii SSSL was calculated simply to demonstrate the low level of takes (see table 3-13). If these rates are applied to the anticipated 56 sets in the proposed action, the resulting takes are considered nil.

In an attempt to identify a proxy fishery that may reflect habitat utilization similar to that utilized by marine mammals on the West Coast, observer data from the Atlantic HMS fishery and stock abundance was reviewed. No take of ESA-listed marine mammals has been observed nor is it anticipated in the Atlantic-based SSSL fishery. Some of the areas fished overlap feeding areas and migratory corridors for ESA-listed marine mammal species, similar to the conditions in the West Coast EEZ, thus this may serve as a better ecological proxy for the anticipated takes in the proposed fishery than the Hawaii SSSL fishery or the DGN fishery, suggesting that the likelihood of takes is quite low.

Based upon the rarity of observed interaction between DGN gear and large baleen whales and the rarity of entanglements in SSSL fisheries in Hawaii and the Atlantic it is not likely that the fishing that would occur under the EFP would affect ESA-listed baleen whales, blue, fin, or humpback whales (table 3-13).

**Table 3-13. Observed takes in SSSL fisheries and minimum population estimates for ESA-listed stocks that may be affected by SSSL EFP.**

Species	Take in HI SSSL	Takes per 100 sets	N(min) (HI stock)	Observed takes in Atlantic-based SSSL	N(min) (Atlantic stock)	N(min) (US West Coast stock)
Humpbacks	1	.0005	1,234	0	647	1,396
Fin	0	0	174	0	2,362	3,454
Sperm	2	.0713	7,082	0	3,539	2,265
Blue	0	0	308	0	unknown	1,384

Based upon the rarity of observed interaction between DGN gear and large baleen whales and the rarity of entanglements in SSSL fisheries in Hawaii and the Atlantic it is not likely that the fishing that would occur under the EFP would affect ESA-listed baleen whales, blue, fin, or humpback whales.

Sperm whales are listed as endangered and are found throughout the California Current off the U.S. West Coast, reaching peak abundances off of California from April to mid-June and the end of August through mid-November (Rice 1974) demonstrating seasonal movements but not a clear migration like most large baleen whales. There have been eight observed takes of sperm whales in the 16 years of DGN fishery observer program. Most of the takes occurred within two relatively limited area around 36° N. latitude and 122° W. longitude (south and west of Monterey Canyon) to around 32° N. latitude and 120° W. longitude (southwest of the Channel Islands and near Cortes Bank). As above, utilizing a CPUE from the DGN fishery and applying it to the anticipated 56 sets results in an extremely low projected rate of take, suggesting that the likelihood of sperm whales interacting with longline gear operating in similar spatial and temporal distributions as the historic DGN is extremely low. Sperm whales are more abundant in

waters around Hawaii than the West Coast EEZ therefore a review of the Hawaii-based SSSL was done. There have been no observed entanglements in the SSSL fishery as it has been operating since 2004 and only one observed take between 1994–2002 and the animal was not seriously injured (Forney 2004). One sperm whale was observed taken in an experimental fishery outside the Hawaii EEZ, but an assessment of its condition (i.e., seriously injured or not) could not be made (Carretta, *et al.* 2007).

The Atlantic SSSL was reviewed as a possible proxy for the SSSL EFP fishery since SSSL effort and sperm whale feeding areas overlap temporally and spatially in the Atlantic, similar to the proposed action area. Interestingly, although both the Atlantic SSSL fishery and sperm whales utilize the same regions, 100, 200 and 1000 meter isobaths, sperm whales have not been observed taken in the fishery, despite high levels of effort. There were over one million SSSL hooks set in the regions of sperm whale feeding, primarily the Mid-Atlantic Bight (MAB) and Northeast Coastal (NEC) (Fairchild-Walsh and Garrison 2007).

To complete our review of sperm whale takes in other fisheries, we reviewed observer data from the California-based SSSL adjacent to the West Coast EEZ and there were no reports of interactions.

The rarity of observed sperm whale takes in the historical DGN fishery, the Atlantic and Hawaii SSSL fisheries, and California-based SSSL fishery suggests that entanglements are rare events and at the level of effort in the proposed action, entanglements are considered very unlikely.

Sperm whales have been observed interacting with longline fisheries in Alaska, feeding on sablefish that have been caught on bottom longlines (Angliss and Outlaw 2007). One animal was observed with trailing gear attached from a longline fishery in 2000 and was determined to be seriously injured due to the amount of gear attached to the animal. No other serious injuries were recorded during this time, 1999–2003 (Angliss and Outlaw 2007). Sperm whales feed primarily on large and medium-sized squids, although the list of documented food items is fairly long and diverse. Prey items include other cephalopods, such as octopuses, and medium- and large-sized demersal fish, such as rays, sharks, and many teleosts (Berzin 1972; Clarke 1977, 1980; Rice 1989). The diet of large males in some areas, especially in high northern latitudes, is dominated by fish (Rice 1989), which may explain the depredation events (removing fish off hooks) observed in the Alaska longline fisheries. All observed depredation events were done by males (Hill, *et al.* 1999).

It is not impossible that sperm whales may begin a pattern of depredation on longlines within the proposed action area, although this is considered unlikely to occur in 2007. The causes for sperm whales and other odontocetes depredation on longline gear are not known but the animals are likely to become familiar with the sounds of the fishery (e.g., boat engines and gear hydraulics) and associate the sounds with feeding opportunities (Gilman, *et al.* 2006). There is also evidence that the same individual whales will feed on longlines (Hill, *et al.* 1999) suggesting that this is a learned and specialized behavior. It is considered unlikely that sperm whale depredation will develop in the SSSL conducted under the SSSL EFP since this does appear to be a specialized and learned behavior that is likely developed over time and exposure to the fishery. The relatively low level of effort is unlikely to cause a change in sperm whale behavior. Also, the fishery will occur within a very large geographical area and sperm whales are believed to use passive acoustics to locate longline vessels. The distances at which the vessels can be heard by sperm whales is not known although sperm whales have been observed not reacting to longline vessel sounds over 10 miles away (NMFS 2006). If the SSSL fishery were to expand, additional analysis of potential of depredation may be necessary, but as described in Hill, *et al.* (1999) and Angliss and Outlaw (2006), high levels of depredation on the sablefish bottom longline fishery was not correlated with high levels of serious injury or mortality. In Hill, *et al.* (1999), no serious injuries or mortalities were observed; in the 2000 through 2004 fishing seasons, the estimated mean annual serious injuries or mortalities is 0.45.

Due to the overlap of sperm whale distribution and the proposed action, it is not impossible that sperm whales may be affected by the proposed action, but given our review of other SSSL, the relative abundances of these stocks, and the relatively low level of effort anticipated in the proposed action, it is considered very unlikely that sperm whales would be affected by the action, either by entangling in lines while depredating or getting snagged on line or hooks while moving through an area.

It is not impossible that ESA-listed whales may become entangled in the SSSL gear. As described above, observed takes in this gear are extremely rare. Relying upon the DGN observer data to reflect the likelihood of species presence in the action area and likelihood of interactions, blue and sei whales have not been observed taken in the DGN fishery and only one fin whale has been observed taken, within the SCB which is not part of the action area. Humpback whales have been observed incidentally taken in the DGN fishery, although at low numbers, and there has been only one observed incidental take in the Hawaii-based SSSL fishery (the minimum population sizes of these two stocks is comparable). As noted above, sperm whales are known to interact with longline gear, although observed serious injuries or mortalities are extremely rare. In the Hawaii-based SSSL, there have been only two observed interactions, one animal was not seriously injured, the condition of the other was not assessed. In the Gulf of Alaska sablefish longline fishery, the estimated mean annual mortality is 0.45 sperm whales (Angliss and Outlaw 2006). Both the Hawaii-based SSSL and Alaska sablefish longline fisheries had substantially more annual effort than is proposed in the SSSL EFP fishery. Based upon the relatively low level of effort in the EFP, the comparisons to other SSSL fisheries, and the relative abundance of ESA-listed whales within the action area it is not considered likely that any ESA-listed whales will be impacted by the action.

Steller sea lions may be exposed to the longline fishery although this is considered unlikely. Incidents of observed entanglements in DGN are extremely rare, only two observed entanglements in 16 years of observations. Because Steller sea lions are found only along the West Coast, observer records from fisheries in Alaska were reviewed to further assess likelihood of entanglements of Steller sea lions. Longline fisheries are much more widespread, with much higher levels of effort, in the waters off Alaska, where the endangered stock of western Steller sea lions are found. In the Alaska fisheries, one Steller sea lion has been observed incidentally taken and killed in the Alaska sablefish longline fishery, which results in an estimated annual mortality of 1.37 (Angliss and Outlaw 2006). Steller sea lion rookeries are located at Año Nuevo and South Farallon Island, both of which are inshore of the proposed action area and therefore there is not expected to be a direct or indirect effect of the fishery on the rookeries. Also, activity in the rookeries (i.e., pupping, nursing, and breeding) occurs from January through May; thus there is no temporal overlap between rookery activities and the proposed action, although it is not impossible that animals moving to rookeries may interact with the proposed fishery. Based upon the rarity of interactions between Steller sea lions and DGN gear, and observer records from Alaska, and the timing and location of breeding in California waters, Steller sea lions are not expected to be affected by the proposed action.

One stock of killer whales is listed as endangered, the ENP southern residents. These animals have been observed feeding primarily on salmon and are thought to be fish eaters (as opposed to transients that prey primarily on marine mammals and other non-fish species). The ENP southern residents have been observed five times in central California, generally near Monterey Bay from December through February (NMFS 2006e). There have been no sightings of this population in the action area during the months of September through December, although during this time sightings of this stock within inland waters of Washington State are common. In Alaska, killer whales have been observed preying on longline fisheries in the Bering Sea and Gulf of Alaska (Sigler, *et al.* 2003). Recent genetics studies indicate that resident killer whales are predators on longlines targeting cod and flatfish (which may be part of their normal diet), while transient whales are predators on fisheries targeting pollock (usually trawls) (Angliss

and Outlaw 2006). The most recent data indicates one observed mortality of a resident killer whale in the cod longline fishery in 2003 (Angliss and Outlaw 2006). In the historic DGN fishery, there was one observed take of a transient killer whale. Swordfish, the target species of the proposed fishery, are unlikely to be a prey species for the endangered killer whale population since they feed primarily on salmon (NMFS 2006b). Due to the rarity of this population in the area, rare occurrence of killer whale takes in the DGN observer records, and the low likelihood that this population would deplete swordfish or tuna, the likelihood of interaction in the proposed EFP fishery is very low to nonexistent.

Northern right whales and Guadalupe fur seals may be in the proposed action area, but it would be very unlikely, based upon observer records from the DGN fishery (no recorded entanglements for either of these species) and also aerial and ship-based surveys conducted throughout the area (Carretta, *et al.* 2007). Therefore, it is not anticipated that the proposed action would affect either of these ESA-listed species.

### **Non-ESA-listed Marine Mammals**

Only three gray whales have been observed taken in the DGN fishery. Unlike some of the other large whale species, large aggregations of feeding gray whales are not likely to occur within the primary action area of the proposed action (i.e., off the California coast). The majority of the gray whale stock moves into the waters off Oregon, Washington, British Columbia, Canada, and especially Alaska to feed throughout the summer. The timing of the proposed action coincides with the annual migration of gray whales from northern waters to the waters Baja California, Mexico throughout the fall. When migrating, gray whales will generally stay relatively close to shore and are therefore not likely to be within the proposed action area. Based upon the available information it is very unlikely that gray whales would be affected by the proposed action.

As noted above, one population of killer whales is listed as endangered; however, another population, the ENP transients, may be found in the action area. Based upon the extremely low observed level of takes in the DGN fishery (one in 16 years) it is very unlikely that the longline fishery would entangle a transient killer whale. Also transients off the U.S. West Coast are thought to feed primarily on marine mammals and are unlikely to deplete bait or target species, swordfish, off a longline, further limiting the likelihood of exposure.

Short-finned pilot whale is a species of concern in terms of bycatch within West Coast fisheries since the stock's PBR is very low—1.2—and at this time the five year average annual mortality is one (estimated annual mortality is calculated for the most recent five year period for which information is available to be consistent with recent survey data, less than eight years old, and used to estimate a stock's population). The annual mortality of one is based upon one observed short-finned pilot whale caught and killed in a DGN fishery in 2003 which was observed at approximately 20 percent (NMFS observer program). The stock found in the proposed action area is the California/Oregon/Washington stock of short-finned pilot whales which has a wide range that extends into the waters off Baja California, Mexico. Short-finned pilot whales are a tropical and warm water species and their range appears to be primarily restricted to the waters south of Point Conception during normal or cold water ocean conditions (Forney 2006). Although once commonly seen off southern California, surveys conducted since the strong 1982–1983 El Niño suggest that their abundance within the West Coast EEZ has declined since the 1980's (Carretta, *et al.* 2007). The current minimum population estimate for this stock is 149 (Carretta, *et al.* 2007). The abundance of short-finned pilot whales in the West Coast EEZ appears to be variable and related to oceanographic conditions (e.g., El Niño or periods of unusually warm water off the coast) (Forney 1997). During warm water or El Niño periods, short-finned pilot whales appear to more commonly move north of Point Conception. Short-finned pilot whales are known to be capable of diving to deep depths presumably in search of squid, their primary prey. It is not known precisely how warmer water conditions

may affect their offshore distribution or where in the water column they feed. The target SST identified by the applicant is 15–18 degrees C (60–65 degrees F), which is generally colder than the preferred temperatures of short-finned pilot whales, which may limit the likelihood of exposure to the gear. However, in 1993 the NMFS Southwest Science Center's (SWFSC) ship survey recorded the highest number of pilot whales ever recorded in one survey and all were found in waters 15–18 degrees C (Forney 2007). 1993 was part of a prolonged period of unusually warm water in the West Coast EEZ, which is likely to have contributed to the distribution of this stock.

Short-finned pilot whales have been observed taken in the DGN fishery. Only one short-finned pilot whale has been observed taken and killed in the DGN fishery since the implementation of the Cetacean Offshore Take Reduction Plan (TRP); the take occurred south of Point Conception in 2003. Prior to that, from 1990 through September 1997, 11 short-finned pilot whales had been observed taken and killed in the DGN fishery, all north of Point Conception. Eight of the short-finned pilot whales were observed taken in 1993, with multiple animals (two and four) taken in single hauls. Observed takes also occurred in 1992 and 1997, with single animals taken in each net. The years 1992, 1993, and 1997 were all identified as El Niño years or part of a prolonged warm-water period (from 1991 to 1993) (Pacific Marine Environmental Laboratory 2006).

Short-finned pilot whales have been observed taken in the Atlantic pelagic longline fishery and NMFS recently completed a draft take reduction plan for the long-finned and short-finned pilot whale, and Risso's dolphins. The nature of the interactions in the Atlantic is unclear; fishermen suggest that depredation on swordfish and tuna is occurring, although squid (the bait commonly used in longlines in the Atlantic) is a more typical prey item (NMFS 2006a). Squid bait would not be used in the proposed SSL EFP fishery.

Short-finned pilot whales have been observed taken in the Hawaii-based SSL fishery: one take in 1996 (line wrapped around the caudle peduncle—the animal was dead when retrieved) and one take in 2000 (the animal was seriously injured after being hooked in the mouth or ingesting a hook) (Forney 2004). These two observed takes occurred during an observer program operating from 1994–2002 in which 1,308 shallow longline sets targeting swordfish were observed. The level of take may be related to the abundance of short-finned pilot whales in the water around Hawaii; the current minimum population estimate in that region is 5,986. Since implementation of gear changes in the SSL fishery in Hawaii, no short-finned pilot whales have been observed taken. The reason for this is unknown, although one of the constraints on the re-opened SSL fishery was that squid could not longer be used as bait. Squid is a primary prey for short-finned pilot whales, so switching bait may have had an effect on depredation. However, there has been no comprehensive review of the fishery to analyze marine mammal bycatch and changes to bycatch levels since the fishery was re-opened in 2004.

Short-finned pilot whales have been observed taken in the Atlantic pelagic longline fishery and NMFS recently completed a draft take reduction plan for the long-finned and short-finned pilot whale, and Risso's dolphins (NMFS 2006a). As with short-finned pilot whales in the waters around Hawaii, the rate of interactions in the Atlantic may be related to the relative abundance of population interacting with longline gear and the overlap of fishing effort and whale distribution. A population estimate for the short-finned pilot whale is not possible due to difficulties in distinguishing short-finned from long-finned pilot whales during surveys, although the total minimum population for *Globicephala spp.* is 24,866 and the 2005 estimated annual serious injury or mortality is 211.5 (Waring, *et al.* 2007). There is substantial overlap in the areas utilized by short-finned pilot whales and the SSL fishery, particularly in the Mid-Atlantic Bight and Northeast Coast. Both whales and fishers utilize the 200 and 1000 fathom isobaths for feeding and fishing. There is a sizable amount of fishing effort in these two areas, as noted above over one million hooks are set annually. The nature of the interactions is not completely understood; fisherman report that pilot whales feed on caught tuna and swordfish, although in this area of the Atlantic,

squid dominates the diet of pilot whales, so it would be reasonable to believe that the bait is being depredated upon (NMFS 2006) In the Atlantic-based SSSL fishery, squid bait is allowed, however only mackerel bait may be used in the EFP fishery which may further reduce likelihoods of interactions.

The level of short-finned pilot whale serious injury and mortality is a source of concern in the Atlantic SSSL fishery, but the fishery likely does not reflect what will likely occur in the proposed action for a number of reasons. One reason is the relative abundance of the stocks in the two areas, the current minimum population estimate is 149 in the West Coast EEZ (Carretta, *et al.* 2007) and over 24,000 in the Atlantic (Waring, *et al.* 2007), so there are many fewer animals in the proposed action area and so less likelihood of interactions. Also, in the Atlantic, pilot whale foraging areas are along the continental shelf, which is the same area where much of the pelagic longline effort occurs (Waring, *et al.* 2007). The foraging areas of short-finned pilot whales within the proposed action is not well known, but does not appear to overlap spatially with pilot whale feeding areas to the extent of overlap in the Atlantic. Finally, in the Atlantic fishery, squid bait is commonly used and squid is a primary prey choice for pilot whales in the Atlantic and the Pacific (Leatherwood and Reeves 1983). Squid bait will not be allowed in the proposed action, thus it is not reasonable to compare these two fisheries in terms of probabilities of depredation and interactions.

Based upon the low abundance of short-finned pilot whales in the U.S. West Coast EEZ, their occurrence in water generally warmer than those targeted by the applicant, the current climate prediction that for late 2007 of ENSO neutral or La Niña condition, and the rarity of entanglements on Hawaii longlines (where the stock is much more abundant) and the use of mackerel bait, rather than squid bait (squid is a prey species of the short-finned pilot whale) it is considered unlikely that short-finned pilot whales would be affected by the proposed action.

Species of beaked whales have been observed taken in the historical DGN fishery and could possibly be taken in the proposed longline fishery. Mesoplodont beaked whales consist of six species, Blainville, Hubb's, Perrin's, lesser beaked, ginko toothed and Stejneger's. Due to difficulties in distinguishing these individual species, the six species are managed as one stock, the California/Oregon/Washington mesoplodont beaked whales. From the 16 years of observer data from the DGN fishery, five Hubbs, one Stejneger's, and two unidentified mesoplodonts have all been observed entangled in the DGN fishing gear at low numbers, for a total of eight interactions with individual animals from this stock. The Cuvier's beaked whales have been observed taken at a higher rate, 21 individuals over 16 years. Cuvier's beaked whales are the most widely distributed of all of the beaked whales and like other beaked whales, are generally found in deep offshore, tropical-to-cool temperate waters of the world. They are the most commonly observed beaked whale species within the West Coast EEZ. They seem to prefer slope waters with a steep depth gradient. Their preferred prey appears to be squid and deep-water fishes (Leatherwood and Reeves 1983). The reason for the high level of takes in the DGN fishery is not known; although all of the takes occurred from 1992 to 1995, there have been no observed takes since 1995. There have been no reports of beaked whales interacting with the California-based SSSL fishery outside the EEZ and beaked whales have not observed taken in the Hawaii-based SSSL fishery (although one Blainville beaked whale was observed killed in the deep-set tuna fishery (Forney 2004). Based upon the lack of observed recent interactions between the DGN fishery and beaked whales, lacked of observed takes in the Hawaii-based SSSL fishery and the tendency of beaked whales to forage and travel at depths greater than the proposed SSSL gear, it is unlikely that mesoplodont beaked whales would be affected by the proposed action. However, it is possible that Cuvier beaked whales may interact with the SSSL, based upon their abundance, distribution, and history of interactions with the DGN fishery. Takes in the DGN are as follows: 1992 (6), 1993 (3), 1994 (6), 1995 (6). Records of Cuvier's beaked whales being taken in other SSSL fisheries could not be found, therefore an estimation of take based upon a proxy fishery could not be made, however, based upon the low observed levels of takes, the number of Cuvier's beaked whales that may be taken in the proposed action is expected to be low.

For other marine mammal species, the level of observed takes in the DGN fishery was used to estimate the species most likely to occur in the same area and time as the proposed action. If the CPUEs developed from the DGN records are used and applied to 56 sets (assuming that effort could be standardized and that one set of a DGN would equal one set of a SSSL), the resulting rates of takes suggest that most marine mammal species are unlikely to be taken in the longline EFP fishery. Using this quantitative approach, a very low number of Risso's dolphins, short-beaked common dolphins, northern elephant seals, and California sea lions may be taken, due to their abundance in the area (the minimum population estimates for these three stocks are 305,694, 60,547, and 138,881 animals respectively) (Carretta, *et al.* 2007). Risso's dolphins and northern right whale dolphins may also be taken at low levels. Risso's dolphins have been observed taken at low levels in the SSSL fishery in Hawaii and there was one observed take in the California-based SSSL fishery (NMFS SWR Observer Program unpublished data; NMFS PIRO Observer Program unpublished data). Five California sea lions were observed taken in the 1988-1989 experimental drift longline fishery for shark off California (see table 3-3), although the condition of the animals (alive, injured, killed) was not recorded. A short-beaked common dolphin was observed taken in the Hawaii-based SSSL fishery between 1994 and 2002, although it was not seriously injured (Forney 2004). A very low number of northern right whale dolphins and northern elephant seals may be taken based upon take rates in the DGN fishery, although there is no record of these species being taken in California-based longline fisheries operating outside the EEZ in the past. Surveys indicate that some species, particularly California sea lions, have a more coastal distribution, so exposure to the SSSL fishing gear 40 nmi offshore is unlikely. Similarly, northern right whale dolphins have more often been observed within 40 nmi of offshore or within the SCB, than within the proposed action area in the fall, which may minimize the likelihood of exposure. Risso's dolphins, short-beaked common dolphins, and Cuvier's beaked whales are exhibiting a wide distribution across the west coast EEZ. Both Risso's dolphins and Cuvier's beaked whales are deep-divers and seem to prey largely on squid, which may limit their likelihood of feeding on mackerel bait set at relatively shallow depths (40 to 45 meters). Short-beaked common dolphins may be the most likely to be exposed to SSSL gear, due in part to their tendency to feed at night (Leatherwood and Reeves 1983) and their wide distribution throughout the proposed action area.

The analysis provided within this section has been based largely upon observer data from the DGN fishery that has primarily occurred in the waters off California but with low levels of effort off of Oregon and Washington. The preferred alternative limits fishing to south of 45° N. latitude (central Oregon), however this was not a condition of the original alternatives. The following provides a brief analysis of possible impacts if fishing had been allowed in the waters off Washington State. In Washington, DGN gear has been banned since 1990. Observer information from an experimental thresher shark DGN fishery within the EEZ off of Washington State was reviewed to provide some insight, albeit limited, into the possible effects of a longline fishery within those waters (WDF&W 1988; WDF&W 1989). As with the swordfish DGN data, application of CPUEs from a gillnet fishery to a longline fishery is problematic. However, what was most striking about the data from Washington was the estimated marine mammal CPUEs, which were generally an order of magnitude larger than the swordfish DGN CPUEs. (A discussion on sea turtle CPUEs in the Washington experimental fishery is provided in section 3.4.2.1.) In addition, species not observed taken in the swordfish DGN fishery, were observed taken in the Washington State fishery, including harbor porpoise and harbor seals. If SSSL sets are made in the waters off Washington, anticipated effects on marine mammals may be different than those presented in this analysis. As noted above, the preferred alternative limits the SSSL EFP to south of the 45° N. latitude, so the waters off of northern Oregon and off of Washington State will not be fished under the proposed SSSL EFP. Thus the analysis done based upon the historic DGN observer data is applicable to the preferred alternative.

The following provides a very brief review of the marine mammals considered most likely to be affected by the proposed action.

#### Short-beaked common dolphin (*Delphinus delphis*) – CA/OR/WA stock

Short-beaked common dolphins are the most abundant cetacean off California, with abundance varying both seasonally and between years. They are distinguished in color from the long-beaked common dolphin by having a white abdominal area with a darker eye patch that is continuous with a dark stripe that extends forward and joins the blackness of the lips. Their preferred prey is small schooling fish and they often hunt at night in the deep scattering layer of vertically migrating prey (Reeves, *et al.* 2002). In more temperate waters of the higher latitudes, these dolphins tend to calf in the late spring and early summer and gestation lasts approximately 10–11 months, with a 10-month lactation period (Reeves, *et al.* 2002). Surveys show wide distribution from the coast out to at least 300 nmi from shore. The best abundance estimates for the short-beaked stock is 449,846 (Coefficient of Variance (CV) =0.25) animals, with a minimum population estimate of 365,617 animals and an estimated PBR of 3,656 animals per year. The estimated mean annual take (serious injury and mortality) for short-beaked common dolphins in U.S. commercial fisheries is 93 (CV=0.23) animals, based on information from 1997–2001. This stock is not classified as strategic under the MMPA (Carretta, *et al.* 2007).

#### California sea lion (*Zalophus californianus*) – U.S. Stock

California sea lions are perhaps the most familiar pinnipeds in the North Pacific Ocean. Adult females and juveniles are slender-bodied, whereas adult males are robust at the shoulder, chest, and neck, and slender at the hind end. The snout is long, straight, and narrow. They have broad foreflippers with hair on the upper surface and short hindflippers with short claws. Adult males have a pronounced forehead and are mostly dark brown to black, with areas of light tan on their face. Females and juveniles are lighter in color than males (Reeves, *et al.* 2002). California sea lions have a diverse diet, feeding on northern anchovy, market squid, sardines, Pacific and jack mackerel, and rockfish (Reeves, *et al.* 2002). Population estimates are made from pup counts and the proportion of pups in the population, since not all age classes of sea lions are ashore at the same time. California sea lions breed at the Channel Islands, off southern California, at islands along the Northern Pacific coast of Baja California, and on the east coast of Baja California in the middle and southern Gulf of California (Reeves *et al.* 1992). After the breeding season, large numbers, particularly males, migrate north along the Pacific coast. The U.S. stock of California sea lions population ranges between the United States/Mexico border and extends northward into Canada. The population abundance estimate for this stock is between 237,000–244,000 animals, with a minimum population estimate of 138,881. The PBR for this stock is calculated to be 8,333 animals per year. Estimated mean annual take in commercial fisheries is 1,476 animals, based on data from 1997–2001. Takes have been documented during those years in the CA/OR DGN fishery, the California set gillnet fishery for halibut and angel shark, the CA/OR/WA groundfish trawl fishery, the WA/OR salmon net pen fishery, and the salmon pen fishery operating out of British Columbia. Other threats to this stock include shooting, entrainment in power plants, marine debris, and boat collisions. The stock is not classified as strategic under the MMPA (Carretta, *et al.* 2007).

#### Risso's dolphin (*Grampus griseus*) – California/Oregon/Washington Stock

Risso's dolphins are found world-wide in tropical and warm-temperate waters. From seasonal distribution patterns seen from aerial and boat surveys, it is thought that Risso's dolphins move northward into Oregon and Washington during the late spring and summer, while they are found generally off California during the cold water months (Carretta, *et al.* 2007). They have a distinctive, beakless head shape and body that is noticeably more robust in the front half than in the back, a blunt snout, and prominent appendages, with long pointed flippers and a tall, slender, and falcate dorsal fin. Adults have

extensive linear scarring concentrated on the back and sides, which makes many adults appear almost completely white except for the dark dorsal fin and flippers (Leatherwood, *et al.* 1983; Reeves, *et al.* 2002). Risso's dolphins travel in groups of on average 25 individuals and feed most often on squid, primarily at night (Reeves, *et al.* 2002). Risso's dolphins in CA/OR/WA waters are considered one stock in the SARs. The best estimate of population abundance for this stock is 16,066 (CV=0.28), with a minimum population estimate of 12,748 animals. PBR for this stock is estimated to be 115 animals per year. The mean annual serious injury and mortality in commercial fisheries for this stock is estimated to be 3.6 (CV=0.63) animals, based on data from 1997–2001. This stock is not classified as a strategic stock under the MMPA (Carretta, *et al.* 2007).

#### Northern right-whale dolphin (*Lissodelphis borealis*) - California/Oregon/Washington Stock

Northern right-whale dolphins are generally seen in shelf and slope, cool temperate waters, ranging on the West Coast of North America from the Gulf of Alaska and the State of Washington, south to Baja California (Reeves, *et al.* 2002), depending on prey availability. They are distinguished by their slim, graceful body and the absence of a dorsal fin or any trace of a dorsal ridge. They are primarily black, but with a striking white lanceolate pattern of varying extent on the ventral surface. The melon slopes gently forward into a small distinct beak (Leatherwood, *et al.* 1983). They travel in schools of several hundred to thousands of animals and often associate with Pacific white-sided dolphins. Primary prey species include small fish, including lanternfish and squid. Peak calving occurs in the summer months, and the gestation period is a little over a year, with a calving interval of at least two years (Reeves *et al.* 2002). The SARs designated northern right-whale dolphin found in the waters of California/Oregon/Washington as one stock. The estimated population abundance for this stock is 20,362 (CV=0.26) animals, with a minimum population estimate of 16,417 animals. Based on this minimum population, the estimated PBR is 164 animals per year. The mean annual serious injury and mortality of northern right whale dolphins in U.S. commercial fisheries is estimated to be 23 animals, based on data from 1997–2001. This is not classified as a strategic stock under the MMPA (Carretta, *et al.* 2007).

#### Northern elephant seal (*Mirounga angustirostris*) –California Breeding Stock

The northern elephant seal is the largest phocid in the Northern Hemisphere. They have a robust torso that tapers to narrow hips with short foreflippers, with slightly longer outer digits and long broad claws. Males begin to develop an elongated fleshy nose (proboscis) at about puberty, which they inflate during the winter breeding season to resonate sound when threatening other males. Adult males can be about three to four times the mass of adult females. Adult females and juveniles are mostly lighter to chocolate brown, whereas males are uniformly dark brown except for their chest, which are heavily calloused and scarred and thus appear white and light brown (Reeves, *et al.* 2002; Reeves, *et al.* 1992). The California breeding population of northern elephant seals is considered one stock in the SARs, separate from the breeding population in Baja California, Mexico. Generally, northern elephant seals breed and pup from December to March. Males then forage further north in Alaskan waters, while females forage off Oregon and Washington waters, typically south of 45° N. latitude. Adults return to land to molt between March and August, with males beginning their molt later than females. Northern elephant seals eat mesopelagic fish and squid, though some may forage on the sea bottom and continental shelf for skates, rays, sharks, and rockfish (Reeves, *et al.* 2002). The best estimate of population abundance for the California breeding stock is 101,000 from 2001, with a minimum population estimate of 60,547 animals. PBR for this stock is calculated to be 2,513 animals per year. Threats to this stock include mortality and injury in fishing gear (greater than 86 mean annual takes per year, based on data from 1996–2000). Takes have been documented in the California/Oregon DGN fishery, the California set gillnet fishery for halibut and angel shark, and the California/Oregon/Washington groundfish trawl fishery. Other threats include boat collisions, collisions with automobiles, shootings, and entanglement in marine debris. The stock is not classified as a strategic stock under the MMPA (Carretta, *et al.* 2007).

### Cuvier's beaked whale (*Ziphius cavirostris*)

Cuvier's beaked whales are the most widely distributed of all of the beaked whales and are found in deep offshore, tropical to cool temperate waters of the world. They seem to prefer continental slope waters with a steep depth gradient. They are rotund in shape with a steep melon and a short, thick beak. Adult males have a white head, while the lighter head coloration in females is less pronounced. Mature animals can reach up to 23 ft in length, with females larger than males. They usually travel alone or in small groups and feed mainly on squid on or near the ocean floor. Little is known of the reproduction of this species (Reeves, *et al.* 2002). The SARs designated the Cuvier's beaked whales in the EEZ waters off CA/OR/WA as one stock. Sightings of Cuvier's beaked whale off the U.S. West Coast have been infrequent, although they are the most commonly encountered beaked whale off the West Coast. Seasonal trends are not apparent from stranding records. Based on the best available data, the best population estimate for this stock of Cuvier's beaked whale is 1,884 (CV=0.68) animals, with a minimum population estimate of 1,121 animals. The estimated PBR for this stock is 11 animals per year, and the average annual estimated take (serious injury and mortality) in the U.S. commercial fisheries is zero animals. As with other beaked whales, anthropogenic noise may also threaten the Cuvier's beaked whale, particularly mid-frequency active sonars, although the extent of this threat is unknown. Since the estimated annual average incidental mortality of this stock of Cuvier's beaked whale does not exceed its PBR level, it is not classified as a strategic stock under the MMPA (Carretta, *et al.* 2007).

#### *3.4.1.2 Other Actions Contributing to the Baseline Condition of Marine Mammals*

Most of the marine mammal stocks identified as most likely to interact with the longline EFP fishery range along the West Coast of the contiguous United States and Baja California, Mexico. The following text provides an overview of cumulative effects in primarily U.S. waters on marine mammals that may, although are unlikely, to interact with the longline EFP fishery. As described above, a number of ESA-listed marine mammals may be in the area of the proposed longline EFP fishery, these are: blue, sei, fin, humpback, northern right, and southern resident killer, and sperm whales; Guadalupe fur seals; Steller sea lions. Based upon the low level of effort (sets and hooks) under the proposed longline EFP, interactions are very unlikely to occur and authorization of take of these ESA-listed species under Section 101(a)(5)(E) of the MMPA is not necessary. A very low number of short-beaked common dolphins, northern elephant seals, California sea lions, Risso's dolphins, and northern right whale dolphins may be taken during longline operations carried out under the EFP. The following is a general description of cumulative effects for marine mammal species found within the U.S. West Coast EEZ.

All marine mammals in the North Pacific are vulnerable to a variety of threats detailed in the following section.

Fishery interactions with marine mammals are regulated under the MMPA. The following fisheries have been classified as either a Category I or II fishery in the MMPA 2007 List of Fisheries (72 FR 14466 March 28, 2007) based on the level of serious injury or mortality of marine mammals that occurs incidental to the fishery.

- Category I fisheries: CA angel shark/halibut and other species set gillnet (>3.5 inch mesh); CA/OR thresher shark/swordfish DGN ( $\geq 14$  inch mesh)
- Category II fisheries: CA yellowtail, barracuda, white seabass and tuna DGN fishery (mesh size >3.5 inches and <14 inches); CA anchovy, mackerel, tuna purse seine; CA squid purse seine; CA pelagic longline (this includes the DSLI fishery).

All of these fisheries have had some level of interaction with marine mammals, either documented from ongoing observer programs or historic observer data. A more thorough description of the fisheries and impacts on marine mammal stocks can be found in the most recently published U.S. Pacific Marine Mammal Stock Assessment Report: 2005 (Carretta, *et al.* 2007) and the Alaska Marine Mammal Stock Assessment, 2005 (Angliss and Outlaw 2006).

Marine mammals may also be affected by a variety of past and current anthropogenic and non-anthropogenic threats. Historically, the primary anthropogenic effects have been from direct harvest of marine mammals. All large marine mammal species, baleen whales and some odontocetes, have been captured in whaling operations. In the past, commercial whaling occurred at higher levels than at the present time, although some species continue to be subject to directed hunting, including fin whales, sperm whales, gray whales, minke whales, and beaked whales (although not necessarily the stocks exposed to the DGN fishery). Commercial whaling is closely monitored by the International Whaling Commission to ensure sustainable level of harvest, although illegal whaling is known to occur and recently pressure has been put on the IWC to relax the 20 year whaling moratorium.

Threats to marine mammals include entanglement in discarded fishing gear, ship strikes, lethal removal by fisheries (gunshots), exposure to toxins (including PCBs, DDT, and heavy metals), pollution, loss of habitat or prey, and underwater sound. These effects are difficult to quantify, but may be reflected in stock trends.

Within the proposed action area, a number of fisheries have been observed and incidents of marine mammal takes have been recorded. These include the California angel shark/halibut and other species set gillnet (>3.5 inch mesh); California/Oregon thresher shark/swordfish DGN (14 inch mesh); the California yellowtail, barracuda, white seabass DGN fishery (mesh size >3.5 inches and <14 inches); California anchovy, mackerel, tuna purse seine; California squid purse seine. Some of the marine mammal species that may be affected by the proposed action have limited distribution (primarily the waters off California, Oregon, and Washington), although some are distributed throughout the waters off Mexico and others are highly migratory (particularly baleen whales) and thus their range extends as far as Alaska to the north and Central America to the south. For the most part, fishery effects outside U.S. waters are largely unknown. See the Pacific SARs (Carretta, *et al.* 2007); Alaska SARs (Angliss and Outlaw 2007); and the draft Negligible Impacts Determination (NMFS 2006d) for more information on threats to marine mammals.

### 3.4.2 Sea Turtles

Four species of marine turtles may be found in the area of the proposed action, they are listed along with their status in table 3–14.

**Table 3–14. Sea turtles within the proposed action area**

Sea turtles	Status
Leatherback turtle ( <i>Dermochelys coriacea</i> )	Endangered
Loggerhead turtle ( <i>Caretta caretta</i> )	Threatened
Olive ridley ( <i>Lepidochelys olivacea</i> )	Endangered/threatened
Green turtle ( <i>Chelonia mydas</i> )	Endangered/Threatened

#### 3.4.2.1 Species of Sea Turtles Most Likely to be Affected by the Proposed Action

All four sea turtle species within the proposed action area have been observed taken in the DGN fishery and in longline fisheries throughout the Pacific, although leatherbacks and loggerheads are most

commonly caught in SSSL gear (NMFS Hawaii observer program; NMFS observer program; Watson, *et al.* 2005). Based upon observer records, leatherback sea turtles were the most commonly observed sea turtle entangled and killed in the DGN fishery and the CPUE of leatherbacks was substantially higher north of Point Conception than south of the point (Carretta, *et al.* 2005). This is likely due to the oceanographic differences between the two areas. Loggerheads are the second most commonly observed sea turtle species taken in the DGN fishery with all takes occurring south of Point Conception, usually within the SCB, and all but one during declared El Niño years. Table 3–15 provides the number of observed takes of sea turtles in the DGN fishery between 1990 and 2005 with 20 percent observer coverage.

**Table 3–15. Number of observed takes of sea turtles in the DGN fishery, 1990-2005.**

Species	Number Taken
Turtle, Green/Black	1
Turtle, Leatherback	23
Turtle, Loggerhead	15*
Turtle, Olive Ridley	1

\*All but one of the takes occurred during El Niño years and none occurred within the proposed action area.

### Leatherback Sea Turtles

Of all the sea turtle species within the action area, the leatherbacks are the most likely to be affected by the proposed action. As noted above, there is a much higher leatherback CPUE north of Point Conception than south and this is consistent with the biology and emerging information about the distribution and foraging patterns of Pacific leatherbacks. Aerial surveys conducted during the late summer and fall months reveal that leatherbacks forage off central California, generally at the end of the summer, when upwelling relaxes and sea surface temperatures increase. Leatherbacks were most often spotted off Point Reyes, south of Point Arena, in the Gulf of the Farallon, and in Monterey Bay. These areas are upwelling “shadows,” regions where larval fish, crabs, and jellyfish are retained in the upper water column during relaxation of upwelling. Researchers estimated an average of 170 leatherbacks (95 percent CI = 130–222) were present between the coast and roughly the 50 fathom isobath off California. Abundance over the study period, 1990–2003, was variable between years, ranging from an estimated 20 leatherbacks in 1995 to 366 leatherbacks in 1990 (Benson, *et al.* 2007).

Initially, genetic analyses of stranded leatherbacks found along the West Coast determined that the turtles had originated from Western Pacific nesting beaches. Furthermore, genetic analysis of samples from leatherback turtles taken off California and Oregon by the DGN fishery and in the Northern Pacific, taken by the California-based longline fishery, revealed that all originated from Western Pacific nesting beaches (i.e., Indonesia/Solomon Islands/Malaysia; Dutton 2003).

In the last five years, researchers have documented movements of leatherback turtles between nesting beaches in the Western Pacific and the U.S. West Coast. Observations of tracked leatherbacks captured and tagged off the West Coast have revealed an important migratory corridor from central California, to the south of the Hawaiian Islands, leading to Western Pacific nesting beaches. Researchers have also begun to track female leatherbacks tagged on Western Pacific nesting beaches, both from Jamursba-Medi and War-mon, Papua, Indonesia, and from the Morobe coast of Papua New Guinea. Most of the females that have been tagged in Jamursba-Medi, Papua, which primarily nest during the late spring and summer, have been tracked heading on an easterly pathway, towards the West Coast or heading north toward foraging areas off the Philippines and Japan. In addition, one female that was captured in central California in 2005 still had a tracking device that had been attached to her on Jamursba-Medi, confirming

this trans-Pacific migration (Dutton 2005). Research and tagging of leatherbacks is part of ongoing work by the SWFSC.

For a full description of the status of leatherback sea turtles and all sea turtle species that may be found in the proposed action area, see the draft EA written for the DGN EFP (NMFS and PFMC 2006), the 2006 biological opinion written for the DGN EFP (NMFS 2006c), or the biological opinion written for this SSSL EFP (NMFS 2007). The following is a very brief review of the basic status of leatherbacks in the Pacific.

Based on published estimates of nesting female abundance, leatherback populations are declining at all major Pacific basin nesting beaches, particularly in the last two decades (NMFS and USFWS 1998; Spotila, *et al.* 1996; Spotila, *et al.* 2000). Declines in nesting populations have been documented through systematic beach counts or surveys in Malaysia (Rantau Abang, Terengganu), Mexico, and Costa Rica. In other leatherback nesting areas, such as Papua New Guinea, Indonesia, and the Solomon Islands, there have been no systematic consistent nesting surveys, so it is difficult to assess the status and trends of leatherback turtles at these beaches. In all areas where leatherback nesting has been documented, however, current nesting populations are reported by scientists, government officials, and local observers to be well below abundance levels of several decades ago. The collapse of these nesting populations was most likely precipitated by a tremendous overharvest of eggs coupled with incidental mortality from fishing (Eckert 1997; Sarti, *et al.* 1996).

In both the Eastern Pacific and Western Pacific, leatherbacks are threatened by poaching of eggs, killing of nesting females, human encroachment on nesting beaches, incidental capture in fishing gear, beach erosion, and egg predation by animals. In May 2004, researchers, managers, and tribal community members with extensive knowledge of local leatherback nesting beach populations and activities in Papua (Indonesia), Papua New Guinea, the Solomon Islands, and Vanuatu assembled in Honolulu, Hawaii, to identify nesting beach sites, and share abundance information based on monitoring and research, as well as anecdotal reports. Dutton, *et al.* (2007) estimate that there are between 2,700 and 4,500 breeding females in the Western Pacific population. Information on trends in abundance is not available, making it difficult to assess the health of the population.

Based upon the level of take in the historic DGN fishery and the known distribution of leatherbacks within the proposed action area, it is likely that leatherbacks will be affected by the proposed SSSL EFP. Determining the number of individual leatherback taken and associated mortalities is difficult because there has not been a SSSL fishery in the proposed action area, so there are no observer records from fisheries that can be utilized to make projections. During internal review of the draft EA, a more comprehensive review of other SSSL fisheries was undertaken to characterize the level of anticipated takes in the proposed action. As was done for other species, the DGN observer records were reviewed to indicate presence of the species in the proposed action area. As described previously, comparing one set of DGN gear to one set of SSSL gear is not considered reasonable given the differences in the gear and the lack of evidence to support the assumption that the gear types are comparable. If the sets were comparable, then applying the CPUEs for leatherbacks to anticipated SSSL effort would yield an anticipated take of less than one leatherback. This approach was not considered the best available.

The Hawaii-based SSSL, which re-opened in April 2004 was considered as a possible proxy. CPUEs of leatherbacks in this fishery were highly variable over the past three years, ranging from 0.0027 to 0.013 turtles captured per 1,000 hooks, reflective of the dynamic nature of interactions between sea turtles and fishing gear. Using CPUEs from Hawaii may not be appropriate to the West Coast EEZ given the differences in leatherback behavior in the two areas (the waters off Hawaii have been identified as migratory and perhaps feeding areas, whereas the West Coast EEZ has been identified as a foraging area for Western Pacific leatherbacks). However, if the leatherback CPUE used in the 2004 biological opinion

for the Hawaii pelagics FMP (NMFS 2004c) is applied to the level of effort proposed in the SSSL EFP, the anticipated rate of take is extremely low, approximately one leatherback. As with the DGN fishery, this estimate of take likely does not accurately reflect the area and likely interactions.

Recent work from the East Coast suggests that leatherbacks of the northeast coast of the United States and southeast coast of Canada utilize shelf and slope waters during the summer as foraging areas. Two areas in particular, the Northeast Coast (NEC) and Mid-Atlantic Bight (MAB), may most closely resemble some of the foraging areas on the U.S. West Coast, particularly central California. Leatherbacks were satellite tagged ( $n=38$ ) between 1999 and 2003 off Nova Scotia, Canada within the NEC. Tracks from the tags indicate that leatherbacks travel extensively in the shelf and slope waters (James, *et al.* 2005). On the water observations of “prey handling” at the surface of the water and dive patterns suggest that the NEC and MAB are high use foraging areas for Western Atlantic leatherbacks (James and Herman 2001). Recent work by the SWFSC and their colleagues indicate that the U.S. West Coast in some areas is utilized by leatherbacks in a similar manner as in the Atlantic, that is, leatherbacks migrate into the area seasonally to forage on abundant gelatinous plankton and jellyfish, the primary prey of leatherbacks in these areas. If it is assumed that the range of leatherback CPUEs, per area and per quarter, in the Atlantic-based SSSL fishery reflects the range of CPUEs that may be observed in the SSSL EFP and apply these to the anticipated maximum number of hooks (67,200), the resulting range of anticipated takes is zero to ten leatherbacks. Alternatively, if we calculate a simple CPUE based upon total number of observer leatherback takes over the total number of observed hooks for the two years and two areas and apply this to the anticipated maximum 67,200 hooks in the SSSL EFP, the estimated total take would be four leatherbacks.

Similar to other SSSL fisheries that were considered as possible proxies for the SSSL EFP, there are a number of problems with using the Atlantic bycatch data and applying it to the Pacific. One of the key problems is the differences in scale in terms of leatherback populations and fishing effort. Satellite tracking work done by James, *et al.* (2005) indicates that leatherbacks moving into the NEC and MAB foraging areas are from Western Atlantic nesting beaches. The most recent population estimate for adult females from these populations, not including nesting beaches in Africa, is 10,000 to 31,000 (TEWG 2007). In 2005, the logbook reported level of effort in the third and fourth quarters in the MAB and NEC was 945,700 hooks; in 2006 the effort was 1,158,100 hooks. The most recent population estimate of the entire Western Pacific leatherback adult females is 2,700 to 4,500 (Dutton, *et al.* 2007). Of these adult females, satellite tracks suggest that females from a specific region, Jamursba-Medi, Papua, Indonesia, travel across the Pacific and forage in the West Coast EEZ (Benson, *et al.* 2007), whereas females from other nesting beaches forage in other parts of the Pacific and along the coasts of Asian countries. Thus the number of leatherbacks likely to be exposed to the SSSL in the CA/OR waters is likely a sub-set of the entire Western Pacific population. As noted previously, the total number of hooks anticipated to be set in the SSSL EFP is 67,200 (compared to around one million set in the Atlantic-based SSSL fishery in just two regions in six months).

Finally, observer data from the SSSL outside the West Coast EEZ was examined, along with estimated CPUEs developed by the SWFSC for the Council in 2003. In order to best approximate the areas likely to be fished under the SSSL EFP, data from east of 130° W. longitude was reviewed. This area is closest to the West Coast EEZ and included sets made by California- (2001–03) and Hawaii- (1997–2001) based vessels. Utilizing the CPUE developed for the SSSL fisheries operating in this area and applying it to the anticipated hooks in the SSSL EFP yields an anticipated take of four leatherbacks. However, the SWFSC’s report also calculated anticipated takes if gear and bait modifications similar to those tested in the NED experiments were applied to the SSSL fishery CPUEs. Assuming an approximately 65 percent decline in leatherbacks takes, yields an anticipated take in the SSSL EFP of three turtles (with a range of two to four). If most fishing effort in the SSSL EFP occurs between 33° N. and 38° N. latitude and offshore, then this estimate may be the most reasonable approximation on what may occur in the SSSL

EFP. However, there is insufficient refinement on the proposed area that will be fished to determine how closely it will follow the historical SSSL effort off the West Coast EEZ. Reviewing these records and using them to calculate a range of anticipated takes in the SSSL EFP does again suggest that the levels of take are likely to be quite low, if records from a nearby area can be reliably used to project takes.

Based upon a review of relevant other SSSL fisheries and the known distributions and abundance on leatherbacks exposed to these fisheries, it is reasonable to assume that rates of take in the SSSL EFP may be higher than rates of take in the Hawaii-based SSSL, but lower than the Atlantic-based SSSL fishery. The historic SSSL just off the West Coast EEZ may serve as the best approximation of likely takes, although the rate may slightly underestimate the anticipated takes within the proposed action area, as leatherbacks may be more densely aggregated in the EEZ as they move out of nearshore feeding areas. It is not known which areas of the EEZ, beyond the neritic zone, are utilized by leatherbacks. The limited tracks from satellite tagged leatherbacks suggest that the animals move southwest as they leave one known feeding area in the central California, which may place them south of the area traditionally fished by the West Coast-based SSSL fishery. It is therefore estimated that approximately five leatherbacks may be taken in the SSSL EFP. This is slightly higher than the high range of takes estimated using the observed leatherback CPUE of the SSSL east of 130° W. longitude and consistent with the rate estimated using the Atlantic-based SSSL fishery data for 2006 (which is a more complete data set than the 2005 data). This number may over-estimate the actual amount of leatherback take observed, but is the best estimate that could be made with the available information. As described previously, take rates of sea turtles in fisheries is highly variable among years, seasons, and areas, thus any projection of takes based upon observer data from the past is difficult to make with accuracy. In light of this, a conservative approach was taken in the development of the anticipated take in the SSSL EFP in which there is no observer data and there has been no historic fishery.

In order to estimate likely mortality associated with the incidental take of five leatherbacks, observer records from other SSSL fisheries were again reviewed. In the Hawaii-based and Atlantic-based fisheries, there were 0 percent and less than 1 percent immediate mortality rates, respectively. Based upon these rates, it is very unlikely that any leatherbacks taken in the SSSL EFP will be killed immediately. However, post-hooking mortality is a concern and the NMFS post-hooking mortality matrix (Ryder, *et al.* 2006) was used in this assessment. The Hawaii-based SSSL fishery records did not provide sufficient detail to estimate post-hooking mortalities with the matrix. All leatherbacks were recorded as “lightly hooked” but there was no detail on whether these animals were hooked externally (e.g., flipper, shoulder, or shell) or hooked in the mouth or jaw. Also, the precise amount of gear left on the animal was not recorded. Without these types of information, only a broad assessment of likely post-hooking mortalities can be made.

In previous biological opinions, post-hooking mortality estimates have been done based upon estimates from the NED experiment. In the experiment, with high levels of observer coverage, the leatherback post-hooking mortality rate was estimated to be 15 percent. This is due in part to the nature of the hookings (externally hooked) and removal of trailing gear. It is reasonable to assume that a similar situation will occur in the SSSL EFP; therefore, anticipated post-hooking mortality associated with the five takes is one leatherback.

Any estimate of leatherback takes must be considered with caution, particularly given the high inter-annual variability of take. The reasons for the variability and possible correlations between turtle distribution and oceanographic conditions are a topic of on-going studies by NMFS. A recently published paper described the positive relationship between years with positive Northern Oscillation Index (NOI) and higher abundance within the neritic zone off California, north of Point Conception (Benson, *et al.* 2007). A similar pattern could not be found between NOI conditions and leatherback takes in the DGN fishery, but work in this area will continue.

Based upon the distribution of leatherbacks within the proposed action area, the observed takes in the DGN fishery, and rates of observed takes in the Hawaii-based SSSL and Atlantic-based SSSL fishery, it is possible that a small number of leatherbacks may be taken as a result of fishing under the SSSL EFP. Based upon the differences in the leatherback populations and distribution in the two regions and differences in fishing effort, it is likely that the level of take in the EFP is a number between the two estimates from the Hawaii- and Atlantic-based SSSL fishery. The final ITS developed for this action is five leatherbacks, of which a post-hooking mortality rate of 15 percent, or one leatherback, is anticipated.

As explained above in section 3.4.1.1, the exposure analysis provided here has relied primarily upon observer records from the DGN fishery operating primarily off the coast of California, with limited effort off the coast of Oregon and a ban on DGN gear in waters off of Washington State. Records from the experimental thresher shark DGN fishery in the EEZ off Washington were examined for rates of impacts on sea turtles. While no sea turtles were observed in 1986 and 1987, the first two years of the experiment, with very low levels of observer coverage (less than 6 percent per year), logbook entries from the fishery indicate one leatherback taken in 1986. Perhaps most striking is the level of observed leatherback takes was in 1988: 13 leatherbacks taken in 68 observed sets, yielding a CPUE of 191.2 leatherbacks per 1,000 sets (the estimated leatherback CPUE, north of Point Conception, is 7.7 turtles per 1,000 sets). The reason for the high CPUE cannot be explained with the limited data available at the time of this writing, but high densities of leatherbacks are suspected to exist around the Columbia River plume (between Washington and Oregon). As described in section 3.2.1.1 for marine mammals, if SSSL sets are made in the waters off Washington, anticipated effects on sea turtles, particularly leatherbacks, may be different than those presented in this analysis. The preferred alternative restricts fishing to south of 45° N. latitude.

### **Loggerhead Sea Turtles**

In order to determine whether or not loggerhead sea turtles may be affected by the proposed action, observer records were reviewed along with an extensive review of the literature on loggerhead distribution within the North Pacific. Loggerhead sea turtles have not been observed incidentally taken in the DGN fishery north of Point Conception. All but one observed takes of loggerheads occurred during years in which an El Niño had been declared and all but two occurred with the SCB, as described in the proposed action, there will be no SSSL fishing in the SCB under this EFP. The observed takes in the DGN fishery are likely related to oceanographic conditions and its effects on the distribution of loggerheads. The waters off Baja California, Mexico, have been identified as a key feeding area for juvenile and sub-adult loggerheads that feed on their primary prey, red crab, which are found in high concentrations in coastal warm waters off Baja. Observer records from the DGN fishery strongly suggest that juvenile loggerheads only move into the waters off California during El Niño years and are generally found within the SCB, where SSSL fishing will not occur under the proposed action. However, to better understand the distribution of loggerheads throughout the Pacific and particularly differences in the likelihood of exposure in the proposed SSSL fishery and the Hawaii-based SSSL fishery, a review of the recent literature was done.

Recently, satellite tracking of loggerheads has provided insights into their behavior and distribution in the Pacific. Loggerheads exhibit shallow dive patterns with more than 90 percent of their dives within the top 40 meters of water (Polovina, *et al.* 2004), which is similar to the hook depth range of the proposed fishing gear (hook depths of 40–45 meters below the water's surface). Genetic analysis of loggerheads that may be exposed to the longline gear indicate that they are likely to be from nesting beaches in Japan (95 percent) and Australia (five percent) and forage off Baja California (Bowen, *et al.* 1995) and the Central North Pacific. Satellite tracking of loggerheads indicates that loggerheads occupy a wide range of SST from 15–25 degrees C while in the Central North Pacific, although tracks of turtles within narrowly defined temperature bounds were also observed (Polovina, *et al.* 2004). The published temperature range

is within the stated preferred water temperature for fishing under the proposed action. However, based upon recent satellite tracking and ongoing studies it does not appear that the waters of the West Coast EEZ are utilized by loggerheads. Satellite tracking indicates that loggerheads tagged and released from North Pacific fisheries and from Japan travel in the North Pacific Transition Zone (NPTZ) and the Kuroshio Extension Current perhaps spending years as juveniles feeding in these large Pacific currents (Polovina, *et al.* 2004, 2006 ). Satellite tracks of juvenile loggerheads in the NPTZ end at approximately 130° W. longitude (Polovina, *et al.* 2004), which is the eastern boundary of the Subarctic and Subtropical gyre in which the NPTZ is found. This area is east of the proposed action area and on the western edge of the California Current. It has been speculated that when the gyre meets the south-moving California Current, objects in the gyre, including juvenile loggerheads, are moved into the waters off Baja (Nichols, *et al.* 2000). After spending years in the nearshore environment feeding, loggerheads head back across the Pacific to nesting beaches in Japan and Australia. Limited satellite tracking of loggerheads tagged in Baja indicate a due east movement that suggests that they may be utilizing the subtropical front at 25–30° N. latitude (Nichols, *et al.* 2000).

Due to a lack of satellite tags of loggerheads east of 130° W. longitude, a review of observer records from the California-based SSSL fishery outside the EEZ and stranding records were reviewed for indications of loggerheads in the proposed action area. The California-based SSSL was observed for three years and loggerhead takes observed, with high concentrations between 140–150° W. longitude. Data from the Hawaii-based SSSL fishery, observed from 1997–2001, were also reviewed. The total record of observed SSSL sets in the California-based and Hawaii-based SSSL fisheries is 586 sets. In this data set, there were no observed takes at or east of 130° W. longitude (NMFS observer program). To further assess the likelihood of interactions between the proposed SSSL and loggerheads, observer records were reviewed for loggerhead strandings. The majority of strandings occurred in counties bordering the SCB (i.e., Los Angeles, Orange, and San Diego counties). Less than five strandings were recorded north of the SCB. This is consistent with oceanographic differences between the two areas, with warmer waters to the south of Point Conception and colder waters to the north. The available data suggests that while loggerheads may be occasionally found in waters north of Point Conception and outside the SCB, it is considered quite rare based upon fishery observer records, stranding records observer records, along with the preferred temperature range identified for the species. Taken together this information strongly suggests that loggerheads are unlikely to be found in the proposed action area and are unlikely to be affected by the proposed action.

### **Green Sea Turtles and Olive Ridley Sea Turtles**

There has been only one observed take of a green turtle and one observed take of an olive ridley in the DGN fishery since 1990. Generally, both green and olive ridley sea turtles are found in warm waters, greater than 18 degrees C, which is warmer than the targeted SST identified by the applicant. Further, the only observed takes of these species both occurred in southern California during a period of a warm water intrusion from Baja California, Mexico, that is believed to have brought individual sea turtles into the SCB. Take of these two sea turtles species in fisheries in the West Coast EEZ is extremely low, particularly in the areas of the proposed action, outside the SCB, where SSTs are generally lower than the preferred temperatures for green and olive ridley sea turtles. It is unlikely that green or olive ridley sea turtles would be affected by the proposed action.

#### **3.4.2.2 Other Actions Contributing to the Baseline Condition of Sea Turtles**

Anthropogenic and non-anthropogenic effects on leatherback sea turtles include poaching of eggs, killing of females at nesting beaches, human encroachment on nesting beaches, incidental capture in fishing gear, beach erosion and microclimate-related impacts at nesting sites (e.g., loss of trees due to deforestation near nesting sites on beaches can cause sub-optimal incubation conditions for eggs in nests), egg

predation by animals, and low hatchling production (Tapilatu and Tiwari 2007). In the case of leatherbacks, a number of actions have occurred in recent years to provide better protection of females at nesting beaches, protect eggs and hatchlings from poaching, and limit direct take of leatherbacks as food. Many of these efforts, particularly in the Western Pacific, have occurred over the past five to fifteen years (WPFMC 2006). The NMFS Southwest Regional Office funds several sea turtle conservation projects each year, depending on the available funding. In 2007, the office provided funds to: (1) War Mon Smolbag Theatre for monitoring and protecting leatherback nesting beaches in Vanuatu; (2) ProPeninsula for outreach and education efforts and proactive work in the establishment of a loggerhead refuge area in Baja California, Mexico; (3) Aquatic Adventures for support towards experiments to reduce sea turtle bycatch in gillnets and longlines; and (4) Earth Resource Foundation for support towards outreach in southern California to reduce the introduction of plastic into the marine environment. The effects of these actions may not yet be observed in the population, since leatherback and all sea turtle populations are tracked by counting nesting females and the age at sexual maturity averages 13 to 14 years old (Zug, *et al.* 2002). (Recent work in the Atlantic by Avens and Goshe (2007) suggest that leatherbacks may not reach sexual maturity until they are at least 20 years old, although there has been no comparable recent analysis in the Pacific, so the estimated age to 13 to 14 years old is considered appropriate for Pacific leatherbacks). Given the late age of sexual maturity and nesting, effects of past actions may take longer to detect in nesting female populations.

### **Fishery Effects**

Leatherback sea turtles are subject to take in U.S.-based fisheries and international fisheries. The following U.S. fisheries are known to take leatherbacks: the Hawaii longline fishery (shallow- and deep-set); the Hawaii handline, troll, pole and line fishery; and the West Coast DGN fishery. For each of these fisheries, Section 7 consultations have been conducted and the cumulative anticipated takes under the current incidental take statements is 33 takes annually, of which there are projected to be 10 mortalities annually. In the Hawaii-based SSLL fishery, which has 100 percent observer coverage, a turtle cap is imposed upon the fishery; if 16 leatherbacks are incidentally taken, of which two are expected to result in mortalities, the fishery must close. On March 20th, 2006, the Hawaii-based SSLL fishery was closed after reaching the loggerhead sea turtle cap of 17 takes. Only one leatherback sea turtle was observed taken before the fishery closed. For all other fisheries, if the take of leatherbacks or other sea turtles in the fishery exceeds the incidental take statement, re-initiation of consultation is required and if necessary emergency rules can be implemented to close the fishery to protect ESA-listed species.

A U.S. West Coast-based DSLL fishery has recently developed that may take leatherback, loggerhead, green, and olive ridley sea turtles. In an initiation package developed to begin Section 7 consultation on this component of the HMS FMP, it was estimated that up to six vessels may participate in this fishery, setting approximately 800,000 hooks per year. This level of effort results in an estimated take of one leatherback in three years, one loggerhead in three years, and annually one green turtle and three olive ridley sea turtles. NMFS has conducted a Section 7 consultation on this action and determined that the estimated levels of take will not result in jeopardy to these species.

Very few international fisheries have observer programs; therefore, takes of sea turtles in most fisheries is unknown. It is difficult to quantify effects since so little is known about the leatherback takes, including which populations, Eastern Pacific or Western Pacific, these takes may be affecting. A complete review of fisheries that are known to take, or may take, leatherback sea turtles is provided in the 2004 NMFS biological opinion on the HMS FMP (NMFS 2004c). The Japanese tuna longline fishery and the coastal setnet and gillnet fisheries in Taiwan are known to incidentally take a low number of leatherbacks; they are cumulatively estimated to take less than 30 animals annually. The Eastern Tropical Pacific purse seine tuna fishery has a requirement of 100 percent observer coverage on large vessels, which make up 66

percent of the fleet. Observer records indicate that only one leatherback was observed taken in this fishery (Kondel 2006).

One of the biggest fishery impacts on Pacific sea turtles is from various tuna longline fisheries (Kaplan 2006). It is difficult to quantify the impacts on leatherbacks of the foreign tuna longline fleet in the Central and Western Pacific. Observer levels are very low, less than one percent, and there are no observers in Japanese, Korean, or Australian distant water fisheries (NMFS 2004c). From these low observer rates, it has been estimated that 2,182 sea turtles are taken, and 500–600 turtles killed, annually in the various tuna longline fisheries in the Central and Western Pacific (NMFS 2004c). The species taken, in order of highest to lowest occurrence, are: olive ridley, green, leatherback, loggerhead, and hawksbill (NMFS 2004c).

### **Non-fishery Effects**

As described above, a number of non-fishery anthropogenic actions may affect leatherbacks: poaching of eggs; killing of females at nesting beaches; human encroachment on nesting beaches; incidental capture in fishing gear; beach erosion and microclimate-related impacts at nesting sites (e.g., loss of trees due to deforestation and sub-optimal incubation conditions for eggs in nests); egg predation by animals; and low hatchling production. There are also natural phenomena that may affect leatherbacks that are detailed in the following paragraphs.

The affects of climate on sea turtles are just beginning to be studied and are largely speculative. Nonetheless, long-term changes in climate could have a profound effect on leatherbacks and other sea turtles. Changes in temperature (rising air temperatures) may affect nesting success; very high temperatures while eggs are incubating in the sand may kill the offspring. The sex of turtles is temperature dependent; eggs incubated at higher temperatures produce more females while eggs incubated at lower temperatures result in more males. Increased air temperatures may result in a bias of the sex ratio of offspring, which over the long-term could lead to reduced fecundity (insufficient males to fertilize eggs). Thus, while the number of nesting females may be stable or increasing, the eggs may not be viable or the hatchling output may not produce a balanced sex ratio necessary for future successful reproduction.

The climate may also affect turtle nesting habitat. Long-term climate change (e.g., rising average temperatures) will likely result in rising sea levels due to loss of glaciers and snow caps coupled with thermal expansion of warming ocean water which may lead to the loss of usable beach habitat (Baker, *et al.* 2006). Similarly, short-term climate variability may cause an increase in storm or tidal activity that can inundate nesting sites, causing loss of habitat. Studies suggest that leatherbacks do not have the same high level of nesting site fidelity as hard shelled turtles, so they may be able to better adapt to the loss of habitat by seeking out new nesting areas.

Oceanographic changes due to climate may also affect leatherback sea turtle prey availability, migration, and nesting. Leatherbacks that may be exposed to the SSLL EFP are believed to travel across the Pacific for large concentrations of prey, particularly jellyfish. Short-term variability in climate such as the El Niño Southern Oscillation (ENSO) may limit prey due to a reduction in upwellings brought by warm surface waters and limited or no wind (Peterson, *et al.* 2006; Benson, *et al.* 2006). Over the longer term, climate models suggest a number of possible changes in oceanographic conditions, including the slowing down of the thermohaline circulation, higher precipitation storms, rising sea surface temperatures, and rising sea levels (IPPC 2001). Also, as temperature patterns change in oceans, current foraging habitats may shift (McMahon and Hays 2006). It is believed that leatherbacks migrate along ocean currents and it is possible that currents may change along with other oceanographic features (USFWS 2005). There is

already evidence to suggest that some sea turtles' re-migration periods are being affected by variations in SSTs (Chaloupka 2001; Solow, *et al.* 2002).

Additional studies will be necessary to determine how climate may be affecting leatherbacks and the entire marine eco-system in the Pacific and elsewhere. The possible effects are included here to provide a very brief review of possible effects and areas of necessary additional study in the field.

Finally, the effects of the December 2004 tsunami have been reported in a report by the signatory States to the Indian Ocean and Southeast Asia Marine Turtle Memorandum of Understanding (IOSEA). The report's assessment of effects on leatherbacks in the region is briefly summarized here. The tsunami hit the northern coast of Indonesia, the country with perhaps the largest nesting populations of leatherbacks. However, the area hit was not a major nesting area. Low nesting densities have been observed in Sumatra, but nesting does not occur in December. The tsunami did not hit the area where leatherbacks in Malaysia nest. A number of research and conservation centers in Thailand were lost (including the loss of two young volunteers). A small number of leatherbacks nest in the winter along the Indian Ocean in Thailand. Eggs from nests laid before and after the tsunami likely did not survive. Reports in the media shortly after the tsunami suggest that in the long-term there may be some benefits to sea turtles, as previously developed beaches have returned to conditions closer to pristine. New building regulations may prevent the development of these beaches, thus adding to usable nesting habitat, but at this point such suggestions are speculative. Research is planned by conservation groups in Thailand to assess the longer-term effects of the tsunami on nesting and foraging of sea turtles in the area. In India, all leatherback nests laid were likely lost to the tsunami (which occurred during the nesting season). Some of the most important nesting sites have been severely damaged, although new nest sites may develop due to the creation of new beaches. The longer-term effects of the tsunami are at this point speculative, but loss of nesting habitat is a clear concern, along with loss of beach vegetation (vegetation helps prevent beach erosion and provide shade to nest sites). The effects of the tsunami on foraging habitats in all areas are not known, although loss of seagrass, mangroves, and coral reefs have been reported. Fortunately, the major leatherback nesting areas were not affected by the tsunami. Perhaps the greatest loss is within the research and conservation community, which lost not only members, but also facilities, data, and animals. Most organizations are currently trying to re-build their operations.

### **3.4.3 Other ESA-listed Species**

There are other ESA-listed marine animals in the West Coast EEZ. With respect to marine finfish that may occur in the pelagic environment where the proposed action will occur, these are various runs, or evolutionarily significant units (ESUs), of salmon and steelhead. As discussed in section 3.3.3.1, the likelihood that any salmon would be taken by SLL gear is extremely remote. All other ESA-listed species that may be affected by the proposed action have been described in the preceding sections or in section 3.5.

## **3.5 Seabirds**

Due to the nature of pelagic longline operations and the fishing area under consideration for the proposed action, the only seabirds potentially impacted by this proposed fishery are the black-footed albatross (*Phoebastria nigripes*), the Laysan albatross (*P. immutabilis*) and the short-tailed albatross (*P. albatrus*). The brown pelican (*Pelecanus occidentalis*) and Cassin's auklet (*Ptychoramphus aleuticus*) also occur in the proposed action area, but are not likely to be adversely affected, as these species are not known to interact with pelagic longline fishing gear and nighttime setting will reduce the chance these species will interact with the gear.

### **3.5.1 Fishing-related Sources of Mortality**

#### **3.5.1.1 Pelagic Longline Fishing in the United States**

U.S.-based pelagic longline swordfish and tuna fisheries in the vicinity of the Hawaiian Islands have the potential to affect albatrosses. NMFS observer records from 1994–2000 (based on four percent observer coverage) estimate an average take of 1,380 black-footed albatross and 1,163 Laysan Albatross per year. No takes of short-tailed albatross in any U.S.-based pelagic longline fishery have been reported. The Hawaii-based swordfish longline fishery was closed by court order in 2001 due to concerns over incidental catch of sea turtles. Seabird incidental catch decreased significantly with the fishery closure. The swordfish fishery based in Hawaii was reopened on a limited basis in 2004, with requirements to conduct sets beginning no earlier than one hour after local sunset and ending deployment no later than one hour before local sunrise, use large 18/0 circle hooks, and carry 100 percent observer coverage. In addition, all swordfish-target sets are to use thawed and blue-dyed bait. Observers have documented 10 black-footed albatross and 71 Laysan albatross captured in this fishery since it reopened in 2004, with 2,133,096 hooks observed.

The Hawaii-based tuna, or deep-set pelagic longline fishing vessels, are not required to use any seabird deterrents when fishing south of 23° N. latitude, generally south of the southernmost short-tailed albatross observations in Hawaii. When fishing north of 23° N. latitude, these vessels are required to use a line-setting machine, minimum 45 gram weights on branch lines, thawed and blue-dyed bait, and strategic offal discharge.

#### **3.5.1.2 Trawl Fishing in the United States**

U.S.-based trawl fisheries also have the potential to affect albatrosses. In some trawl fisheries, sonar equipment mounted on the trawl net transmits sonar data to the vessel via a “third wire” or “net sonde” cable. Seabirds attracted to offal and discards from trawl vessels may either strike the hard-to-see cable while in flight, or get caught and tangled in the cable while they sit on the water. USFWS is currently investigating the possibility of seabird collisions with U.S.-based trawl fishing gear, both with third wires and with warp cables (the larger diameter, more visible cables running to the trawl doors).

### **3.5.2 Non-fishing-related Sources of Mortality**

USFWS lists current non-fishing threats to short-tailed albatross as: catastrophic events at breeding colonies, climate change and oceanic regime shift, contaminants, air strikes, disease/parasitism, predation and other natural factors, invasive species, and other human activities (USFWS 2005). Black-footed albatross and Laysan albatross experience many of the same threats as the short-tailed albatross.

### **3.5.3 Current Status of Seabird Populations**

Three species of albatross are known to occur within the region with short-tailed albatross listed as endangered. The black-footed albatross is the most abundant albatross off the West Coast of Canada and the United States, ranging throughout the North Pacific between 20° N. and 58° N. latitude, but more eastern in its at-sea distribution than the Laysan albatross (Cousins and Cooper 2000). The estimated number of black-footed albatross worldwide is approximately 290,000, of which 58,000 pairs (116,000 birds) bred in 2001–02 (USFWS 2005). The conservation status for black-footed albatross under the World Conservation Union (IUCN) criteria for threatened species is “Vulnerable,” due to an observed 20 percent or more population decrease over three generations (~45 years). While the Laysan albatross is less common in the West Coast EEZ, it is the most abundant albatross Pacific-wide with an estimated 2,200,000 individuals (USFWS 2005), with centers of concentration in the Central and Western Pacific

(Cousins and Cooper 2000). Numbers of breeding Laysan albatross have declined over the last five years in the two largest colonies of this species (USFWS 2005). IUCN status for the Laysan albatross is “Lower Risk-Least Concern”. Both the black-footed albatross and Laysan albatross nest principally in the Hawaiian Islands, mate for life, and lay only one egg in a single season. The black-footed albatross occurs off the West Coast primarily from spring through fall but can be found year round; breeding birds begin returning to the Hawaiian Island chain in October. During egg-laying, incubation, and early chick feeding, which lasts from December through March, these birds are generally more concentrated near the breeding islands, although some may still travel considerable distances. The Laysan albatross also occurs uncommonly off the West Coast year round, primarily in summer during the non-breeding season.

The short-tailed albatross has rarely been sighted off the West Coast of the United States or off Mexico in recent history, and has not been observed to interact with any West Coast HMS fishery. It is nonetheless highly endangered, has historically occupied West Coast EEZ waters, and will likely return to its former range as its population recovers (and may have already begun to do so). Of the 23 sightings of this species off the West Coast since 1947, 74 percent have been made in the last two decades (1983–2000) with 88 percent occurring from August–January (Roberson 2000). This temperate and subarctic species breeds only on the Western Pacific islands of Torishima and Minami-Kojima in Japan. The most recent estimate of its population includes 1,712 individuals on Toroshima and 340 individuals from Minami-Kojima (USFWS 2005). In summer (i.e., the nonbreeding season), individuals appear to disperse widely throughout the historical range of the North Pacific, with observed concentrations in the northern Gulf of Alaska, Aleutian Islands, and Bering Sea. Individuals have been recorded as far south as the Baja Peninsula and south to about 20° N. latitude off the Pacific coast of Mexico (USFWS 2000). Its current distribution may also be complicated by identification problems. For the untrained observer, even though the short-tailed albatross is the largest albatross and has an extremely large pink bill, during its various plumage stages it can be confused with black-footed albatross and Laysan albatross (Mitchell and Tristram 1997). The short-tailed albatross is currently listed as Endangered throughout its range under the ESA, including U.S. waters (65 FR 46643, July 31, 2000).

### **3.6 Socioeconomic Environment**

#### **3.6.1 West Coast HMS Commercial Fisheries for Swordfish and Shark**

Since there is currently no longline fishery within the West Coast EEZ, the discussion in this section focuses on other closely-related fisheries which target swordfish and either take place in the West Coast EEZ or land in West Coast ports. Where it is relevant, additional discussion is included on the Hawaii pelagic longline fishery for swordfish.

The socio-economic characteristics of the West Coast HMS commercial fisheries for swordfish and shark are described in sections 2.2.4–2.2.5 of the HMS FMP and section 2.0 of the September 2006 HMS Stock Assessment and Fisheries Evaluation (SAFE) report which was prepared by NMFS. Historical measures of economic performance for these fisheries are provided in section 4.1 of the 2006 HMS SAFE. Relevant portions of these descriptions are incorporated below as background on the socio-economic environment in which the EFP would operate.

Swordfish and shark are currently harvested commercially within the U.S. EEZ by two principle gear types, DGN and harpoon. In addition, swordfish are occasionally caught by anglers in the private recreational and CPFV fleets. A California-based high seas longline fishery (with effort outside the U.S. EEZ), which is allowed to land its catch in California ports, developed in the 1990s. Longline fishing effort is prohibited within the West Coast EEZ; the proposed EFP would provide an exemption to this prohibition to allow the sole applicant the opportunity to fish a limited number of sets within the West Coast EEZ.

California's commercial swordfish industry transformed from primarily a harpoon fishery to a DGN fishery in the late 1970s, and landings soared to a historical high of 286 mt by 1984. Initial development of the DGN fishery in the late 1970s was founded on catches of common thresher shark. The thresher shark fishery rapidly expanded, peaking at more than 900 mt in 1981. After 1981, swordfish became the primary target species for the fleet, because it commands a higher price-per-pound than thresher shark, resulting in a decline in reported thresher shark landings to lows of the late 1980s and early 1990s. However, common thresher is still a target species of the DGN fishery and is commonly landed with swordfish. Since 1990, annual landings and ex-vessel revenue for thresher shark have averaged 169 mt and \$500,179, respectively. The number of DGN vessels landing swordfish declined from 228 in 1985 to 43 in 2004. Since 1984, annual landings and ex-vessel revenues have been declining in general, averaging 354 mt and \$2.5 million, respectively.

A key question which this EFP would help address is whether longline fishing subject to gear restrictions and continuous monitoring represents an economically and environmentally superior alternative to either DGN or harpoon gear for fishing within the West Coast EEZ. The Hawaii pelagic longline fishery achieved roughly an 89 percent reduction in marine turtle bycatch per unit of longline fishing effort when use of circle hooks became mandatory in 2004 (Gilman, *et al.* 2006b). A reduction in marine turtle bycatch at a given level of fishing effort implies the potential for some combination of increased fishing effort (and target species catch) along with a reduction in marine turtle bycatch, provided target species catch per unit of effort is not adversely impacted by the gear modification.

### **3.6.2 United States Swordfish Demand**

It is informative to consider recent changes in the share of U.S. swordfish demand that is provided by U.S. landings versus imports. Besides providing insight to the health of the U.S. commercial swordfish fishery, such statistics also shed light on changes in the amount of U.S. demand which is met by foreign landings of swordfish. Since protected marine sea turtles are migratory species, an increase in foreign swordfish landings to meet U.S. import demand could potentially have implications for the global level of marine turtle bycatch. It is also important to note that U.S. regulators cannot generally monitor nor control bycatch in foreign fleets.

U.S. annual swordfish demand is comprised of that year's U.S. landings plus imports. Annual demand reached a record high in 1998 due mainly to increased imports (table 3-16). Between 1989 and 2005, U.S. annual swordfish demand ranged from between 10,948 metric tons (mt) and 23,114 mt, averaging 16,556 mt. During this period, U.S. landings averaged 6,444 mt (about 39 percent of demand) and imports, 10,111 mt (61 percent). US landings of swordfish showed a general pattern of decline from the early 1990s through the early 2000s, with landings in 2005 of 3,039 mt at only 28 percent of the record landings of 10,851 recorded in 1993.

The share of U.S. swordfish demand supplied by landings into Hawaii and the States of Washington, Oregon, and California are 10-47 percent of total U.S. supply during 1989-2005 (table 3-16), with a lower share of the total since 2000 than before. Between 24-73 percent of U.S. swordfish landings are supplied by Pacific landings during the same period.

The share of US swordfish demand supplied by imports increased from 35 percent in 1993 to 77 percent of the total in 2005. In 2005, U.S. imports of swordfish were 10,187 mt, valued at about \$77 million. Singapore, Panama, Canada, and Chile were the dominant suppliers of imports. Over the entire period from 1989 through 2005, imports increased from rough parity with U.S. landings to over three times domestic landings.

Table 3-16. U.S. annual swordfish demand, 1989-2005.

Year	U.S. Landings	Imports (metric tons)-	Demand	Share of Demand (%)	
				U.S. Landings	Imports
1989	6,801	6,813	13,614	50%	50%
1990	6,993	7,476	14,469	48%	52%
1991	8,583	7,171	15,754	54%	46%
1992	9,647	6,883	16,530	58%	42%
1993	10,851	5,838	16,689	65%	35%
1994	7,404	4,379	11,783	63%	37%
1995	6,267	4,681	10,948	57%	43%
1996	6,100	5,140	11,240	54%	46%
1997	6,499	15,598	22,097	29%	71%
1998	6,832	16,282	23,114	30%	70%
1999	7,454	13,843	21,297	35%	65%
2000	8,004	14,314	22,318	36%	64%
2001	4,266	13,698	17,964	24%	76%
2002	3,930	15,712	19,642	20%	80%
2003	4,142	13,150	17,292	24%	76%
2004	2,742	10,726	13,468	20%	80%
2005	3,039	10,187	13,226	23%	77%
2006	N/A	10,334	N/A	N/A	N/A
Average(1989-2005)	6,444	10,111	16,556	39%	61%

Sources: U.S. Department of Commerce. 2007. U.S. Foreign Trade . U.S. Department of Commerce. 2007 Commercial fishery landings.

Table 3-17. Pacific swordfish landings, 1989-2005 (metric tons).

Year	Total U.S. Supply (1)	Pacific landings (2)	Pacific Share (%) of U.S. Supply (2)/(1)	Pacific Share (%) (2)/ U.S. Landings
1989	13,614	1,642	12%	24%
1990	14,468	2,831	20%	40%
1991	15,727	4,980	32%	58%
1992	16,529	6,482	39%	67%
1993	16,689	7,887	47%	73%
1994	11,783	5,065	43%	68%
1995	10,948	3,827	35%	61%
1996	11,239	3,854	34%	63%
1997	22,097	4,333	20%	67%
1998	23,114	4,653	20%	68%
1999	21,297	5,127	24%	69%
2000	22,318	5,611	25%	70%
2001	17,963	2,503	14%	59%
2002	19,641	2,035	10%	52%
2003	17,292	2,282	13%	55%
2004	13,468	1,422	11%	52%
2005	13,226	1,860	14%	61%

Sources: U.S. Department of Commerce. 2007. U.S. Foreign Trade . U.S. Department of Commerce. 2007 Commercial fishery Landings.

### **3.6.3 West Coast Ports Involved in HMS Fishing**

Communities which would primarily benefit from any increase in commercial catch due to EFP effort would include ports along the California coast from Eureka to San Diego. Any increase in longline revenues would create an economic impact through the local economies.

Only one fisherman, the EFP applicant, would be directly impacted by the EFP, as the sole EFP participant. This fisherman has invested a great deal of time, money, and lost value of alternative employment opportunity in acquiring the human capital (fishing skills) and gear (boats, nets, etc.) whose value may only be realized through the opportunity to fish.

A key benefit of catch from the EFP would be to provide a local supply of fresh fish to area buyers and processors. Area restaurants would benefit from having a reliable local supply of fresh swordfish. The availability of fresh locally caught fish would be of particular value since the alternative is to rely on fresh swordfish imported from fisheries with potentially higher levels of protected species bycatch due to less stringent environmental regulation than U.S. EEZ fisheries (Dutton and Squires 2007).

## **4.0 ENVIRONMENTAL CONSEQUENCES**

### **4.1 Estimating Change in Efforts under the Alternatives**

The impact analysis in this EA is based on estimates of the change in effort from a baseline level, or the no action alternative, that would occur under each of the action alternatives. As referenced in the description of the baseline condition in chapter 3, the quantitative estimation of potential impacts for the proposed action on target and non-target finfish can utilize in a proxy fashion observer records from two existing HMS fisheries. These fisheries are the Hawaii-based SSL fishery for trips using circle hooks and mackerel-type bait and the California-based DGN fishery. These estimates are not ideal in the comparative sense given that the SSL fishery, although employing almost identical gear as the proposed action, is prohibited from the coastal, more temperate waters of the proposed action; and the DGN fishery, although it overlaps to some degree the proposed action area and season, employs a non-comparable gear type. For this EA, it was deemed a better fit to utilize the Hawaii-based SSL observer records for those trips that took place after January 2004, coinciding with the implementation of, among other measures, the mandatory use of circle hooks and mackerel bait. These trips and records match the gear and operational methods the proposed action will employ but may not fish a comparable species list and distribution based on oceanography differences between the tropical and temperate coastal habitats fished.

The applicant is unable at this time to define the exact number of hooks per set that he will deploy for a given trip or how many sets will occur, up to the maximum of 14 per trip. A range of effort estimates were drawn up based on a low estimate of 400 hooks deployed per set, a moderate or average estimate of 1,000 hooks per set, and a high estimate of 1,200 hooks per set. The moderate figure is based on the applicant's estimate of an average number of hooks that he can efficiently fish per set once he reaches full production fishing and other operational mitigating factors are catered to. The first trip and sets will most likely be expended in an exploratory fashion, given the applicants inexperience with the gear type fishing in the proposed action area. As a result, the hooks per set may start out near the low end of the range and gradually increase towards the stated average once proficiency sets in.

The impact estimates will assume all four trips will be conducted with the maximum of 14 sets per trip carried out (i.e., most liberal interpretation of potential impacts). The three EFP action alternatives include, among other mitigation measures, a set limit and catch quotas to reduce the potential take for protected species such as striped marlin. The alternatives include area constraints as well but these constraints may or may not constrict effort for the proposed action given the limited scope and window of opportunity.

### **4.2 Direct and Indirect Impacts of Alternative 1 (No Action)**

Alternative 1, the no action alternative, represents the state of the environment if the EFP was not issued and the fishery did not occur. Chapter 3 describes the baseline environment, including past, present, and reasonably foreseeable future actions contributing to cumulative effects. The resources in question, finfish, marine mammals, sea turtles, and seabirds would continue to be affected by those other activities. Thus, chapter 3 provides a description of the effects under the no action alternative.

### **4.3 Direct and Indirect Impacts of Alternatives 2, 3, and 4 on Finfish**

Impacts to target, non-target, and prohibited finfish species are principally reflected in increased catches of these species, which are a function of the estimates of change in effort discussed in section 4.1.

Evaluation of the consequences of the alternatives includes the entire affected environment, as described in chapter 3 of this document.

#### **4.3.1 Evaluation Criteria**

In order to evaluate the potential impact of the alternatives on the resources in question, a set of criteria were developed to help determine whether any of the alternatives are likely to result in significant adverse impacts to finfish. For the target, non-target, and prohibited species finfish interactions under the various alternatives, the following criteria are used:

- Would the alternative likely result in catch levels that would create an “overfished” or “overfishing” condition for any of the HMS FMP management unit species?
- Would the alternative likely result in catch levels that would exceed any of the management objectives of the HMS FMP?
- Would the alternative likely result in catch levels that would contribute to a substantially elevated conservation concern for prohibited species under the HMS FMP?
- Would the alternative provide sufficient monitoring to ensure that management objectives of the HMS FMP are being adhered to and that needed data elements are collected for future management decisions?

For each criterion above, the effects are measured in terms of estimated effort in number of hooks (as discussed in section 4.1) for the alternatives, and the corresponding catch based on the CPUE estimates from the Hawaii-based SSL fishery observer data for trips utilizing circle hooks and mackerel-type bait outside the EEZ. These trips reflect the mandatory management measures instituted per the court order that re-opened the fishery and reflect the current state of affairs in the fishery today. Table 4–1 provides effort estimates in number of sets associated with the action alternatives.

#### **4.3.2 Direct and Indirect Impacts of Alternative 2**

Impacts to target, non-target, and prohibited finfish species under alternative 2 are principally reflected in increased catches of these species, which are a function of the estimates of change in effort discussed in section 4.1. Evaluation of the consequences of the alternatives includes the entire affected environment, as described in chapter 3 of this document.

Projected catches of target, non-target, and prohibited finfish species are presented in table 4–1 utilizing the Hawaii-based SSL observer records as a proxy for trips utilizing circle hooks and mackerel-type bait outside the EEZ. As mentioned previously, it is uncertain if the proposed EFP catches will be similar to the catch rates observed in the Hawaii-based SSL fishery given the disparate areas fished and the dissimilar oceanographic features between the more coastal, temperate California Current System and the more tropical off-shore waters near Hawaii.

Catch estimates are provided for the low (400 hooks) and high (1,200 hooks) effort estimates that the applicant supplied in the EFP application. These estimates are then multiplied across the maximum number of sets per trip (14) and total trips (4) to come up with projected maximum catch in numbers of animals. An additional column, providing catch estimates for 1,000 hooks per set, is included based on the applicant’s best guess of probable average hooks-per-set of effort once he gains experience in the fishing method and area.

The estimated impacts are addressed in the summary evaluations (section 4.3.4) for the major non-target tunas, sharks, and finfish that cover the HMS FMP objectives, among other things, of maintaining sustainable fisheries and managing fishing mortality levels based on established control rules and thresholds outlined in the HMS FMP (PFMC 2003).

Using the highest potential effort scenario (67,200 hooks), coupled with the observed CPUE estimates presented in table 4.1, the proposed action would harvest in order of magnitude an estimated 1,153 target swordfish, 850 blue sharks, 235 dorado, 105 bigeye tuna, 59 shortfin mako sharks, and 57 striped marlin. The impacts for bigeye tuna and shortfin mako sharks are discussed in the summary evaluation section (4.3.3) for these species. U.S. longline bigeye tuna catches in the Pacific are subject to an annual quota of 500 mt. The catch of bigeye tuna under this EFP would be monitored for accounting and compliance with the annual quota and would therefore be a part of conservation measures established by the IATTC and implemented by NMFS. The impacts for striped marlin are discussed under alternative 3 (4.3.2) for establishing take caps but as previously mentioned the estimated catch is very minor and unlikely to have an adverse impact on the population status. In addition, fishing would terminate under the EFP if a total of 12 striped marlin were captured thereby capping the potential harvest and population impact at a negligible amount.

The estimated harvest of swordfish represents a very minor fraction of the annual catches in the EPO. The lack of contrast in the standardized catch and effort series in the northern and southern regions of the EPO suggests that the fisheries that have been taking swordfish in these regions have not been of a magnitude sufficient to cause significant responses in the populations. In addition, catches in the region have been fairly stable since 1989, averaging about 3,700 mt in the northern region and 8,400 mt in the southern region annually. Based on these considerations, it appears that swordfish are not overfished in the northern and southern regions of the EPO (Hinton *et al.* 2004). Swordfish stocks have not been declared overfished or undergoing overfishing nor are there currently quotas or harvest guidelines in place under the HMS FMP.

There are high catch rates of blue shark in HMS fisheries targeting swordfish, including the West Coast DGN fishery and SSSL fisheries prosecuted by Hawaii-based and (in the past) California-based vessels. The use of circle hooks and other mitigation measures, as would be required under the EFP, does not appear to reduce blue shark catch rates but does appear to increase survivorship. Hawaii SSSL observer records for trips utilizing circle hooks, mackerel-type bait, and de-hooking pliers (162 trips, June-March, 2006), indicate that approximately 95 percent of captured blue sharks were released alive. Available information about the stock indicates that the North Pacific stock is not over-exploited. However, the blue shark is listed as “near threatened” world-wide by the IUCN and California CPFV skippers operating in the SCB report fewer observations of blue sharks than in previous years. This observation is supported to some degree by NMFS Shark Abundance Survey data for the years 1994-2006 (Kohin 2007). Estimated blue shark mortality under the EFP, however, would represent a small incremental increase in overall fishing mortality. The required use of a NMFS-approved shark de-hooking device as part of the mandatory EFP terms and conditions would further serve to enhance the survival of released blue sharks.

Table 4-1 Projected EFP catch (numbers of fish) using Hawaii-based SLL observer records for trips utilizing circle hooks and mackerel-type bait outside the EEZ.<sup>24</sup>

Species	Projected EFP catch (no.) for trips utilizing circle hooks (h) and mackerel-type bait			
	CPUE (catch/1000 h)	22,400 h 400 h X 14 sets X 4 trips	56,000 h 1000 h X 14 sets X 4 trips	67,200 h 1200 h X 14 sets X 4 trips
Swordfish	17.16	384.3	960.7	1,152.9
Albacore	1.06	23.7	59.2	71.0
Bigeye tuna	1.57	35.1	87.7	105.3
Yellowfin tuna	0.16	3.7	9.1	11.0
Pacific Bluefin	0.00	0.0	0.0	0.0
Skipjack tuna	0.07	1.5	3.7	4.4
Tunas and mackerels	0.02	0.3	0.8	1.0
Blue shark	12.64	283.2	707.9	849.5
Shortfin mako shark	0.88	19.6	49.0	58.8
Unid mako sharks	0.05	1.2	3.0	3.6
Unid sharks	0.00	0.0	0.0	0.0
Bigeye thresher shark	0.02	0.5	1.4	1.6
Pelagic thresher shark	0.00	0.0	0.1	0.1
Unid thresher sharks	0.01	0.1	0.3	0.4
Striped marlin	0.85	19.0	47.5	57.0
Blue Marlin	0.18	4.1	10.2	12.3
Black Marlin	0.00	0.0	0.0	0.0
Shortbill spearfish	0.11	2.6	6.4	7.7
Unid billfishes	0.02	0.4	1.0	1.2
Pelagic stingray	0.09	2.1	5.3	6.4
Remora	0.43	9.7	24.2	29.0
Longnose Lancetfish	1.27	28.4	70.9	85.1
Snake mackerel	0.32	7.2	18.0	21.6
Unid. fish	0.02	0.5	1.3	1.5
Escolar	1.66	37.2	92.9	111.5
Dorado	3.50	78.4	196.0	235.2
Oilfish	0.23	5.1	12.8	15.4
Wahoo	0.07	1.7	4.2	5.0
Sickle Pomfret	0.13	3.0	7.5	9.0
Pacific Pomfret	0.00	0.0	0.0	0.0
Common Mola	0.01	0.2	0.6	0.7
Opah	0.08	1.8	4.6	5.5

#### 4.3.3 Direct and Indirect Impacts of Alternatives 3

The impacts to finfish as a part of alternative 3 were previously analyzed under alternative 2 and will not be repeated here with the exception of a discussion on the impacts of establishing a catch cap for striped marlin. The option of establishing caps for selected species is discussed in chapter 2. The striped marlin

<sup>24</sup> Based on 161 trips and 2,133,096 hooks of observed effort.

stock in the EPO is considered currently healthy as outlined in section 3.3.2.2. However, recent ISC analyses report that the striped marlin stock biomass North Pacific-wide has declined to levels that are 6 to 16 percent of the level in 1952 and that fishing mortality should not be increased. Projected catch of striped marlin, utilizing the Hawaii-based SSLL observer records for circle hook trips as a proxy, is estimated to be 19 animals at 22,400 hooks of effort, 48 animals at 56,000 hooks of effort, and 57 animals at 67,200 hooks of effort (table 4-1). Given that striped marlin distribution and abundance increases in the more tropical waters targeted by the Hawaii-based SSLL fishery, the actual catch of striped marlin under the proposed action should be less in the more temperate, inshore habitat that will be fished in the proposed action area. An option for establishing a catch cap would be to utilize the Southern California Billfish Club catch records for recreationally caught striped marlin (see table 4-2) and select a percentage of the annual catch to be reserved as a cap that would address any concerns raised by the recreational fishing community. The catches reported in this database for the most part reflect marlin captured in the SCB, which will be a closed area under the terms and conditions of the proposed action, so direct comparisons are not possible. Given that the rationale for imposing a catch cap may be more aligned with resource user conflicts versus resource conservation concerns, establishing a specific striped marlin time/area closure is another viable option that may achieve the desired results. The peak striped marlin catches in the SCB occur in September, coinciding with a series of major recreational billfish tournaments.

**Table 4–2. Striped marlin catches from the U.S. Exclusive Economic waters adjacent to the State of California recorded by major billfishing clubs and Commercial Passenger Fishing Vessels logbook data, 1976–2006.**

Year	Balboa Angling Club <sup>1</sup>	Avalon Tuna Club <sup>2</sup>	San Diego Marlin Club <sup>3</sup>	CPFV <sup>4</sup>	Annual Total (number)
1976	212	53	210	7	482
1977	386	52	276	12	726
1978	169	32	505	7	713
1979	279	53	344	26	702
1980	147	24	525	58	754
1981	332	77	902	67	1,378
1982	232	51	564	33	880
1983	416	121	312	65	914
1984	502	77	155	287	1,021
1985	393	79	285	71	828
1986	173	27	196	43	439
1987	311	48	204	168	731
1988	268	17	263	134	682
1989	158	37	343	40	578
1990	293	18	150	108	569
1991	105	23	142	12	282
1992	27	49	64	25	165
1993	104	20	103	30	257
1994	152	30	174	42	398
1995	90	16	132	39	277
1996	172	10	232	21	435
1997	219	62	352	24	657
1998	147	95	149	17	408
1999	70	23	86	3	182
2000	78	29	67	3	177
2001	61	24	67	0	152
2002	23	12	12	3	50
2003	7	20	55	4	86
2004	5	26	117	4	152
2005	78	12	138	18	246
2006	176	31	161	13	381

<sup>1</sup>Data Source: Cathcart 2007.

<sup>2</sup>Data Source: Seibert 2006.

<sup>3</sup>Data Source: [www.themarlinclub.com/Weighins/overtheyears.htm](http://www.themarlinclub.com/Weighins/overtheyears.htm). The 2006 data are preliminary.

<sup>4</sup>Data Source: CDFG CFIS CPFV logbook data; 2006 preliminary.

#### **4.3.4 Direct and Indirect Impacts of Alternative 4**

The impacts to finfish as a part of alternative 4 were analyzed under alternatives 2 and 3 and will not be repeated here with the exception of the establishment of a catch cap of 12 striped marlin. If the striped marlin cap is reached the EFP will be terminated. The potentially premature termination of the EFP would have a negative economic impact on the EFP holder. The Pacific Council's recommendation for an EFP cap of 12 striped marlin was not set utilizing population-based, scientific criteria. The cap was qualitatively derived based on, among other things, competition between resource user groups (e.g., sport fishing impacts).

Alternative 4 stipulates no EFP fishing north of 45° N. latitude. This would further constrain the area of operation and equate to a reduction in the potential bycatch interactions. The EFP applicant, however, has stated that he did not intend to fish that far north.

Alternative 4 stipulates no fishing within 40 nmi of the coastline. This would further constrain the area of operation and equate to a potential reduction in bycatch interactions. Restricting the proposed action area could negatively impact the target species CPUE, but data demonstrating the available abundance and distribution of swordfish within the 10 nmi strip of water in question (i.e., between 30 nmi and 40 nmi off the coastline) are not available. Since the applicant requested the change to further restrict the proposed action area from 30 nmi out to 40 nmi, the potential negative impacts of such a request have been deemed acceptable in the overall fishing strategy being pursued.

#### **4.3.5 Summary Evaluation**

The evaluation criteria identified in section 4.3.1 are used below to summarize the overall impacts of the alternatives on finfish. The impact summary of alternatives 2, 3, and 4 are the same except for the marlin cap and de-hooker requirement under alternative 4

##### **4.3.5.1 Risk of Overfishing**

#### **Target Species**

Based on the status summary for the most recent EPO swordfish stock assessments presented in chapter 3, coupled with the relatively small increase in total effort and catch on a regional basis, the increase in swordfish catch anticipated under the proposed alternatives would most likely not trigger either an overfished or an overfishing condition. This assessment could change as more information and updated stock assessment work becomes available. This includes elucidation on the two-stock determination for the EPO Pacific swordfish stocks referenced in chapter 3, as well as incorporation of improved catch and effort data from regional large-scale commercial fisheries operating outside the United States. The combined U.S. swordfish fishery lands approximately 13 percent of the North Pacific-wide swordfish landings based on the latest tables produced by the ISC (ISC 2007). The DGN fishery lands roughly 13 percent of the U.S. swordfish catch based on Pacific Fishery Information Network (PacFIN) records for the same time period (PFMC 2006). For the alternatives proposed, the fairly small incremental increases in SSL swordfish fishing effort would constitute a very minor fraction of the composite regional catch and effort targeting swordfish.

#### **Non-target Tunas**

Based on the most recent stock assessments, coupled with the relatively small increase in total effort and catch on a regional basis, the increase in major non-target tuna catch under the action alternatives would not trigger either an overfished or an overfishing condition with the exception noted for bigeye and

yellowfin tuna. The Pacific Council and NMFS are undergoing action as required by the MSA to reduce fishing mortality below an identified threshold (the default being  $F_{MSY}$ ) for these two species. Because these stocks have a wide distribution and the majority of catches are made outside of U.S. waters by vessels from other nations, management measures intended to end overfishing will be implemented through the RFMO framework (see section 4.3.5.2).

In the case of the North Pacific albacore tuna stock, RFMO regional resource conservation resolutions have been passed requiring member nations, including those identified in this document that fish for North Pacific albacore, to cap the effort of their fishing fleets targeting albacore. The United States as a member nation and party to these resolutions, is developing a plan of action to meet this obligation. That plan is in the early stages at this point.

### **Non-target Sharks**

Based on the available stock status and summary information presented in chapter 3 of this EA, coupled with the relatively small increase in total effort and catch on a regional basis, the increase in major non-target shark catch under the proposed alternatives would not trigger either an overfished or an overfishing condition.

### **Other Non-target Finfish**

None of the major non-target finfish species taken in the SSLL fishery, such as pelagic stingrays and common molas, are regularly monitored for stock status. Very little is known about their population dynamics, but there does not seem to be a resource conservation concern at this time. These factors would suggest that the major non-target finfish catch under the action alternatives would not trigger either an overfished or an overfishing condition.

#### *4.3.5.2 Failure to Meet HMS FMP Management Objectives*

### **Target Species**

The HMS FMP management objectives for swordfish are, among others, those embodied in the goal of the MSA, namely to ensure the long term sustainability of fisheries and fish stocks by halting or preventing overfishing and by rebuilding overfished stocks. A detailed description of the control rules for these HMS FMP management unit species and objectives are presented in the 2003 HMS FMP/FEIS (PFMC 2003, Ch 3) and will not be repeated here.

### **Non-target Tunas**

The HMS FMP management objectives for albacore, yellowfin, bigeye, bluefin, and skipjack tuna stocks are, among others, those embodied in the goal of the MSA, namely to ensure the long term sustainability of fisheries and fish stocks by halting or preventing overfishing and by rebuilding overfished stocks. Based on stock status and summary information presented in section 3.3.2, the alternatives proposed would not at this point conflict with any HMS FMP management objectives taking into account the domestic and international processes under way to address the overfishing conditions that exist for bigeye and yellowfin tuna. RFMO conservation measures have been put in place to reduce the catch and effort for bigeye and yellowfin tuna and they include, among other things, an annual catch quota of 500 mt for the U.S. domestic longline fishery and seasonal closures for the purse seine fishery, including U.S. vessels that target tuna.

## **Non-target Sharks**

### Common Thresher Sharks

A harvest guideline of 340 mt has been established under the HMS FMP for common thresher shark catch. Utilizing the SSLL observer records as a proxy (table 4-1), the anticipated catch of common thresher shark under the proposed action is negligible. The catch of all thresher sharks using the highest estimated effort of 62,700 hooks, is equal to two sharks. However, common thresher sharks may be more available within the U.S. West Coast EEZ than on the high-seas where the Hawaii-based SSLL fishery operates.

Based on the catch estimates projected for the action alternatives, the HMS FMP harvest guideline of 340 mt would not be exceeded by the estimated catch of common thresher shark under the most liberal effort scenario. If, however, the estimated private boat recreational catch of thresher shark is factored into the equation, the overall harvest guideline could be exceeded for the proposed alternatives under consideration. These private boat catch estimates, however, must be used with caution due to the high variances and potentially biased catch estimates (PFMC 2006, p.20).

### Shortfin Mako Sharks

A harvest guideline of 150 mt has been established under the HMS FMP for shortfin mako shark catch. Utilizing the SSLL observer records as a proxy (table 4-1), the anticipated catch of shortfin mako shark under the highest effort scenario for the proposed action (67,200) is estimated to equal 59 animals. The average round whole weight for shortfin mako sharks caught within the action area, derived from length-weight conversion formula (Kohler, *et al.* 1996), and utilizing at-sea observer measurements for makos captured in the DGN fishery is estimated to be approximately 37 kgs. Multiplying the average weight of 37 kg by 59 mako sharks gives an estimated catch of approximately 2.2 mt.

The average DGN catch of shortfin mako shark for the period 2001-2005 is approximately 35.2 mt (PFMC 2006). Summing the estimated catch under the proposed action results in a total catch estimate of 37.4 mt. This does not exceed the HMS FMP harvest guideline of 150 mt. As noted in regards to the common thresher and blue sharks estimates, private recreational boat catch is not well documented but could contribute a significant component of the overall shortfin mako catch. These private boat catch estimates, however, must be used with caution due to the high variances and potentially biased catch estimates (PFMC 2006, p.20).

## **Other Non-target Finfish**

There are no HMS FMP management objectives, outside of the aforementioned MSY control rules for HMS management unit species, for the major non-target finfish that may be captured under the proposed action.

### *4.3.5.3 Elevated Conservation Concern for HMS FMP Prohibited Species*

Given the low interaction rates and catch probabilities, coupled with the single vessel and maximum set effort limitation under the proposed action, the impacts on prohibited species are not likely to substantially elevate conservation concerns for the species in question.

#### 4.3.5.4 Sufficient Monitoring

The EFP monitoring protocol requires 100 percent observer coverage for all trips and observer protocols require monitoring the entire set and haul-back sequences. Each observer would also be provided a satellite phone by NMFS to ensure adequate communication with NMFS while at sea. As such, there would be more than an adequate amount of monitoring in place to ensure that HMS FMP management objectives are adhered to for the proposed action.

### 4.4 Direct and Indirect Impacts of Alternatives 2, 3 and 4 on Protected Species

#### 4.4.1 Evaluation Criteria

In order to compare the alternatives, the following questions were developed by which to judge the effects of each alternative:

1. Would the anticipated level of marine mammal take under the alternative result in average annual mortalities equal to or greater than a stock's Potential Biological Removal (PBR)?
2. Would the anticipated level of marine mammal take under the alternative result in average annual mortalities equal to or greater than 10 percent of a stock's PBR?
3. Would the anticipated level of sea turtle take under the alternative result in mortalities that would exceed the existing incidental take statement (ITS) for the HMS FMP?
4. Would the anticipated level of sea turtle mortality under the alternative have a measurable impact on the population?

Given the limited data available, the evaluation of the alternatives is necessarily qualitative and based upon the best available information at this time.

In section 3.4, an exposure analysis was conducted to determine which protected species (marine mammals and/or ESA-listed species) have the highest risk of exposure, and effects on protected species under the proposed action. In this exercise, the alternatives were not differentiated as the three action alternatives reviewed by the Council are very similar in terms of protected species impacts. The only difference is that alternative 3 includes caps on various marine mammal and sea turtle species to be established by the ESA Section 7 consultation and alternative 4 contains species caps on striped marlin, short-finned pilot whale, and leatherback sea turtles. In addition, alternative 4 prohibits fishing under the proposed EFP north of 45° N. and within 40 nmi of shore (other alternatives prohibited fishing within 30 nmi). As described in section 3.4, it is difficult to project the species that may be affected by the proposed action due in large part to a lack of direct information from a longline fishery within the proposed action area, the West Coast EEZ. Based upon the available information it is believed that small numbers of a few marine mammal species may be taken during the proposed action; these include: California sea lions, northern elephant seals, short-beaked common dolphins, Risso's dolphins, northern right whale dolphins, and Cuvier's beaked whales. In addition, it is likely that leatherback sea turtles may be taken in the fishery, although it is considered unlikely that other sea turtle species will be taken.

In order to assess what may happen to animals that encounter the SSSL gear, observer records from other longline fisheries were reviewed. In the California SSSL fishery, outside the EEZ, three marine mammals have been observed entangled in gear (two Risso's dolphins and one unidentified dolphin), and one was killed. In the Hawaii-based SSSL fishery since 2004, all of the marine mammals were recorded as injured and one killed. It must be noted that the format of the information does not provide a means of

recording an uninjured animal released unharmed and analysis on serious injuries has not yet been conducted. In the Hawaii-based SSSL fishery targeting swordfish prior to 2004, there were 16 observed entanglements of marine mammals. The species observed taken were Risso’s dolphin, short-finned pilot whale, sperm whale, spinner dolphin, bottlenose dolphin, and short-beaked common dolphin. Ten of the 16 takes were considered serious injuries, 1 was a mortality (at time of entanglement) and 5 of the entanglements were not serious injuries (Forney 2004), thus over two-thirds of the entanglements resulted in serious injuries or mortalities. In the Atlantic, the mortality/serious injury rates varied among marine mammal species, but were on average around 50 percent (NMFS 2006a). This rate of serious injury/mortality may serve as the best estimate available for this analysis. The rate of immediate sea turtle mortalities in the Hawaii-based SSSL is zero (Gilman, *et al.* 2006c) and less than 1 percent in the Atlantic-based SSSL fishery (Fairfield-Walsh and Garrison 2007). The post-hooking mortalities have been standardized by NMFS and are described below.

#### 4.4.2 Direct and Indirect Impacts of Alternative 2

It is not possible to quantify the number of marine mammals of each species that may be affected by the proposed EFP, as described in previous sections. However, based upon marine mammal take rates in other SSSL fisheries and the biology, abundance, and distribution of the species, the number of individuals taken is likely to be quite low, likely in the range of one to ten depending on the species and their responses to the gear. As described in section 3.4.1.1, toothed whales and some dolphins may depredate on bait or hooked fish but not become hooked or entangled in the gear. If some marine mammal species begin a pattern of depredation, the likelihood of entanglements may increase, although in some longline fisheries, much of the catch may be consumed in water by marine mammals often with very low levels of actual entanglements or hookings (Gilman, *et al.* 2006a). Large whales may also become entangled in the gear. Based upon observed rates in other SSSL fisheries, it is estimated that approximately 50 percent of marine mammals takes (entanglements or hookings) in the proposed fishery would result in a serious injury/mortality.

To evaluate the effects of alternative 2 on marine mammals, the current average annual mortalities/serious injuries and related PBRs were examined for those species considered most likely to interact with the proposed fishery. As shown in table 4–3, none of the species that have been identified as most likely to be taken in the fishery are from stocks with low PBRs. The species considered most likely to be affected by the proposed action were estimated based upon the relative abundance of the species, records of take in the DGN fishery (similar to the proposed fishery spatially and temporally), observed takes in other SSSL fisheries, and the behavior and distribution of the stocks.

**Table 4–3. The PBRs and most recent annual serious injury/mortalities estimates for marine mammal stocks considered most likely to be affected by the proposed action (Carretta, *et al.* 2007)**

Species/stock	PBR	Average annual mortality/serious injury
California sea lion	8,333	1,562
Northern elephant seal	2,513	≥88
Short-beaked common dolphin	3,656	93
Risso’s dolphin	115	3.6
Northern right whale dolphin	164	23
Cuvier’s beaked whales	11	0

As shown in table 4–3, none of the six stocks are being taken in fisheries at a level of average annual mortality/serious injury close to its PBR. However, two of the six marine mammal stocks, CA/OR/WA northern right whale dolphins and California sea lions, have average annual mortalities that are greater than 10 percent of their PBR. Ten percent of PBR has been defined in policy by NMFS as the zero

mortality rate goal (ZMRG), which is the goal of each U.S. fishery under the MMPA. If mortalities of northern right whale dolphins or California sea lions occur during fishing under this alternative, any mortalities or serious injuries would move these stocks further from the MMPA goal of ZMRG. However, as described in section 3.4.1, it is possible that neither California sea lions or northern right whale dolphins will encounter the SSSL gear based upon the lack of observations of these species in the offshore areas of the west coast EEZ (they are more often observed within 40 nmi of shore). Also, as previously discussed, most interactions between small cetaceans and longline gear involve depredation, or feeding on the bait or catch on the longline hooks. Neither mackerel or swordfish are identified as a preferred prey for northern right whale dolphins, so it may be unlikely that depredation by this species would develop.

Given the paucity of information available for the exposure analysis and the dynamic nature of the marine environment, it is not impossible that takes of other marine mammal species may occur during the proposed SSSL EFP fishery. Table 4-4 lists the marine mammal stocks that may be exposed to the fishery which have very low PBRs along with the current average annual mortality estimates.

**Table 4-4. Marine mammal stocks with low PBRs that could be affected by the proposed action (Carretta, *et al.* 2007).**

Species/stock	PBR	Average annual mortality/Serious injury
Short-finned pilot whale	1.2	1
Sperm whale	1.8	1
Humpback whale	2.3	≥1.6

Takes of these three whale species within the proposed action area are quite rare based upon NMFS observer program data from the DGN fishery (see table 3-12 for years 1990-2005; for 2006 and thus far in 2007, there have been no takes of short-finned pilot, humpback or sperm whales). Short-finned pilot and sperm whales have been observed killed and seriously injured in the DGN fishery, with some incidents of multiple animals taken during one set; humpback whales have been observed entangled in DGN gear but have been released alive and not seriously injured (NMFS SWR observer program unpublished data). In the Hawaii-based SSSL, two short-finned pilot whales have been seriously injured or killed in the SSSL fishery prior to 2004. Two sperm whales have been observed taken in the Hawaii-based SSSL; one sperm whale was observed entangled in gear but was not seriously injured, that is, the animal was able to free itself without trailing gear (Forney 2004). The other was taken during an experimental SSSL fishery in 2002, but an assessment of the severity of its injuries could not be made (Carretta, *et al.* 2007). There is one account of a humpback whale being taken in the Hawaii-based SSSL (February 2006) although no assessment of its condition was made. There are three accounts of longline interactions with humpback whales in Hawaii in the deep-set tuna longline fishery. All have been provisionally determined to have been not seriously injured, although a final assessment has yet to be published (Forney 2006; Forney 2004). If, during the course of fishing under the EFP, a marine mammal is hooked or entangled, removing all gear would be one step the applicant could take to ensure that the animal is not considered seriously injured. Generally, if trailing gear is left on a marine mammal the interaction is considered a serious injury (Angliss and DeMaster 1998).

The uncertainty over possible takes in the EFP fishery make it possible that short-finned pilot whales, sperm whales, or humpback whales could be taken at a level that could cause the average annual mortality/serious injury to exceed or approach the stock's PBR. Based upon the best available information, it is not expected that these species would be taken by the proposed EFP fishery, although the likelihood of short-finned pilot whales interacting with the SSSL gear may be higher during an El Niño year or during a period of warm water, as described in section 3.4.

Regarding the second question, if mortalities or serious injuries of California sea lions, or northern right whale dolphins occur, the take would exceed 10 percent of PBR for those stocks, however, takes of these two species is considered quite unlikely.

The likelihood of take of most sea turtle species under the proposed action is quite low. Based upon observer records from the DGN fishery, other SSL fisheries, and the biology and distribution of the species, a small number of leatherbacks may be exposed to and affected by the proposed action. To evaluate the likelihood of leatherback mortalities, a review of Hawaii observer records since the implementation of mitigation measures in 2004 was reviewed and is provided in table 4–5.

**Table 4–5. Changes in sea turtle hookings observed in Hawaii-based SSL fishery, before and after implementation of bycatch mitigation measures in 2004.**

Turtles observed taken	Deeply hooked	Ingested hook	Lightly hooked	Entangled
<i>Before regulations</i>				
Leatherback (n=31)	0	10%	84%	6%
Hardshelled (n=180)	60%	0	38%	2%
Loggerhead (n=163)				
<i>After regulations</i>				
Leatherback (n=10)	0	0	100%	0
Loggerheads (n=27)	0	22%	63%	15%

As shown in the table, changes in the hook type (18/0 circle hooks with a 10 degree offset and mackerel bait) resulted in substantial changes in the way the animals were hooked. While the reason for the change in hookings is still under investigation, the results are encouraging, particularly for hardshelled turtles (i.e., loggerhead, olive ridley, green, and hawksbill sea turtles). See Gilman, *et al.* (2006d) for a review of longline gear experiments being conducted around the world.

Observer records from the Hawaii-based SSL after regulations indicate that all leatherbacks hooked (n=10), were alive and lightly hooked. All species of sea turtles taken in the Hawaii-based SSL fishery following the 2004 regulations were alive when brought to the vessel (i.e., no immediate mortalities from drowning on SSL gear) (Gilman, *et al.* 2006c). Leatherbacks lightly hooked with all gear removed have a post-hooking mortality rate ranging from 10 to 15 percent. If the hook is not removed and gear is left on the leatherback, post-hooking mortality rates range from 15 to 40 percent (Ryder, *et al.* 2006). In the Hawaii-based SSL fishery 30 percent of leatherbacks were released without any gear attached, and 70 percent were released with gear attached (Gilman, *et al.* 2006c). In the Hawaii-based SSL fishery, 17 loggerheads were lightly hooked and six were deeply hooked. Of these 23, 19 were released without any gear (post-hooking mortality rate of 5 to 10 percent) and 4 were released with gear still attached (Gilman, *et al.* 2006c) (post-hooking mortality rates of 10 to 30 percent; Ryder, *et al.* 2006; figure 4-6). There is insufficient detail in the records from the Hawaii-based SSL to link the observed takes to the post-hooking mortality matrix. Therefore, a larger data set with greater detail, the NED experiments on modified gear, was considered for estimating mortality rates.

In the NED experiment, with 100 percent observer coverage, most leatherbacks had most, if not all gear removed and most were externally hooked (i.e., hooked in the shoulder, flipper, or shell), which reduces the likelihood of post-hooking mortalities, compared to swallowed hooks (Fairfield-Walsh and Garrison 2007; Watson, *et al.* 2005). Interestingly, approximately one third of the leatherbacks incidentally taken in the Atlantic-based SSL fishery were entangled, while none of the leatherbacks observed in the Hawaii-based SSL fishery were recorded as entangled. This may simply be related to the differences in sample sizes, observed takes in the Hawaii-based SSL fishery over three years is 10; observed takes in

the Atlantic were 103 (NMFS 2004). If it is assumed that the larger sample size better reflects the nature of the interactions between leatherbacks and SSL gear, then the calculated leatherback post-hooking mortality rate is estimated to be 15 percent (NMFS 2004). The low rate of post-hooking mortality is likely due in part to the nature of the hookings (externally hooked) and removal of trailing gear. It is reasonable to assume that a similar situation will occur in the SSL EFP if proper sea turtle mitigation measures are applied; therefore, anticipated post-hooking mortality associated with the five takes is one leatherback.

**Table 4-6. Post-hooking mortality rates of hardshell and leatherback sea turtles in longline gear.**

Nature of interaction	Released with hook and line $\geq$ half the length of the carapace	Release with hook and line < half the length of the carapace	Release with all gear removed
Hooked externally with or without entanglement	20 (30)	10 (15)	5 (10)
Hooked in lower jaw with or without entanglement	30 (40)	20 (30)	10 (15)
Hooked in cervical esophagus, glottis, jaw joint, soft palate, or adnexa with or without entanglement	45 (55)	35 (45)	25 (35)
Hooked in esophagus at or below level of the heart with or without entanglement	60 (70)	50 (60)	n/a
Entanglement only	50 (60)	50 (60)	1 (2)
Comatose/resuscitated	n/a	n/a	60 (70)

Note: Hard shelled rates are outside of parenthesis. Leatherback rates are in parenthesis.

It must be stressed that as incidental takes are difficult to correlate with any particular variable or change in the SSL fishery gear in Hawaii (Gilman, *et al.* 2006c) it is highly unlikely, but not impossible, that other species may be hooked and/or higher numbers of animals may be hooked, entangled, or killed as a result of this fishery. For example, 77 percent (202 of 264) of all turtles observed captured in the Hawaii-based SSL fishery (4,261 sets observed) were caught alone, with the remaining 23 percent caught in clusters of two or more turtles caught in a single set (Gilman, *et al.* 2006c), thus it is possible that one set of SSL gear could result in the take of multiple turtles. The weight of available evidence supports the exposure analysis and estimated low levels of impact on turtle species, but given that there is no direct data on this fishery, the actual effects may differ from those presented here.

**Table 4-7. Incidental take statement for sea turtles for the HMS FMP**

Species	Entanglement	Mortality	Conditions
Leatherback	3	2	All years
Loggerhead	5	2	During El Niño years
Green	4	1	SST in fishing area similar to Nov 1999
Olive Ridley	4	1	SST in fishing area similar to Nov 1999

Turning to the question of whether anticipated takes of sea turtles are likely to result in mortalities higher than the current HMS FMP ITS (table 4-7), the current ITS for leatherbacks is three turtles likely to be taken annually with two mortalities in the HMS fishery (i.e., in the existing DGN fishery). If the patterns of encounters observed in the Hawaii-based and Atlantic-based SSL fisheries are applicable to the SSL EFP, then few leatherbacks would be expected to be caught and of those, none are expected to be immediately killed. Only a small percentage of hooked turtles would be likely to die, post hooking, as a result of injuries. It is conservatively estimated that up to five leatherbacks may be taken in the SSL

EFP. If not more than two or three leatherbacks were entangled or lightly hooked and all gear removed, then the probability of a mortality would be very low. However, if more leatherbacks are taken, as could occur without a take cap, the likelihood of mortalities increases. Due to the uncertainties surrounding the probability of leatherback takes, it cannot be stated that total mortalities from this proposed fishery will reach or exceed the existing ITS. Without a limit on the amount of take, it is also difficult to determine what the number of mortalities may be and how this may affect the Western Pacific leatherback population.

The indirect effects of this alternative on marine mammals and sea turtles are likely to be quite minor. The gear configuration (long branchlines and limited hooks between each float) makes it likely that hooked marine mammals and sea turtles will be able to swim to the surface. The long-term effects of animals being hooked and released from fishing gear are not well known, but it is generally believed that animals released with all gear removed and no other injuries, do not suffer from debilitating long-term effects (Angliss and DeMaster 1998; Ryder, *et al.* 2006). It is likely that any animals incidentally taken during this proposed fishery will have all gear removed before being released.

#### 4.4.3 Direct and Indirect Impacts of Alternative 3

The substantive difference between the three action alternatives is that under alternative 3 take caps could be imposed on the EFP to limit the take or mortality of selected species. At their April 2007 meeting, the Council used information provided in this section to develop caps on protected species. The analysis of those caps is provided in section 4.4.4 on the preferred alternative. Because this section was utilized by the Council during their decision making and development of their preferred alternative, it remains in this EA.

##### 4.4.3.1 Take Caps for Marine Mammals

This alternative’s impact on marine mammals is essentially the same as the impacts described under alternative 2, although this alternative would include caps, which could provide greater certainty in terms of impacts on protected species. Table 4–8 provides a list of marine mammal species with low PBRs that may be affected by the proposed action and species that have been identified by the Council in past actions as species of concern.

Table 4–8. Marine mammals with low PBR values and/or Council species of concern.

Species/stock	Average annual serious injury/mortality*	PBR
Short-finned pilot whale	1	1.2
Sperm whale	1	1.8
Humpback	≥1.6	2.3
Fin	1.4	15
Gray	7.4	442
Minke	0	5.9

\*See Carretta, *et al.* (2007) and Angliss and Outlaw (2006) for more details; ESA-listed species are in italics.

As noted in the exposure analysis in section 3.4.1, humpback whales and sperm whales have been observed entangled in longline gear in areas other than the proposed action area (e.g., all of the observed humpback whale interactions occurred in the SCB, outside the proposed action area). Utilizing CPUEs from the Hawaii-based SSL fishery, and applying these to the level of effort defined in this action, suggests that the likelihood of take of either of these species is very low. Although given the rarity of

these events, quantitative analysis must be viewed with caution due to the very limited data to estimate future takes having a high level of uncertainty associated with the predictions. A review of the Atlantic-based SSSL observer records indicates that no takes of ESA-listed marine mammals (other than in the NED experiment) have been observed or anticipated in the fishery (NMFS 2004d). Given these two fisheries as examples of the probability of interactions with the SSSL gear and what is known of the proposed action, it is considered unlikely that these two ESA-listed species will be encountered during the SSSL EFP fishery.

As shown in table 4–8, two marine mammal stocks have annual average serious injury/mortalities close to their PBRs: humpbacks and short-finned pilot whales. In order to ensure that the total average annual serious injury/mortalities of these stocks does not exceed its PBR, the most precautionary approach is to implement a cap on the number of seriously injured or killed individuals from the CA/OR/WA stock of short-finned pilot whales and ENP stock of humpback whales. However, assessing serious injury may be difficult at sea. The current protocol requires that observers record as much information as possible from an entanglement event with marine mammals and take photographs if possible. The SWFSC would review the record and determine if any injuries resulting from the entanglement should be considered a serious injury (defined as an injury likely to lead to mortality). In the Hawaii-based SSSL targeting swordfish, the majority of observed marine mammal takes (11 of 14) were either serious injuries or mortalities (Forney 2004). The Council may therefore choose to take a precautionary approach and assume that most marine mammal takes could result in a serious injury or mortality and set caps at incidental takes.

Although caps are not specified under this alternative, it is possible to qualify the relative impacts of this alternative on the marine mammals stocks from which the take(s) may occur. As noted in table 4–8, there are a number of marine mammal stocks with very low PBRs and three of these have been observed in the DGN fishery, which operates in approximately the same time and area as the proposed SSSL EFP fishery. If caps are implemented for these stocks, there is greater certainty that average annual serious injury/mortalities would not exceed the stock's PBR.

Turning to the questions developed to analyze the impacts of the alternatives on marine mammals, if the Council decides to implement caps on selected marine mammal stocks, based upon the material presented in this section, this alternative offers greater certainty that serious injury/mortalities of marine mammals resulting from this proposed action would not exceed 10 percent of the stock's PBR and/or exceed the total PBR for certain stocks.

#### *4.4.3.2 Take Caps for Sea Turtles*

As noted above, it is difficult to estimate the likely bycatch of sea turtles under this proposed action; however, based upon observer records from the Hawaii-based SSSL fishery, the Atlantic-based SSSL fishery, and the California- and Hawaii-based SSSL fishery in the high seas near the West Coast EEZ, along with the known biology and distribution of sea turtles that may be in the proposed action area, the level of take is expected to be low (five or less leatherbacks) with consequent low levels of post-hooking mortalities. The exposure analysis in section 3.4 suggests that only a small number of leatherbacks may be affected by this action. Loggerheads could be affected, although this is considered very unlikely based upon the known distribution of loggerheads and records of bycatch. Loggerhead takes are more likely during El Niño events or periods of unusually warm water (NMFS 2001) and current climate models from the National Weather Service Climate Prediction Center<sup>25</sup> indicate that La Nina conditions are expected through the end of 2007 and into early 2008. Also, as described in preceding sections, the likelihood of loggerheads being affected by the proposed fishery is extremely low in part due to the proposed action

<sup>25</sup> [http://www.cpc.ncep.noaa.gov/products/analysis\\_monitoring/enso\\_advisory/ensodisc.html](http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.html)

area, which excludes the SCB. Take of green and olive ridley sea turtles is not anticipated (as described in section 3.4.2.1), so the only take cap that may be set, consistent with the ITS developed by NMFS, is for leatherback sea turtles.

Similar to the analysis of this alternative for marine mammals, setting turtle take caps provides greater certainty that the level of impact on sea turtles is minimized, although impacts are expected to be low. As described above, records of interactions from various SSSL fisheries provide the best insight into the effects of the fishery on individual turtles (e.g., the ways in which turtles may be hooked, immediate mortality rates, etc). A review of those records suggests that take levels will be low and mortality rates will be very low. NMFS has conducted a Section 7 consultation on the Council's preferred alternative which included the recommendation that turtle caps be adopted into this EFP, consistent with the incidental take statement. NMFS anticipates that up to five leatherbacks will be taken under fishing operations authorized by the proposed EFP and that of these five, one turtle is likely to die, post-hooking, due to its injuries. NMFS determined that the turtles most likely to be affected by this action are adult and sub-adult leatherbacks. NMFS determined that the loss of one adult or sub-adult leatherback sea turtle is not likely to jeopardize the continued existence of endangered leatherback sea turtles or their recovery in the wild. The proposed action is likely to result in leatherback takes and mortalities that exceed the existing ITS for the HMS FMP, but would not be likely to cause a measurable adverse impact on the Western Pacific leatherback population or the species globally (as listed on the ESA).

The indirect effects of this alternative would be the same as those described for alternative 2 in section 4.4.2.

#### **4.4.4 Direct and Indirect Impacts of Alternative 4 (Preferred Alternative)**

The Council's preferred alternative, alternative 4 is the most precautionary of the four considered by the Council and is likely to have the least direct impact on protected species. The caps imposed on the number of striped marlin (12 for the duration of the EFP) may affect the level of effort in this EFP fishery. It is a reasonable presumption that reductions in the effort and areas fished make it less likely that protected species would be incidentally taken and/or killed by the proposed action.

Another key element that may reduce impacts on protected species is the prohibition on fishing north of 45° N. latitude. As described in section 3.4.2, levels of incidental takes, particularly of leatherback sea turtles, may be higher in the waters off northern Oregon and Washington. Although some limited DGN fishing did occur in the waters north of 45° N. latitude, the bulk of the effort occurred to the south of this area, thus the analysis done utilizing patterns of exposure from the DGN fishery, is most applicable to the proposed action area of the preferred alternative.

It is difficult to evaluate the impacts of moving the inshore boundary of the proposed action area to 40 nmi offshore, rather than 30 nmi offshore (north of Point Conception). The fishing area south of Point Conception, outside the SCB, remains unchanged. Because many marine mammals utilize waters closer to shore for feeding and migration, it is likely that moving the fishing activity farther offshore will reduce the likelihood of marine mammal interactions. However, most of the dolphin species considered most likely to be affected by the action are distributed across with entire West Coast EEZ, beyond 40 nmi from shore. Northern right whale dolphins have a more coastal distribution than other dolphin species; therefore, moving the fishing activity farther offshore may reduce the likelihood of interactions. Similarly, California sea lions have most often been surveyed close to shore, so moving the fishing activity farther offshore is likely to reduce the likelihood of interaction, although both California sea lions and elephant seals have been observed taken in the DGN fishery farther than 40 nmi from shore. Cuvier's beaked whales and Risso's dolphins are distributed across the entire West Coast EEZ, so the change in the proposed action area is not likely to significantly affect their likelihood of exposure. The distribution of

leatherback sea turtles within the proposed action area is less well known than that of marine mammals. It is known that leatherbacks utilize nearshore neritic waters (generally within 30 miles of shore) for foraging in parts of central California (Benson, *et al.* 2007). It is possible that by moving fishing activities farther from known leatherback foraging areas, that the likelihood of entanglement is reduced, at least within the waters closest to the nearshore foraging area. However, there is insufficient data on leatherback habitat utilization throughout the West Coast EEZ to state this with certainty.

The take cap of one short-finned pilot whale may limit effort in the SSLL EFP fishery. As described previously, it is unlikely that a short-finned pilot whale will be incidentally taken in the SSLL EFP fishery. However, this cap ensures that the mean 5-year take of this stock in fisheries does not exceed the current PBR of 1.2.

The USFWS consultation resulted in a cap of one short-tailed albatross. Similar to the other take caps proposed under this alternative, there may be indirect benefits to other protected species due to a limitation on the level of effort.

With regard to the questions developed as criteria for determining significance of the alternatives, the possible constriction of effort imposed by the various take caps under this alternative may have a direct benefit on short-finned pilot whales (by limiting the take to one animal) and indirect benefits to other marine mammals, by limiting fishing effort. Although low numbers of marine mammals are expected to be taken in the SSLL EFP fishery (based upon records from other fisheries), constraining effort will presumably lessen the likelihood of exposure to this gear. This, in turn, will make it less likely that takes of individuals from stocks will exceed the stocks' PBRs, or 10 percent of PBRs.

If effort under this alternative is not constrained due to hitting caps of striped marlin, short-finned pilot whale or seabird species, then up to five leatherbacks may be taken with an anticipated mortality, post-hooking, of one leatherback. As described above in section 4.4.3.2, a Section 7 consultation was conducted on the preferred alternative and NMFS determined that the anticipated level of leatherback take and mortality associated with this proposed action is unlikely to jeopardize the continued existence of endangered leatherback sea turtles. This level of mortality would exceed the current ITS for the HMS FMP, however, is unlikely to have an adverse impact on the Western Pacific leatherback population. This assumes that post-hooking release of gear is consistent with performance in the NED experiments, that is, all or most trailing gear is removed, entangled leatherbacks are complete disentangled, and hooks are removed, when possible.

NMFS may consider additional measures that may increase the likelihood of successful release of hooked animals, as well as, make recommendations on areas that may be avoided in order to limit the likelihood of interactions between SSLL gear and protected species.

#### **4.5 Direct and Indirect Impacts of Alternatives 2, 3, and 4 on Seabirds**

Seabird impacts of alternatives 2, 3 and 4 are calculated using the applicant's proposed average EFP effort level (56,000 hooks) along with seabird interaction rates from the Hawaii shallow-set pelagic longline fishery from 2004 to 2006. The Hawaii longline fishery switched to nighttime setting in 2004. During this period, observers recorded 10 black-footed albatross and 71 Laysan albatross captured in 2,133,096 hooks observed. Zero short-tailed albatross have been observed caught in the Hawaii pelagic longline fishery. Using these take rates, the proposed action would be expected to take one black-footed albatross, two Laysan albatross, and zero short-tailed albatross. An ITS does not exist for black-footed albatross or Laysan albatross, since these species are not listed under the ESA. The 2004 USFWS BO on the HMS FMP does not expect that short-tailed albatross would be taken by any of the HMS fisheries.

The effects of this proposed action on seabirds are consistent with the USFWS Opinion. Any take caps imposed under alternative 4 would further serve to limit impacts of the proposed action on seabirds.

## **4.6 Direct and Indirect Impacts of Alternatives 2, 3, and 4 on the Socioeconomic Environment**

### **4.6.1 Introduction**

NEPA regulations define the human environment “to include the natural and physical environment and the relationship of people with that environment” (40 CFR 1508.14). In examining the socioeconomic effects of longline EFP alternatives, benefits, costs, and economic impacts are evaluated by comparing the estimated impact under each EFP alternative to the level under the baseline or no action alternative. Primarily qualitative analysis of the socioeconomic impacts of EFP alternatives is provided, as the proposed fishery did not exist historically and hence there are no data on which to base a quantitative assessment. Cost and earnings data from the California high seas longline fishery are used to gauge the potential scale of the economic impacts, but should not be interpreted as predictive for what would occur under the proposed EFP, as many relevant factors would likely differ between the proposed EFP and the high seas longline experience. Otherwise—particularly with regard to indirect effects, and non-consumptive and non-use values associated with EFP alternatives—socioeconomic evaluations of management alternatives are primarily theory-informed, qualitative descriptions (Herrick, *et al.* 2003).

Benefit-cost analysis concerns the change in net benefits resulting from the various EFP alternatives that would be realized by society as a whole, known as welfare effects. Benefits are measured by willingness to pay and costs are opportunity costs or the value of the next best alternative. These are primarily quantified here through measures of economic producer surplus (anticipated economic benefits to society of increased effort under the EFP alternatives).

Net economic benefits primarily consist of economic producer surplus, which on an individual commercial fishing vessel basis is the difference between gross ex-vessel revenues and all fishing costs, including labor costs for captain and crew and a return to the vessel owner. The net economic benefit also includes consumer surplus, which is the net value of finfish products to the consumer. The net benefit to the consumer is the difference between what the consumer actually pays and what they are willing to pay, i.e., the value to the consumer over and above the actual purchase price or the total consumer willingness to pay less the amount actually paid. Producer surplus can increase through decreases in unit harvesting costs (improved economic efficiency), or an increase in ex-vessel prices received. Consumer surplus can increase through a decrease in prices paid, increases in the quantities consumed, or improvements in product quality. If the inputs used to harvest fish and the resulting landings are traded in competitive markets, then theoretically, consumer and producer surplus can be measured or approximated by market demand and supply curves.

Financial impacts relate to the potential consequences of the action alternatives on the financial well being of small entities. This concerns changes in profitability, i.e., changes in firms’ cost and earnings. For small organizations (such as small-scale commercial fishing enterprises), concern is with the potential impact of the action alternatives on their economic viability. In the case of small government jurisdictions, the impacts deal with how the action alternatives would affect the income and expenditures of public authorities.

### **4.6.2 Evaluation Criteria**

The evaluation criteria employed to assess economic consequences of the action alternatives, including the proposed EFP and regulatory changes, to the human environment have both a quantitative component

and some qualitative components. The former involves the use of an estimate of potential effort together with the observed range of profits per unit of effort from the California high seas longline fishery to produce a corresponding estimate of producer surplus. The latter involves a number of considerations, addressed below in this section.

A separate estimate of producer surplus was not developed for alternatives 3 or 4, as there is no means of quantifying the effect of the additional species protection measures contemplated under alternatives 3 or 4. However, the direction of the effect is clear, as any changes made under alternatives 3 or 4 could only serve to reduce allowable effort relative to the level of allowable effort permitted under alternative 2. In particular, the take caps contemplated under alternatives 3 and 4 could result in earlier termination of effort than would occur under alternative 2, while the area restriction imposed under alternative 4 would potentially limit effort that could otherwise occur in the restricted area. Thus the producer surplus estimates under alternative 2 can be interpreted as upper limits on what could be achieved under alternatives 3 or 4.

#### **4.6.3 Direct and Indirect Impacts of Alternatives 2, 3, and 4**

Direct economic effects of changes in economic production are normally measured by the change in producer surplus, an economic concept intended to measure the net benefit of changes in production, which is calculated as the difference between the anticipated increase in revenues less the anticipated increase in costs due to a change in the level of production effort. In the case of the proposed longline EFP, two measures of producer surplus were taken into consideration: economic producer surplus and financial producer surplus. Financial producer surplus is the estimated increase in producer revenues less the estimated increase in pecuniary costs under each alternative. Economic producer surplus adjusts the financial producer surplus downwards to reflect the opportunity cost of alternative potential sources of income. For instance, if the participating fisherman expected to earn a net profit of \$100,000 in longline fishing but could earn \$80,000 in alternative employment over the same period, his financial producer surplus would be \$100,000 while his economic producer surplus would be \$20,000.

Estimates of potential financial producer surplus are presented in table 4–9. The producer surplus estimates scale with estimated EFP effort. Economic producer surplus estimates are not produced, due to a lack of information about the sole participant’s opportunity costs of participation, but they would generally be lower than the levels of financial producer surplus. The financial producer surplus estimates are sensitive to the assumed level of profitability of \$6 per hook, which may be unrepresentative of what would occur under the proposed EFP.

Indirect effects of the EFP would potentially include downstream effects on fish processors who would purchase and process the catch, and on consumers who would benefit from an additional supply of locally caught fresh swordfish.

**Table 4–9. Estimates of potential longline EFP effort**

Effort (No. of Hooks) Hooks per set	Sets per trip		
	6	10	14
400	9,600	16,000	22,400
1,000	24,000	40,000	56,000
1,200	28,800	48,000	67,200

The California-based high seas longline costs and earnings survey was used to obtain an estimated range of variable financial profits per longline hook, which was roughly between \$2 and \$10 when adjusted to 2007 dollars. Effort was multiplied by an assumed level of variable financial profit per longline hook of \$6 to estimate potential financial producer surplus, as shown in table 4.10 below:

**Table 4–10. Estimates of potential financial producer surplus**

Financial Producer Surplus Hooks per set	Sets per trip		
	6	10	14
400	\$57,600	\$96,000	\$134,400
1,000	\$144,000	\$240,000	\$336,000
1,200	\$172,800	\$288,000	\$403,200

The estimates in the above table may be adjusted to any other assumed level of financial profit \$x per longline hook by ratioing (multiplying by  $x/6$ ); for instance, to scale up to estimated variable financial profit at \$10 per hook, multiply any of the table entries by  $10/6 = 5/3$ . For comparison purposes, it should be understood that the estimates of financial producer surplus are based on experience from the California-based high seas longline fishery over the years from 2001–2004, which may not accurately represent what would occur under the proposed EFP for many different reasons:

1. Fuel costs are likely higher currently than they were in the earlier period;
2. Travel distances (and hence travel costs) from port to fishing grounds would likely be lower for the EFP than they were for the high seas fishery;
3. The sole EFP participant's decisions about where and when to fish would have an uncertain and unquantifiable impact on profitability;
4. Differences in fishing conditions, environmental conditions and skipper skills between the high seas longline fishery observer sets and the experience which could occur under the EFP would have an uncertain and unquantifiable impact on profitability.

There are a number of further considerations which should be taken into account when considering the likely economic impact of the EFP. These are considered in turn below.

- Economic producer surplus takes into account the private opportunity cost to the EFP participant of longline effort in conjunction with this EFP, compared to whatever other use of his time was available. Since there is no way to objectively predict a single individual's private opportunity cost of time, no effort to explicitly measure economic producer surplus is made here, other than to mention that it would adjust downward from the level of financial producer surplus.
- Participation in the EFP is based on the sole participant's willingness to assume the risks and potential rewards of participating. Standard results in economics suggest that a rational individual will only enter into such an arrangement if the anticipated economic value of doing so (including any nonmarket value involved) exceeds the costs. The participant's willingness to participate and bear the economic risks involved with implementing the EFP and providing valuable data about the potential for longline fishing to serve as an economically and environmentally favorable alternative to other swordfish gear should be taken into consideration.
- The fishermen who have devoted time and financial resources to learn to fish with specialized gear and skills cannot fully replace the value of lost opportunity in their optimum fishing environment with less suitable opportunities of equal value elsewhere. The indirect positive effects of the EFP on the value of the participant's specialized skills and gear (human and physical capital) are not quantified in the analysis, but work in the direction of an increase in economic value of allowing the EFP to proceed.
- The positive indirect effect of revenues and local catch to downstream industries is not covered in the analysis, but is considered below in the discussion of affected fishing communities.

- Non-market value plays a hidden role in the participation decision, as part of the decision to undertake an occupational endeavor is based on a tradeoff between relative enjoyment of the work and pecuniary remuneration. As pointed out above, the participant presumably would not willingly enter the EFP if he had another more attractive employment opportunity, taking nonmarket values into account.
- A potential loss of nonmarket existence value of protected species affected under EFP alternatives 2, 3, and 4 could work against the economic gains under the EFP. However, this effect is ambiguous, due to the unknown and unmeasured indirect impact of changes in EFP effort on the global level of endangered and threatened species take. When the protected species as well as the target species are migratory, as with endangered leatherback turtles and swordfish, a curtailment of fishing effort in the West Coast EEZ may lead to an export of consumption demand for the target species to other fisheries which would otherwise be satisfied by U.S. production. Evidence presented in Bartram and Kaneko (2003) and in Sarmiento (2006) suggests that an increase in U.S. longline effort could potentially result in both greater fishing opportunity for U.S. fishermen, and a reduction in the global level of marine turtle bycatch, if the increase in U.S. catch offsets swordfish caught and imported to the United States from other fisheries with less stringent environmental protection measures and monitoring.
- There is potentially an increase in value to the U.S. economy associated with increased access to the global swordfish stock through an increase in U.S. EEZ effort to harvest swordfish which would otherwise be harvested by foreign fleets. Some of this foreign harvest will be imported back into the United States to replace the potential longline-caught swordfish, but the value of the resource is lost to the U.S. economy, with less certainty or control over the level of migratory protected species bycatch.
- Based on an April 2007 assessment, the Monterey Bay West Coast Seafood WATCH<sup>26</sup> program has listed U.S. domestic longline-caught swordfish as a “Good Alternative” from the standpoint of whether the fisheries which caught them are “healthier for ocean wildlife and the environment.” By contrast, Seafood WATCH places imported longline caught swordfish on their “Avoid” list since there are no integrated international laws to reduce bycatch and these international longline fleets are contributing heavily to the long-term decline of threatened or endangered species such as sea turtles and seabirds. By contrast, due to strict bycatch regulations and management oversight in the U.S. domestic longline fleet, swordfish from our domestic fleet is listed as a “Good Alternative”.
- Observer costs of the EFP theoretically should be included as a reduction in economic producer surplus, at an approximate cost of slightly over \$1000 per day at sea. However, the cost of observer coverage is mitigated to an unknown degree by a gain in nonmarket value due to the added assurance that not too many protected species interactions will occur under the EFP, plus an important opportunity for NMFS to obtain relevant information as the basis for future management decisions.

Indirect effects of the EFP would potentially include downstream effects on fish processors who would purchase and process the catch, and on consumers who would benefit from an additional supply of locally caught fresh swordfish.

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<sup>26</sup> [http://www.mbayaq.org/cr/SeafoodWatch/web/sfw\\_regional.aspx](http://www.mbayaq.org/cr/SeafoodWatch/web/sfw_regional.aspx)

#### **4.6.4 Summary Evaluation**

The estimated economic surplus is positive but may be unrepresentative of what would occur under the EFP due to the inability to reliably predict what level of profit per unit of effort would occur. By any reasonable objective standard, the direct impact of the EFP would be limited and small, given the sole participant and the tight limit on the level of allowable effort.

#### **4.6.5 Fishing Communities Involved in the Longline EFP (Including Buyers/Processors)**

Socioeconomic impacts of alternatives 2 and 3, and 4 on affected communities would be realized by: (1) the commercial fishing sector (harvesters, processors and consumers); (2) the recreational fishing sector (charter/party boat operators, charter/party boat patrons and private boat anglers); (3) the non-consumptive use sector (e.g. recreational divers); (4) non-use sectors (protectionists and preservationists); and, (5) fishing communities. Because there is a sole participant who would be limited to a total of four trips, any impact on affected communities would be small and of limited duration.

The primary affected communities of concern are the members of the recreational fishing community and members of the non-use sector (protectionists and preservationists). The 12-fish marlin cap under alternative 4 is used to address recreational fishermen's concern that marlin take may be excessive. Alternative 2 requires gear and fishing practice restrictions to address protected species bycatch concerns, and alternative 3 and 4 propose protected species take caps to further limit bycatch concerns. Alternatives 2, 3, and 4 limit effort to four trips, with further limits on the numbers of sets per trip and the number of hooks per set.

### **4.7 Summary of the Impacts of the Alternatives**

The effects of the alternatives are briefly summarized here, considering the analysis in sections 4.2–4.6 and the description of baseline conditions in chapter 3, which allows consideration of cumulative effects.

#### **4.7.1 Alternative 1 (No Action)**

As noted above under no action, the conditions described in chapter 3, without the incremental effect of fishing under the EFP, would prevail. There is currently no West Coast-based SSSL fishery either inside or outside the EEZ.

#### **4.7.2 Alternative 2**

The following finfish-related issues are highlighted:

- There are high catch rates of blue shark in HMS fisheries targeting swordfish. The use of circle hooks alone does not appear to appreciably reduce blue shark catch rates but it does appear to lead to increased survivorship (Kerstetter and Graves 2006; Gilman, *et al.* 2006b). The switch from squid bait to mackerel type bait, however, has shown to reduce blue shark catch rates in longline experiments conducted in the Atlantic (Watson, *et al.* 2005). Hawaii SSSL observer records for trips utilizing circle hooks indicate approximately 95 percent of captured blue sharks are released alive (Gilman, *et al.* 2006b). Estimated blue shark mortality under the EFP, utilizing circle hooks and mackerel type bait, would represent a small incremental increase in overall fishing mortality.

- Using the Hawaii SSL data as a proxy, an estimated maximum of 59 shortfin mako shark may be caught using the highest effort scenario. The catch rate could be higher if fishing occurs near the SCB or in surrounding waters because the area is a known juvenile nursery habitat for mako sharks. High recapture rates for tagged juveniles show that newly born mako sharks may remain in the SCB and surrounding waters for about two years, after which they appear to move offshore or to the south (Leet, *et al.* 2001). Shortfin mako shark catch rates in the DGN fishery are estimated to be 0.4 animals per set south of Point Conception and 1.2 animals per set north of Point Conception based on NMFS observer records.
- No catches of common thresher shark are expected based on the Hawaii SSL catch rates and less than two thresher sharks of any species would be expected to be caught. However, given the fishing area and catch rates in the DGN fishery, the EFP would most likely result in higher catches than expected based on the Hawaii SSL data. Thresher shark catch rates in the DGN fishery are an estimated 5.3 animals per set south of Point Conception and 8.5 animals per set north of Point Conception based on NMFS observer records, keeping in mind that the catches south of Point Conception include fishing inside the SCB which is out of the proposed action area for this EFP.
- The striped marlin stock is currently not listed as overfished or experiencing an overfishing condition, but the recreational fishing community has raised a concern about commercial catches and the potential for local depletion. Using the Hawaii SSL data as a proxy, an estimated 57 striped marlin may be caught using the highest effort scenario. It is uncertain whether catch rates in the Hawaii fishery would reflect those in West Coast EEZ waters. Striped marlin catch rates in the DGN fishery are an estimated 0.006 animals per set south of Point Conception and 0.08 animals per set north of Point Conception based on NMFS observer records. Anecdotal information suggests that striped marlin are able to avoid drift gillnets to some degree so the DGN estimates should be viewed with caution in regards to an abundance and/or presence/absence indicator.
- Several non-target tuna stocks are being overexploited. A Secretarial determination has been made that bigeye and yellowfin tuna are experiencing overfishing and the Council is responding to this status. The IATTC and WCPFC have adopted resolutions calling on member parties not to increase fishing effort on North Pacific albacore. Overfishing of bigeye and yellowfin tuna is principally a result of catches in the tropical North Pacific by fleets from other nations, especially the purse seine sector targeting floating objects. Addressing overfishing requires action at the regional level through the IATTC. The United States abides by conservation measures adopted by the Commission and the EFP would be subject to any such applicable measures.

The following protected species issues are highlighted:

- The results of the exposure analysis presented in section 3.4.1 suggests that a small number of marine mammals—most likely the California sea lion, northern elephant seal, short-beaked common dolphin, Risso’s dolphin, Cuvier’s beaked whale, and northern right whale dolphin—may be affected by the EFP fishery. Fishing under the proposed EFP is not expected to result in mortalities or serious injuries to these stocks which would exceed the stock’s PBR, although serious injury and/or mortality of California sea lions and northern right whale dolphins would cause the take of animals from these stocks to move further from ZRMG (10 percent of PBR). Marine mammal stocks with very low PBRs—short-finned pilot whales, sperm whales, and humpbacks whales—could be incidentally taken during fishing under the proposed EFP, although this is considered very unlikely.

- Of sea turtles, leatherbacks are the most likely to be affected by the proposed action. Anticipated take levels are low and mortality rates are expected to be only a fraction of anticipated takes (10–15 percent if all of the gear is removed and the animal is lightly hooked, which is likely based upon observer records from the Hawaii-based SSL fishery and experiments conducted in the Atlantic). Loggerhead sea turtles could be incidentally taken during fishing under the proposed EFP, but this is unlikely due to their distribution. In addition, the only observed takes of loggerheads in the DGN fishery have occurred nearshore during El Niño years, most often in the summer, when it is believed that the range of red crabs (a prey species) expands into southern California. Current information does not suggest the occurrence of El Niño conditions during the time period of the EFP.

No concerns were raised with respect to incidental mortality of seabirds.

The EFP would result in modest gains in terms of producer and consumer surplus. The estimated economic surplus is positive but may be unrepresentative of what would occur under the EFP due to the inability to reliably predict what level of profit per unit of effort would occur.

#### **4.7.3 Alternative 3**

Alternative 3 differs from alternative 2 in the imposition of additional mitigation measures. The following issues are highlighted with respect to alternative 3:

- Use of a long-nosed de-hooking device (required under this alternative) was shown to increase survival rate of blue sharks, the major non-target species (O'Brien and Sunada 1994). The impact of this requirement on the commercial viability of fishing is expected to be negligible.
- A catch cap for striped marlin could be imposed to address concerns raised by the recreational fishing community. The cap could be based on a proportion of annual average recreational striped marlin catch (based on fishing club records) or the anticipated catch using Hawaii SSL data.
- Catch caps could have been considered for those marine mammals most likely affected by the EFP, based on the exposure analysis presented in chapter 3. Those species with very low PBR values would have been given greater consideration than those species with relatively high PBR values. As noted previously, the Council used the information provided in the analysis of this alternative to develop take caps in their preferred alternative.
- A catch cap could have been considered for leatherback sea turtles. Based on the conservative exposure analysis a cap of up to five turtles is considered reasonable. Mortality rates associated with this gear type are low and dependent upon how the animal is hooked. Anticipated post-hooking mortality rate for this action is approximately 13 percent; therefore, of the up to five leatherbacks that may interact with fishing operations, only one is expected to die as a result of the interaction. As with marine mammals, the Council used the analysis of this alternative in crafting its preferred alternative.
- The requirement to set the gear at night would substantially reduce incidental catch of seabirds and conservation concerns are likely to be negligible.

- Additional mitigation measures, such as caps, represent a tradeoff against the financial and economic returns of the EFP. Establishing caps increases the likelihood that the EFP would be terminated before the maximum number of sets proposed by the applicant was deployed, representing some level of forgone income.
- Early termination due to caps would also limit the amount of data gathered through this EFP; more data would allow more accurate estimates of the likely effects of any future longline EFP of this type as well as determining if a longline fishery could eventually replace the DGN fishery.

As indicated, the principal mitigation measure under this alternative is the imposition of catch or take caps. The analysis of alternative 3 indicates the possible catch or take of species of concern. Imposition of caps would limit the effects of the EFP to the mortality level associated with any such caps.

#### **4.7.4 Alternative 4**

Alternative 4 is very nearly identical to alternative 3 but additionally specifies caps on allowable catch levels of various key species of concern, including a catch cap of 12 striped marlin, an incidental take cap of one short-finned pilot whale, a cap of one short-tailed albatross, and caps on the incidental take of ESA-listed humpback and sperm whales, and leatherback and loggerhead sea turtles based on the Biological Opinion prepared by NMFS (for marine mammals and sea turtles) and informal consultation with USFWS (for seabirds). With 100 percent observer coverage, these caps serve to ensure that EFP effort would not be allowed to continue if take (catch) of key species of concern proves higher than anticipated. However, as fishing effort under the EFP would end at the point when any of these caps were hit, there is a risk that EFP effort would be terminated before the completion of the maximum allowable effort of 56 sets. Because commercial longline fishing in the West Coast EEZ has not previously occurred, there is no data available to reliably quantify the risk of premature termination of the EFP due to reaching a take cap before 56 sets of effort have occurred. A closure of fishing north of 45° N. latitude is expected to reduce the commercial viability of fishing, due to the potential foregone fishing opportunity in case the swordfish migrate into this area before allowable effort ends. Alternative 4 would also restrict the action area for the EFP by prohibiting fishing within 40 nmi of the coastline. This restriction to the action area could reduce the commercial viability of fishing to an unknown degree, due to the potential foregone fishing opportunity in case the swordfish CPUE was relatively high between 30 nmi and 40 nmi of the coast.

Because many marine mammals utilize waters closer to shore for feeding and migration, it is likely that moving the fishing activity farther offshore will reduce the likelihood of marine mammal interactions. The distribution of leatherback sea turtles within the proposed action area is not as well known as that of marine mammals. Nonetheless, it has been established that leatherbacks utilize nearshore neritic waters for foraging in some parts of California (generally within 30 nmi of shore). It is possible that by moving fishing activities farther from known leatherback foraging areas, that the likelihood of entanglement would be reduced. However, there is insufficient data on leatherback habitat utilization throughout the West Coast EEZ to state this with certainty. These conservation measures may provide, in a qualitative sense, additional positive mitigation benefits in terms of reduced non-target and protected species interactions although quantitative data to substantiate this claim is currently not available.

#### **4.7.5 Cumulative Effects**

Effects of the proposed action have been considered principally in terms of any increase in mortality to various species that may be caught/taken in the EFP fishery. Chapter 3 describes the range of other actions/activities contributing to mortality. The incremental effect of the proposed action is very small

relative to baseline mortality levels and cumulative effects are not expected to materially alter any finding with respect to significant impacts resulting from the proposed action.

#### **4.7.5.1 Finfish**

Factors that may cumulatively affect finfish are sources of fishing mortality other than the change in catch due to the alternatives and environmentally-driven changes in stock productivity. The target and non-target species in the SSSL fishery have a Pacific-wide distribution and are subject to fishing mortality from other U.S. domestic fisheries and to a greater degree, distant water fleets from various Pacific Rim and insular nations. These fisheries were described in chapter 3 as part of the baseline description. Although several of the HMS species of concern being addressed in this document have a wide migratory range that cross established political and management boundaries in the Pacific, the majority of the catch and effort from these fisheries is significantly displaced from the action area. In addition, for most of these distant water fishing fleets, little or no data exist regarding bycatch of marine species, including HMS of interest. Without such information, it is difficult to assess the cumulative impacts of these fisheries on the species under review in this EA.

#### **Target Species**

The catch and effort data presented for other fisheries that interact with HMS populations, including swordfish, are parameters that for the most part are utilized by regional stock assessment scientists, including NMFS scientists, to produce status of the stock and other key population level estimates. As detailed under the baseline stock status information for swordfish presented in section 3.3.2.1 of this document, the best available science at this point does not indicate an overfished or overfishing condition for swordfish. The proposed action, taken as a very minor component of existing commercial and recreational fisheries throughout the Pacific region, would not increase the regional catch of swordfish to a level triggering a resource conservation concern nor a finding of significant impact for the purposes of this document.

#### **Major Non-target Species**

The catch and effort data presented for the cumulative effects of the major non-target species projected to be captured by the SSSL EFP are parameters that for the most part are utilized by regional stock assessment scientists, including NMFS scientists, to produce status of the stock and other key population level estimates. These species include albacore, bigeye, yellowfin, bluefin, and skipjack tunas; blue, thresher, and mako sharks; and striped marlin. As detailed under the baseline stock status information for these species presented in section 3.3.2.2 of this document, the best available science at this point does not indicate an overfished or overfishing condition for these species with the exception of bigeye and yellowfin tuna whose stocks have been determined by NMFS to be subject to overfishing. Given the relatively low SSSL CPUE for these tropical tunas that may occur in the more temperate waters of the proposed action area, coupled with corrective actions being contemplated and/or taken by Pacific regional fisheries management organizations (RFMO), the proposed action would not increase the regional catch of these species to a level triggering a resource conservation concern nor a finding of significant impact for the purposes of this document.

The catch and effort data presented for those major non-target finfish species for which population assessments have not been conducted to date (e.g., pelagic stingray, common mola, and pomfret), do not allow for a stock status determination at this point. It is assumed that the proposed action would not increase the regional catch of these species to a level triggering a resource conservation concern nor a finding of significant impact for the purposes of this document. An additional point to consider is the high rate of release and survival for several of these longline-caught species, including the pelagic

stingray and common mola, which further mitigates the impacts of the proposed action in regards to bycatch mortality.

### **Prohibited Species**

Given the low interaction rates of HMS FMP prohibited species with the fisheries noted, the proposed action would not increase the regional catch of these species to a level triggering a resource conservation concern or a finding of significant impact for the purposes of this document. The HMS FMP mandates release of all prohibited species captured unless a valid scientific collecting permit has been obtained through the proper State channels. There are currently no population assessment estimates, nor management reference points or thresholds available for basking, megamouth, and great white sharks, against which projected catch under this EFP could be measured for purposes of triggering a possible resource concern.

#### *4.7.5.2 Protected Species*

### **Marine Mammals**

General threats to marine mammals in the North Pacific are detailed in section 3.4.1.2. These include entanglement in fishing gear (active fishing gear and discarded gear), ship strikes, exposure to toxins, pollution, loss of habitat or prey, and underwater sound. The effects of these threats are difficult to quantify, but may be reflected in stock trends, some of which are increasing (e.g., Eastern North Pacific humpback whales).

The species considered most likely to be affected by this action, California sea lion, northern elephant seal, short-beaked common dolphin, Risso's dolphin, northern right whale dolphin, and harbor seal are all from stocks that are not listed on the ESA-listed or considered depleted under the MMPA. Very low levels of take of animals from these stocks are anticipated under the proposed EFP. When combined with existing known threats to these stocks, it is not expected that the proposed action will change the status of these species or trigger concern over the stocks' status.

### **Sea Turtles**

General threats to Pacific sea turtles are detailed in section 3.4.2.2. These include poaching of eggs, killing of females at nesting beaches, human encroachment (development), beach erosion, microclimate-related impacts at nesting sites, low hatchling success, and incidental capture in fisheries. Leatherbacks are most likely to be affected by the proposed action and likely only a few individuals. Of these, very low or no mortalities are anticipated, thus the proposed action is unlikely, within the context of other effects, to change the status of leatherbacks in the Pacific.

#### *4.7.5.3 Seabirds*

Seabirds are killed in the longline fisheries referenced above. In addition, domestic longline fisheries in Alaska have been a contributor to mortality. However, both Alaskan and Hawaiian longline fisheries have implemented mitigation measures that have substantially reduced incidental seabird mortality.

#### *4.7.5.4 Socioeconomic Environment*

Cumulative effects consider events outside of the proposed action. When "external" effects combine with the direct and indirect effects of the action they have a net cumulative effect. Due to the limited scale and

short-term nature of the EFP, no cumulative socioeconomic effects are anticipated as a direct result of fishing effort under the EFP.



## 5.0 CONSISTENCY WITH MSA NATIONAL STANDARDS

An FMP or plan amendment and any pursuant regulations must be consistent with ten national standards contained in the MSA (§301). These are:

*National Standard 1 states that conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the U.S. fishing industry.*

As discussed in chapter 4, the proposed action is not expected to result in overfishing of any target or nontarget species.

*National Standard 2 states that conservation and management measures shall be based on the best scientific information available.*

The measures applicable to the EFP are based on the best scientific information available. The literature cited in chapter 9 lists the sources of this information.

*National Standard 3 states 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.*

Target species stocks have a distribution wider than the West Coast EEZ. The HMS FMP recognizes the need for managing these stocks in the international context through RFMO organizations such as the Inter-American Tropical Tuna Commission.

*National Standard 4 states that conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various U.S. fishers, such allocation shall be (A) fair and equitable to all such fishers; (B) reasonably calculated to promote conservation; and (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.*

The proposed action does not involve allocation or the assignment of fishing privileges, except for the exemption allowed to the vessel participating in the EFP.

*National Standard 5 states that 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.*

The proposed action has no effect on efficiency of utilization.

*National Standard 6 states that conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.*

The proposed action focuses on a single fishery and is not expected to affect other fisheries catching the same fish species. The evaluation in this EA recognizes differences in the status of target and nontarget species to the degree known.

*National Standard 7 states that conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.*

The proposed action involves an exemption from certain regulations and does not duplicate existing management measures or regulations.

*National Standard 8 states that conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.*

The proposed action is intended mitigate adverse socioeconomic impacts while avoiding significant adverse natural environmental impacts.

*National Standard 9 states that conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.*

The MSA defines “fish” as all forms of marine animal and plant life other than marine mammals and birds. To the degree that overall fishing effort increases as a result of the proposed action, there could be an increase in bycatch. The proposed action is intended to test measures to reduce the incidental take of protected species. The new and innovative gear being tested has proven effective in other domestic and international SSSL fisheries at increasing the post-hooking survivorship of finfish bycatch species such as blue sharks. In addition, the applicant would be required to use a NMFS approved shark de-hooking device which would further minimize bycatch mortality of hooked sharks.

*National Standard 10 states that conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.*

The proposed action involves one vessel and is not expected to affect safety. This vessel normally operates outside the EEZ so no increased exposure to adverse conditions is expected.

## **6.0 CROSS-CUTTING MANDATES**

### **6.1 Other Federal Laws**

#### **6.1.1 Coastal Zone Management Act**

Section 307(c)(1) of the Coastal Zone Management Act (CZMA) of 1972 requires all Federal activities that directly affect the coastal zone be consistent with approved State coastal zone management programs to the maximum extent practicable. NMFS believes that the Council-preferred alternative would be implemented in a manner that is consistent to the maximum extent practicable with the enforceable policies of the approved coastal zone management programs of Oregon and California. This determination was submitted to the responsible State agencies for review under Section 307(c)(1) of the CZMA. Subsequent to NMFS submitting a Consistency Determination for this action to the California Coastal Commission, a legal interpretation of the CZMA was rendered compelling the applicant, not the permitting agency (NMFS), to submit a Consistency Certification for the proposed EFP under CZMA 307(c)(3)(a). The applicant will be submitting the necessary documentation at a future California Coastal Commission's meeting.

The relationship of the HMS FMP with the CZMA is discussed in section 10.7 of the 2003 HMS FMP (PFMC 2003). The HMS FMP has been found to be consistent with the Oregon and California coastal zone management programs. The recommended action is consistent and within the scope of the actions contemplated under the framework of the HMS FMP. Under the CZMA, each State develops its own coastal zone management program which is then submitted for Federal approval. This has resulted in programs which vary widely from one State to the next. The proposed action is expected to be consistent, to the maximum extent practicable, with California and Oregon's coastal management programs.

#### **6.1.2 Endangered Species Act**

NMFS is required under Section 7(a)(2) of the ESA to insure that any action it carries out is not likely to jeopardize the continued existence of any endangered or threatened marine species or adversely modify designated critical habitat. To fulfill this obligation, NMFS has conducted a Section 7 consultation which determined that the SSSL EFP fishery would not jeopardize the continued existence of endangered or threatened species. Because NMFS would implement the proposed action and must protect ESA-listed marine species, it functions as both the action agency and the consulting agency during the Section 7 consultation. However, different divisions within the agency fulfill these roles. Additionally, USFWS is responsible for potential impacts to listed seabirds. On June 6, 2007, NMFS initiated consultation with the USFWS on the potential effects of the proposed action on short-tailed albatross and brown pelican; USFWS has made a determination that a formal consultation and preparation of a biological opinion is not necessary. The USFWS concurs with NMFS's determination that the proposed EFP is not likely to adversely affect ESA-listed seabird species.

#### **6.1.3 Marine Mammal Protection Act**

The MMPA of 1972, as amended, is the principle Federal legislation that guides marine mammal species protection and conservation policy in the United States. Under the MMPA, NMFS is responsible for the management and conservation of 153 stocks of whales, dolphins, porpoise, as well as seals, sea lions, and fur seals; while the USFWS Service is responsible for walrus, sea otters, and the West Indian manatee.

Off the West Coast the following marine mammal stocks are considered depleted under the MMPA: the Steller sea lion (*Eumetopias jubatus*) eastern stock, Guadalupe fur seal (*Arctocephalus townsendi*),

southern sea otter (*Enhydra lutris*) California stock, sperm whale (*Physeter macrocephalus*) Washington, Oregon, and California stock, humpback whale (*Megaptera novaeangliae*) Eastern North Pacific stock, blue whale (*Balaenoptera musculus*) Eastern North Pacific stock, fin whale (*Balaenoptera physalus*), Washington, Oregon, and California stock, killer whale (*Orcinus orca*) Eastern North Pacific southern resident DPS, sei whale (*Balaenoptera borealis*), and northern right whale (*Eubalaena glacialis*) (Carretta, *et al.* 2007). Any species listed as endangered or threatened under the ESA is automatically considered depleted under the MMPA.

Chapter 4 evaluates impacts of the alternatives on marine mammals.

#### **6.1.4 Migratory Bird Treaty Act**

The MBTA of 1918 was designed to end the commercial trade of migratory birds and their feathers that, by the early years of the 20th century, had diminished the populations of many native bird species. The MBTA states that it is unlawful to take, kill, or possess migratory birds and their parts (including eggs, nests, and feathers) and implements a multilateral treaty between the United States, Canada, Japan, Mexico, and Russia to protect common migratory bird resources. The MBTA prohibits take of seabirds. The MBTA applies within 3 nmi off California, Oregon, and Washington coastline. Because the EFP would occur in Federal waters (seaward of 3 nmi) the fishery would not be subject to the MBTA. Chapter 4 of this EA evaluates the effect of the alternatives on seabirds.

## **6.2 Executive Orders**

### **6.2.1 EO 12898 (Environmental Justice)**

EO 12898 obligates Federal agencies to identify and address “disproportionately high adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations in the United States” as part of any overall environmental impact analysis associated with an action. NOAA guidance, NAO 216-6, at §7.02, states that “consideration of EO 12898 should be specifically included in the NEPA documentation for decision-making purposes.” Agencies should also encourage public participation—especially by affected communities—during scoping, as part of a broader strategy to address environmental justice issues.

The environmental justice analysis must first identify minority and low-income groups that live in the project area and may be affected by the action. Typically, census data are used to document the occurrence and distribution of these groups. Agencies should be cognizant of distinct cultural, social, economic, or occupational factors that could amplify the adverse effects of the proposed action. (For example, if a particular kind of fish is an important dietary component, fishery management actions affecting the availability, or price of that fish, could have a disproportionate effect.) In the case of Indian tribes, pertinent treaty or other special rights should be considered. Once communities have been identified and characterized, and potential adverse impacts of the alternatives are identified, the analysis must determine whether these impacts are disproportionate. Because of the context in which environmental justice is developed, health effects are usually considered, and three factors may be used in an evaluation: whether the effects are deemed significant, as the term is employed by NEPA; whether the rate or risk of exposure to the effect appreciably exceeds the rate for the general population or some other comparison group; and whether the group in question may be affected by cumulative or multiple sources of exposure. If disproportionately high adverse effects are identified, mitigation measures should be proposed. Community input into appropriate mitigation is encouraged.

It should be noted that fishery participants make up a small proportion of the total population in these communities, and their demographic characteristics may be different from the community as a whole.

However, information specific to fishery participants is not available. Furthermore, different segments of the fishery-involved population may differ demographically. For example, workers in fish processing plants may be more often from a minority population while deckhands may be more frequently low income in comparison to vessel owners.

Participation in decisions about the proposed action by communities that could experience disproportionately high and adverse impacts is another important principle of the EO. The Council offers a range of opportunities for participation by those affected by its actions and disseminates information to affected communities about its proposals and their effects through several channels. In addition to Council membership, which includes representatives from the fishing industries affected by Council action, the HMSAS, a Council advisory body, draws membership from fishing communities affected by the proposed action. While no special provisions are made for membership to include representatives from low income and minority populations, concerns about disproportionate effects to minority and low income populations could be voiced through this body or to the Council directly. Although Council meetings are not held in isolated coastal communities for logistical reasons, they are held in different places up and down the West Coast to increase accessibility.

The Council disseminates information about issues and actions through several media. Although not specifically targeted at low income and minority populations, these materials are intended for consumption by affected populations. Materials include a newsletter, describing business conducted at Council meetings, notices for meetings of all Council bodies, and fact sheets intended for the general reader. The Council maintains a postal and electronic mailing list to disseminate this information. The Council also maintains a website<sup>27</sup> providing information about the Council, its meetings, and decisions taken. Most of the documents produced by the Council, including NEPA documents, can be downloaded from the website.

### **6.2.2 EO 13132 (Federalism)**

EO 13132, which revoked EO 12612, an earlier federalism EO, enumerates eight fundamental federalism principles. The first of these principles states “Federalism is rooted in the belief that issues that are not national in scope or significance are most appropriately addressed by the level of government closest to the people.” In this spirit, the EO directs agencies to consider the implications of policies that may limit the scope of or preempt States legal authority. Preemptive action having such federalism implications is subject to a consultation process with the States; such actions should not create unfunded mandates for the States; and any final rule published must be accompanied by a federalism summary impact statement.

The Council process offers many opportunities for States (through their agencies, Council appointees, consultations, and meetings) to participate in the formulation of management measures. This process encourages States to institute complementary measures to manage fisheries under their jurisdiction that may affect federally-managed stocks.

The proposed action does not have federalism implications subject to EO 13132.

### **6.2.3 EO 13175 (Consultation and Coordination with Indian Tribal Governments)**

EO 13175 is intended to ensure regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen the United States government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes.

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<sup>27</sup> [www.pcouncil.org](http://www.pcouncil.org)

The Secretary recognizes the sovereign status and co-manager role of Indian tribes over shared Federal and tribal fishery resources. In Section 302(b)(5), the Magnuson-Stevens Act reserves a seat on the Council for a representative of an Indian tribe with federally-recognized fishing rights from California, Oregon, Washington, or Idaho.

The U.S. government formally recognizes the four Washington coastal tribes (Makah, Quileute, Hoh, and Quinault) have treaty rights to marine fish. In general terms, the quantification of those rights is 50 percent of the harvestable surplus of groundfish available in the tribes' usual and accustomed fishing areas (described at 50 CFR 660.324). Each of the treaty tribes has the discretion to administer their fisheries and to establish their own policies to achieve program objectives.

There is no tribal involvement with this fishery.

#### **6.2.4 EO 13186 (*Responsibilities of Federal Agencies to Protect Migratory Birds*)**

EO 13186 supplements the MBTA (above) by requiring Federal agencies to work with the USFWS to develop memoranda of agreement to conserve migratory birds. NMFS is in the process of implementing a memorandum of understanding. The protocols developed by this consultation will guide agency regulatory actions and policy decisions in order to address this conservation goal. The EO also directs agencies to evaluate the effects of their actions on migratory birds in environmental documents prepared pursuant to the NEPA.

Chapter 4 in this EA evaluates impacts to seabirds.

## 7.0 LIST OF PREPARERS

<b>Name and Affiliation</b>	<b>Responsibility</b>
Dr. Kit Dahl, Staff Officer – Highly Migratory Species, Pacific Fishery Management Council	Project management, draft EA; overall editing; principal author chapters 1, 2, 5, and 6
Mr. Lyle Enriquez, Fishery Biologist, NMFS SWR	Principal author seabird impacts, chapters 3 & 4
Mr. Pierre Gorodo, NMFS SWR	Technical assistance, chapters 3 and 4
Mr. Craig Heberer, Fishery Biologist, NMFS SWR	Project management, draft and final EA; principal author finfish species impacts, chapters 3 & 4
Ms. Charlene Hurst, Heidi Hermsmeyer and Gabrielle Dorr	Copy editors
Ms. Elizabeth Petras, Liaison Officer, NMFS SWR Office of Protected Resources	Principal author protected species impacts, chapters 3 & 4
Dr. Stephen Stohs, Fishery Economist, NOAA Southwest Fisheries Science Center	Principal author socioeconomic impacts, chapters 3 & 4
Dr. Suzanne Kohin, Research Fishery Biologist, NOAA Southwest Fisheries Science Center	Principal author on finfish stock status, chapter 3
Mr. Stephen Wertz, Associate Marine Biologist, California Department of Fish and Game	Technical assistance, chapters 3 & 4
Dr. Yonat Swimmer, NOAA Southwest Fisheries Science center	Longline fishery bycatch reduction research

## 8.0 LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES OF THE EA WERE SENT

A draft EA, which did not contain an evaluation of the preferred alternative, was distributed as part of the meeting materials available for the Pacific Council's April 2007 meeting. Paper copies were distributed to Council members and selected Council advisory bodies. Paper copies were also made available to the public at the meeting. This final EA was prepared to support NMFS's decision to issue the EFP. NMFS will distribute copies of this final EA upon request and an electronic version of the document will be posted on the Agency's Southwest Region website (<http://swr.nmfs.noaa.gov/>).



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## APPENDIX A: NMFS RESPONSE TO PUBLIC COMMENTS ON THE SSSL EFP APPLICATION AND DRAFT EA

### Pacific Council's Public Comment Summary

A substantial number of public comments have been received to date by the Council and NMFS. As established under the Council's Operating Procedure (COP 20) for reviewing EFP applications<sup>28</sup>, NMFS utilized the Council's public meeting as an initial forum for public input on Pete Dupuy's SSSL EFP application. A draft EA document was prepared by the Council's HMSMT for Council deliberation and was made available to the public on March 6, 2007. The Council also accepted public testimony at their regularly scheduled March and April meetings. In total, over 2,100 e-mails, letters, or comments through public testimony, were received by the Council on this proposed action. The majority of the comments urged the Council to recommend denial of the EFP application. The Council does not formally respond to written public comments (Dahl 2007). A summation of the Council received public comments are posted at <http://www.pcouncil.org/bb/2007/bb0407.html#highly>.

The Council made a final recommendation to approve the EFP, following COP 20 protocols, on April 6, 2007, and transmitted that decision shortly thereafter to NMFS.

### NMFS's Public Comment Summary

NMFS published a notice of receipt of the EFP in the Federal Register on June 13, 2007 (72 FR 32618), with a formal request for public comments. An email public comment box was established for this proposed action at [SWR.0648-XA73@noaa.gov](mailto:SWR.0648-XA73@noaa.gov). The public comment period for this proposed action closed on July 13, 2007. Public comments were also received by Dr. William Hogarth, AA for NMFS, and forwarded to NMFS Southwest Region. In total, over 5,000 e-mails and 4,300 letters were received by NMFS on this proposed action.

The majority of the public comments were in opposition of the proposed issuance of the EFP with approximately 98 percent of the comments delivered to the email comment box via a form letter developed by Non-Governmental Organizations (e.g., Sea Turtle Restoration Network). The form letter urged NMFS not to approve the EFP, primarily out of concern over the bycatch and population status of Pacific leatherback sea turtles and marine mammals. Very few of the letters, e-mails, or public testimony, had substantive comments on the associated EA. Those that did were noted below along with NMFS's responses. Substantive public comments on the EA were considered in the review and revision of the draft EA and the document was changed and improved to address those comments. The comments and responses are sorted by major category and/or Federal statutes.

### NMFS consideration of the EFP application is illegal

**Comment:** Most of the public comments received by NMFS for this action were part of an e-mail campaign utilizing a pre-written format that urged NMFS not to approve the EFP. The replicated comment stated that it was a bad idea at best and illegal at worst for NMFS to even consider this application.

**Response:** NMFS has a statutory obligation under the MSA to consider valid EFP applications and make a determination as to whether the applications warrant further consideration. The EFP application contained all of the required information requested as part of the Council's EFP Operating Protocol and as

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<sup>28</sup> <http://www.pcouncil.org/operations/cops.html>

part of the NMFS National EFP Guidelines. Per Council direction, the EFP application was reviewed by the Council's HMSMT and its Advisory Subpanel, and these bodies forwarded a recommendation to the Council that the application met the goals and objectives of the COP and the HMS FMP. The Council then voted to recommend approval of the EFP and transmitted that approval to NMFS. NMFS proceeded with preparation of the documentation needed to allow an informed and analytical decision to be made on the EFP application. This decision will be based in part on the management goals and objectives of the HMS FMP and utilizing the best available science while adhering to the applicable Federal statutes and regulations.

## ESA

**Comment:** The issuance of the EFP would violate the ESA based on impacts to the short-tailed albatross. Self-reports of seabird interactions with the former California-based longline fishery acknowledge take of 100 albatross of various species. Dozens of albatross were also observed taken in the handful of trips with actual observer coverage. It is therefore reasonable to assume that short-tailed albatross are likely to be entangled and killed if the EFP is approved...we do not believe any additional take authorization for the species can be lawfully granted.

**Response:** We do not anticipate any take of short-tailed albatross. The reported and observed albatross takes in the California longline fishery were all black-footed and Laysan albatross. This action does not grant additional take authorization because no takes of short-tailed albatross are anticipated. There will be a conservative catch cap of one short-tailed albatross for the proposed action.

**Comment:** One of the purposes of the EFP is to determine "environmental effects, including the potential impacts to protected species". As such, any take occurring from the EFP cannot be considered "incidental" and authorized under Section 7 of the statute, but is instead part of the proposed action and falls under Section 10(a).

**Response:** A Section 10(a)(1)(A) permit would be the appropriate permit to issue if take were deliberate (not incidental) for scientific purposes or to enhance the propagation or survival of the affected species. The fishing authorized under the EFP would not deliberately take ESA-listed species. Any takes would be incidental to the purpose of the EFP which is to evaluate whether the fishery can operate in a commercially viable manner, with minimal environmental impacts. It acknowledges that takes of ESA-listed leatherback sea turtles may occur, but this is not the purpose of the EFP. A Section 10(a)(1)(B) permit would also be applicable for a non-Federal action; however, the issuance of the EFP is a Federal action, thus it is appropriate that a Section 7 consultation be conducted.

**Comment:** Given that the closure of shallow-set longlining east of 150° W. longitude was promulgated pursuant to NMFS's authority under the ESA, rather than under the MSA, we do not see how an EFP issued under the MSA could lawfully be issued in direct contravention of ESA regulations prohibiting such fishing.

**Response:** The prohibition on setting shallow set longline gear east of 150° W. longitude applies only on the high seas, west of the EEZ. The proposed EFP would occur within the EEZ. The regulation promulgated under the ESA is not applicable to the proposed EFP. The HMS FMP prohibits SSSL fishing within the EEZ (50 CFR §660.712). Therefore, it is appropriate that the applicant apply for an exemption from this section of the regulations implementing the HMS FMP.

**Comment:** If any ESA-listed marine mammal interacts with the EFP fishery, both NMFS and the applicant will have violated Section 9 of the ESA and be subject to civil and criminal penalties there under. See also 16 U.S.C. §1538(g).

**Response:** NMFS does not anticipate the take of any species of marine mammals listed on the ESA during fishing operations authorized by the proposed EFP. This is based upon NMFS's review of the best available information on the distribution and behavior of ESA-listed marine mammals within the proposed action area in addition to reviewing observer records from other fisheries that have occurred in the proposed action area and longline fisheries from other areas. Because no takes of ESA-listed marine mammals are anticipated, NMFS does not anticipate a violation of Section 9 of the ESA. NMFS also did not issue an Incidental Take Statement for ESA-listed species of marine mammals as part of the biological opinion that was prepared for this project after conducting a consultation under Section 7(a)(2) of the ESA. As provided in 50 CFR 402.16, reinitiation of Section 7 consultation would commence immediately if a take of a marine mammal occurs during fishing operations authorized by the proposed EFP.

**Comment:** We believe, as NMFS stated in 2000, that authorization of any leatherback take in the Pacific would violate the requirement to avoid jeopardy to the species. Therefore... the EFP... would violate Section 7(a)(2) of the ESA.

**Response:** Substantial new information on the distribution and abundance of Pacific leatherbacks is available that was not available when the 2000 biological opinion was written. Among the new information are estimates of Western Pacific leatherbacks that are higher than the estimates available in 2000. As described in section 3.4.2.1, new population estimates are available for Western Pacific leatherbacks. These are based upon a meeting of researchers, managers, and tribal community members with extensive knowledge of local leatherback nesting beach populations and activities in Papua (Indonesia), Papua New Guinea, the Solomon Islands, and Vanuatu who met to identify nesting beach sites, and share abundance information based on monitoring and research, as well as anecdotal reports. Data from this meeting have been incorporated into the most recent population estimates by Dutton, *et al.* (2007) of between 2,700 and 4,500 breeding females in the Western Pacific population. Since 2000, NMFS has issued three no jeopardy opinions for actions that would likely take leatherback sea turtles in the North Pacific. The determinations were made, in part, based upon recent work by the SWFSC. These takes and the current environmental baseline were taken into consideration as part of the Section 7 consultation on this proposed action. NMFS would not issue an EFP if it is likely to jeopardize leatherback sea turtles, and any take would be covered by an Incidental Take Statement and therefore not violate Section 9 of the ESA. There would be a take cap of five leatherback turtles, or one leatherback mortality for the proposed action based on the Incidental Take Statement for this EFP.

**Comment:** EFP fishing would put the loggerhead sea-turtle at risk. NMFS instituted the closure of shallow-set longlining east of 150° W., in part to protect North Pacific loggerhead turtles. The North Pacific loggerhead population has declined by upwards of 80 percent in recent decades, and is likely approaching the perilous state of the leatherback.

**Response:** As noted in the response above, the closure of the SSSL fishery east of 150° W. applies to the high seas only, outside the U.S. West Coast EEZ. The closure was necessary to avoid jeopardizing loggerheads that were anticipated to be taken in longline gear in the high seas in North Pacific feeding areas. The State of California has not authorized the use of longline gear in the U.S. West Coast EEZ off of California. When the HMS FMP was developed, this State law and many others were adopted into the final rule. This was not identified as a measure necessary to protect loggerhead sea turtles, since loggerheads are generally found in waters warmer than most of the U.S. West Coast EEZ.. Studies over the past ten years have identified foraging areas for loggerhead sea turtles in the North Pacific. Juvenile loggerheads utilize these areas as they migrate from natal beaches in Japan to productive foraging areas off of Baja California, Mexico, thus exposing them to longline fisheries in the high seas of the North

Pacific. Loggerheads are very rarely observed in the proposed action area and are not expected to be affected by the proposed action, so no risk to loggerheads is anticipated.

**Comment:** Issuing the EFP and allowing longline gear into critical leatherback foraging areas would violate the recommendation of the Pacific Leatherback Recovery Plan, as well as NMFS's affirmative conservation mandates under the ESA. As such, doing so would violate Sections 2(c), 4(f), and 7(a)(1) of the ESA.

**Response:** Recovery plans are guidance documents, not regulatory documents. They should, however, guide Federal agencies in fulfilling their obligations under Section 7(a) of the ESA which calls on all Federal agencies to use their authority to support the purposes of the ESA, and also ensure that Federal actions do not jeopardize the continued existence of listed species. One of the threats to leatherback sea turtles identified in the recovery plan is bycatch in traditional longline fisheries, and one of the recommendations in the plan is the development of gear modifications to reduce mortalities. The fishing gear and techniques being proposed in this EFP are consistent with commercial and experimental SLL fisheries that have demonstrated substantial reductions in sea turtle takes and mortalities. Limited testing of this gear in the West Coast EEZ is consistent with gear testing in other areas. NMFS is continuing to study leatherback foraging areas within the West Coast EEZ and will provide guidance to the fishermen that has applied for this EFP on ways to reduce his likelihood of interacting with leatherbacks. Finally, the standard to which this action must be measured is whether the action is likely to result in a level of take or mortality that will jeopardize the continued existence of leatherback sea turtles. Therefore, NMFS is engaged in an intra-agency Section 7 consultation, as required under the ESA, and has determined that leatherback sea turtles are the only ESA-listed species likely to be adversely affected by the proposed action. It is estimated that no more than five leatherbacks are likely to interact with the fishery and of these one or zero mortalities are likely to occur following a hooking interaction.

**Comment:** Issuance of, and/or fishing under the EFP, would compromise the recovery of loggerhead, green and olive ridley sea turtles.

**Response:** As described in section 3.4.2.1, the best available information on the distribution of loggerhead, green and olive ridley sea turtles suggests that it is very unlikely that individuals from these species will be in the area of the proposed EFP (i.e., north of Point Conception and outside the Southern California Bight); therefore, they are not expected to be incidentally taken in fishing operations authorized by the proposed EFP.

**Comment:** NMFS stated in its 2000 Biological Opinion that authorization of any leatherback take in the Pacific would violate the requirement to avoid jeopardy to the species.

**Response:** NMFS acknowledges that the overall number of leatherback sea turtles has declined in the Pacific over the past few decades. Unfortunately, the status of Eastern Pacific leatherbacks appears to be substantially worse than their counterparts in the Western Pacific. However, NMFS is also now aware of substantive population differences between the Eastern Pacific leatherbacks and Western Pacific leatherbacks off the U.S. West Coast. As described in section 4.3.2.1, genetic analyses of stranded, incidentally caught, and at-sea captures of leatherbacks off California and Oregon, leatherbacks in this area likely originate from Western Pacific nesting beaches. Therefore, it is unlikely, but not impossible, that the leatherbacks that may be hooked or entangled in the proposed EFP would be from the Eastern Pacific population. Also as described in section 4.3.2.1 and in response to comment above, the current population estimate of Western Pacific breeding females is substantially higher than the estimate in 2000, due to the inclusion of nesting sites and populations not previously considered in the Western Pacific range. Due to this new information on the status of Pacific leatherback populations, particularly the

population most likely to occur off the U. S. West Coast, NMFS does not feel that the assessment made in the 2000 Biological Opinion, that any take would jeopardize the species, is still applicable.

**Comment:** It would be inappropriate to allow the capture of turtles by a California-based fishery – EFP or otherwise, when the Hawaii fishery was closed for exactly this reason only one year ago.

**Response:** The Hawaii-based SSSL fishery was closed on March 20, 2006, because takes of loggerheads had reached the annual cap of 17 animals. The cap is the incidental take statement for the biological opinion and is the average anticipated takes in the fishery based upon past observed interactions in the fishery and applying an anticipated reduction similar to the level observed in gear experiments conducted in the Atlantic Ocean. The observer records tracked takes based upon a typical distribution of effort. The CPUE of loggerheads and other turtles is highly variable inter- and intra-annually. The fishery in 2006 did not follow normal patterns of effort as an unusually high level of effort was made in the first quarter, which is a time of high interactions rates, or CPUEs with loggerheads. The Hawaii fishery is actively involved in developing methods to minimize takes of sea turtles in their longline fishery and in 2007 has yet to reach the cap for loggerhead or leatherback sea turtles. Since 2004, the Hawaii SSSL fishery has not met or approached the cap for leatherback sea turtles, which is the species considered most likely to be affected by the proposed action.

### MMPA

**Comment:** The proposed action would likely kill marine mammals at rates in excess of those authorized by the MMPA. The applicant is not applying for, nor is NMFS requiring, the issuance of an MMPA 101(a)(5)(E) permit. The decision by the applicant and NMFS to forgo permitting under the MMPA constitutes a known violation of the statute. This would likely subject the applicant to civil and criminal liability for knowing violations of Federal law.

**Response:** NMFS thoroughly reviewed all of the available information on the distribution of ESA-listed marine mammals within the proposed action area to determine which species may be exposed to the fishery. Reviews of other fisheries in the proposed action area and an extensive review of the literature on marine mammal takes in longline fisheries were conducted. Based upon this information, it is considered very unlikely that ESA-listed marine mammal will be adversely affected by the proposed action, therefore, a 101(a)(5)(E) permit under the MMPA is not necessary. A Section 101(a)(5)(E) permit is only required when incidental take of an ESA-listed marine mammal is anticipated.

**Comment:** There are no take limits for numerous species likely to be exposed to the EFP fishery, such as...long-beaked common dolphins, which are a strategic stock under the MMPA because take exceeds sustainable levels; northern fur seals, which are listed as depleted under the MMPA; and northern right whale dolphins which are subject to take from existing fisheries at levels above the MMPA's ZRMG. Take of any of these species would exceed important legal and/or biological thresholds.

**Response:** NMFS disagrees that long-beaked common dolphins and fur seals are likely to be exposed to the EFP fishery. As described in section 3.4.1.1, NMFS reviewed the available information on the distribution of marine mammals to determine which species are most likely to be affected by the proposed action. NMFS also reviewed observer records from the California DGN fishery, particularly sets made 40 nmi or more offshore, to determine marine mammal species most likely to be affected. Long-beaked common dolphins and northern fur seals are very unlikely to be affected by the proposed action due to their more nearshore distribution; therefore, this action is not considered likely to cause serious injury or mortality to individuals in these stocks. Northern right whale dolphins may be taken in fishing operations authorized by the EFP; however, takes are likely to be low since the species may not be in the area of the proposed action. This is based upon the observed takes in the DGN fishery, in which most occurred

within 40 nmi of shore, and the distribution of this stock was generally along continental shelf and slope waters, which are inshore of the proposed action. The current mean annual takes of northern right whale dolphins is 23 and the PBR is 164. As described in section 3.4.1.1, very few takes of northern right whale dolphins are expected, and there is no way to estimate how many takes may result in serious injury or mortality. NMFS believes the commenter is incorrect in their interpretation of the MMPA. Please see response below for additional information on the MMPA.

**Comment:** The issuance of the EFP would violate the unambiguous command of the MMPA that all fisheries “shall reduce incidental mortality and serious injury of marine animals to insignificant levels approaching a zero mortality and serious injury rate by April 30, 2001. NMFS has defined ZMRG by regulation as ten percent of PBR. The likely take of marine mammal species under the EFP would exceed this threshold.

**Response:** NMFS disagrees and believes that this comment misinterprets the MMPA. The ZMRG, as described in Section 118 of the MMPA, has four parts. First, there is a threshold level of mortality and serious injury (insignificant levels approaching a zero mortality and serious injury rate) and a deadline by which commercial fisheries should reach the threshold. Second, there is a statement that fisheries that have achieved the threshold level of mortality and serious injury are not required to further reduce incidental mortality and serious injury. Third, there is a requirement for a review of fisheries progress toward the threshold. Fourth, there is a mechanism for reducing incidental mortality and serious injury (i.e., Take Reduction Plans). Although the threshold and deadline are stated without condition, there is no statement in the MMPA that excess removals (mortality and serious injury exceeding threshold values after the deadline) cannot be authorized. The fourth part of the ZMRG states that these excess removals must be addressed through the Take Reduction Plan process.

The MMPA is a retrospective statute, that is, fisheries are reviewed and assessed based upon past interactions with marine mammals through such means as Federal or State observer programs or stranding records. The MMPA has no authority to prohibit a fishery or order the closure of a fishery. Under the MMPA, if a fishery is found to be taking marine mammals at a level that exceeds the stock’s PBR or 50 percent of PBR, NMFS will evaluate the fishery and establish a take reduction team to determine means to reduce the fishery’s impact on marine mammals in ways that are economically and technically feasible.

**Comment:** It would be unwise and unlawful to allow an additional marine-mammal killing fishery to operate without a take reduction team prior to at least initiating the take reduction process for the California-based deep-set longline fishery and the Hawaii-based longline fisheries.

**Response:** The California-based deep-set longline fishery is a very limited fishery with currently only one participant. There has been 100 percent observer coverage on this fishery since it began in 2005 and there have been no observed takes of marine mammals; therefore, there is no evidence to suggest that a take reduction plan is necessary for this fishery. The Hawaii-based longline fishery has been observed taking marine mammals, however, the marine mammal stocks affected by the Hawaii-based longline fisheries are not the same stocks that could be affected by the proposed action in the U.S. West Coast EEZ (see Carretta, *et al.* 2007), so there is no relationship between the takes in the Hawaii-based fishery and the proposed action in terms of effects on marine mammal stocks. In the Hawaii-based longline fisheries, it is the take of false killer whales in the deep-set component of the fishery that is driving the take reduction process. Levels of marine mammal bycatch in the Hawaii-based SSL, which has 100 percent observer coverage, are extremely low. False killer whales are a tropical and warm temperate water species and have not been observed in the proposed action area, so there is no relationship between stocks. As a result, actions in the Hawaii-based fishery to reduce bycatch of this stock have no relevance to the proposed action.

**Comment:** Take of short-finned pilot whale from existing fisheries already exceeds PBR... the ZMRG level for pilot whales... equates to fewer than one animal taken every ten years. The proposed EFP would authorize over ten years worth of take in a single fishing season by a single vessel. NMFS cannot lawfully authorize new and additional take of marine mammals for which take levels already exceed the PBR and ZMRG thresholds of the MMPA.

**Response:** The current PBR for the CA/OR/WA stock of short-finned pilot whales is 1.2. The current draft 2007 Pacific Stock Assessment Report includes a revised PBR of 0.9. However, this is still in draft form with the final document expected to be published in January 2008. The current mean annual mortality of this stock of short finned pilot whales is one animal per year, based upon a five year average. NMFS does not anticipate that a serious injury or mortality of a short finned pilot whale will occur during fishing operations authorized under the proposed EFP. The Marine Mammal Protection Act (MMPA) is unlike the ESA in two key areas: 1) the MMPA is a retrospective statute, that is, fisheries are assessed based upon past interactions with marine mammals through such means as Federal or State observer programs or stranding records. The ESA, in contrast, requires that the agency project likely takes of ESA-listed species that may occur in the future and determine if the projected level of take would result in jeopardy to the continued existence of the species. If the projected level of take is considered likely to result in jeopardy to a species, the fishery may not be authorized by NMFS. 2) In contrast to the ESA, the MMPA has no authority to disapprove a fishery or shut-down a fishery – a second key difference between the statutes. Under the MMPA, if a fishery is found to be taking marine mammals at a level that exceeds the stock's PBR or 10 percent of the PBR, NMFS can evaluate the fishery and establish a take reduction team to determine means to reduce the fishery's impact on marine mammals in ways that are economically and technically feasible.

Finally, in making this recommendation to cap the take of short finned pilot whales at one serious injury or mortality, the PFMC was mindful that mortalities over one per year would result in a five year average mortality of greater than 1.2. In the most recent Stock Assessment Report (Carretta, *et al.* 2007), the one observed mortality of a short finned pilot whale in the CA/OR DGN fishery in 2003 was extrapolated to five, since the level of coverage was 20 percent. Thus, it is assumed that five short finned pilot whales were taken and this is averaged over five years in which no whales were observed taken in four of the five years. Hence, five whales divided by the five years assessed (1999-2003) yields one whale per year, the annual estimated mortality. If one whale is observed killed or seriously injured during fishing operations authorized by the EFP (although this is considered very unlikely), that one take would be added to the five (extrapolated value), so the five year total (2003-2007) would be six whales, which divided by five yields an annual estimated average mortality of 1.2. The PFMC was being conservative in its recommendation and mindful of the current low PBR for this stock.

**Comment:** One comment letter contained references to material from the Atlantic Pelagic draft Take Reduction Plan, specifically information about interactions between pilot whales and longline gear in the Atlantic.

**Response:** The analysis of marine mammal impacts in the EA relies upon a variety of data sources, including information from the Atlantic longline fishery. In order to strengthen the analysis, the comments received were reviewed and addressed, as appropriate, in the revised EA.

**Comment:** The EA states that the Atlantic fishery is subject to a take reduction team and plan; however, no take reduction plan has been published and the fishery is continuing to take marine mammals.

**Response:** A draft take reduction plan was published by NMFS on June 8, 2006. The take reduction team met for the first time in June 2005. Some measures recommended by the TRP have been implemented and other recommendations are currently being reviewed with plans for future implementation.

**Comment:** Data provided to the Atlantic Pelagic Longline Take Reduction Team indicated that, although peak bycatch rates occurred at 70-80 degrees F, interactions with pilot whales began to occur at noticeably high rates at between 62 and 66 degrees F (Garrison 2006).

**Response:** There are difficulties in applying fishery data from the Atlantic to the Pacific. As described in section 3.2.1.1 and the Atlantic Pelagic Longline Take Reduction Plan draft submitted to NMFS in June 2006, short-finned pilot whales are distributed generally in warm and tropical waters. By contrast, long-finned pilot whales are more commonly found in temperate waters. In the Atlantic, it is not possible to differentiate between short-finned and long-finned pilot whales when observed taken in longline fisheries; therefore, it is difficult to apply trends in peak bycatch rates and temperatures to specific species of pilot whales. The waters of the proposed action and time of year are generally colder than the temperatures in which short-finned pilot whales are commonly observed, although short-finned pilot whales have been observed at these temperatures during or shortly after unusually warm water periods (e.g., El Niño conditions). 2007 has been an ENSO neutral year and La Niña conditions are predicted for the rest of the year, therefore the warm water conditions that have been correlated with short-finned pilot whales in the proposed action area do not exist. Further information on the stock size and distribution in the Atlantic and Pacific can be found in section 3.4.1.1. Finally, the water temperatures of 70 to 80 degrees F, at which the highest rates of pilot whale interactions occur in the Atlantic, are not generally found in the waters of the proposed action.

**Comment:** The EA used catch per unit effort (CPUE) rates for the DGN fleet to calculate likely impacts on target and non-target species; the interaction rates for these two operationally different fisheries are in some cases quite disparate, both in quantity and nature of bycatch species.

**Response:** As described in sections 3.4.1.1 and 3.4.2.1, utilizing the CPUEs from the DGN fishery was a first step in determining the species most likely to be in the area of the proposed fishing under the EFP and therefore most likely to be affected by the proposed EFP. In addition, NMFS conducted a review of marine mammal biology and distribution within the proposed action area to estimate likely impacts (for example whether the certain species are found only nearshore and therefore not within the proposed action area). An extensive review of other longline fisheries was also conducted to determine possible effects. Section 3.4.1.1 contains a description of the differences in the nature of marine mammal interactions with DGN and longlines. As a summary, although no direct comparisons could be made between a DGN and SLL fishery operating in the same time and location, observer records from longline fisheries indicate a much lower number of marine mammal species interacting with longline gear than with DGN gear. Most interactions between marine mammals and longlines are due to depredation, in which the marine mammal will feed on bait or hooked fish, but are not necessarily hooked or entangled in gear (see description of sperm whale depredation on Alaska longlines).

### **MBTA**

**Comment:** The primary species of seabirds taken by longline fisheries in the North Pacific are albatrosses and fulmars. These are included in the list of migratory birds protected by the MBTA. The proposed action would violate the MBTA as the fishery may take black footed albatross which is protected by the MBTA. NMFS claims that the MBTA does not apply beyond the three nautical mile territorial sea cannot be supported. Neither NMFS nor the applicant have obtained, much less applied for, a MBTA permit from FWS authorizing take.

**Response:** The MBTA was enacted into law when the outer boundary of the United States (i.e., the outer boundary of the territorial sea) was 3 nmi from the coast. The MBTA has not been amended to extend its effect beyond that 3 nmi line. Therefore, NMFS believes that any incidental take of seabirds is not

subject to the MBTA. NMFS does, however, seek to regulate fisheries in ways that avoid such take by mandating the use of conservation measures that have been adopted in both domestic and international longline fisheries to minimize interactions with seabirds.

### NMSA

**Comment:** Four National Marine Sanctuaries, the Monterey Bay, Gulf of Farallones, the Cordell Bank, and the Channel Islands, are adjacent to the area subject to the EFP. The leatherback sea turtle as well as the marine mammals, seabirds, and fish that will likely be caught pursuant to the EFP are all resources protected by these sanctuary designations. The proposed EFP would clearly “destroy, cause the loss, or injure” these resources. We are unaware of any action by NMFS to comply with either the consultation provision of the NMSA or its substantive requirements. Absent such compliance, the proposed EFP cannot lawfully be issued.

**Response:** NMFS has consulted with the National Marine Sanctuary Program on the proposed action. A letter was sent to Sanctuary Program staff on May 16, 2007, which outlined the proposed action and provided all the supporting environmental review documentation that was available at the time. NMFS has worked cooperatively with Sanctuary Program staff to address any concerns that they have in regards to the proposed action. At the request of the applicant, modifications to the preferred alternative were incorporated to further restrict the proposed action area to prohibit fishing within 40 nautical miles of the coastline effectively removing any Sanctuary waters from the action area.

**Comment:** Several commenters expressed concern that issuance of the proposed permit would violate two requirements of the National Marine Sanctuaries Act (NMSA): to avoid injury to Sanctuary resources and to consult with the National Ocean Service (NOS) about potential effects on Sanctuary resources. The proposed action area would be adjacent to the outer boundaries of four national marine sanctuaries. The fin, humpback, and sperm whales are all resources protected by these sanctuary designations. Fishing under the proposed permit would clearly “destroy, cause the loss, or injure” these resources.

**Response:** The “Secretary” who is issuing a permit under the MMPA and the “Secretary” who administers the four sanctuaries in question under the NMSA is the same person: the Secretary of the Department of Commerce. The management of both programs is closely coordinated under NOAA to ensure compliance with both statutes. Additionally, and in response to concerns raised by the National Marine Sanctuaries Program, the applicant has requested that a condition of the proposed EFP be that no fishing will occur within the boundaries of any national marine sanctuary in the action area (i.e., the Monterey Bay, Gulf of the Farallones, Cordell Bank, and Channel Islands National Marine Sanctuaries). The exposure analysis conducted for this proposed action indicates that that fin, humpback, and sperm whales are very unlikely to be affected by fishing under the EFP.

### CZMA

**Comment:** The sea turtles, seabirds, marine mammals, and fish that will be caught and killed under the proposed EFP are all “natural resources” protected by California’s Coastal Management Program. Hooking, entangling, and killing these animals clearly “affects” these resources triggering the consistency requirement of the Coastal Zone Management Act (CZMA). We are unaware of the appropriate CZMA consistency certification in the application materials for the EFP. Absent such a certification and evidence of California’s concurrence in that determination, the EFP application must be rejected as violation of CZMA.

**Response:** The applicant will be presenting his consistency certification to the California Coastal Commission under CZMA Section 307(c)(3)(a), explaining why this EFP would be consistent with the California Coastal Act.

### MSA

**Comment:** The longline EFP threatens vulnerable finfish populations. Of the five major non-target species, three (yellowfin, bigeye and albacore) have been classified as overfished or experiencing overfishing.

**Response:** NMFS is active in both the domestic and international fishery management arenas to address potential resource conservation concerns for Pacific-wide bigeye, Eastern Pacific Ocean (EPO) yellowfin, and North Pacific albacore tuna stocks. Only the EPO yellowfin tuna stock and the Pacific-wide bigeye tuna stock have been declared by the Secretary of Commerce to be in an overfishing state (MSA Section 304(e)). The U.S. longline fleet is constrained by an annual bigeye tuna catch quota of 500 mt established by the IATTC and implemented domestically through the Tuna Conventions Act. The proposed action would catch very few bigeye tuna based on the shallow-set gear configuration and the vertical distribution patterns of bigeye tuna which are found at greater depths. The proposed action would catch very few yellowfin tuna based on the distribution and abundance patterns of EPO yellowfin tuna in the proposed action area. This area includes a more temperate ocean environment versus the more tropical ocean environment where the center of yellowfin tuna populations is typically found. North Pacific albacore stocks have not been declared by the Secretary as either overfished or experiencing overfishing. Measures are being considered to implement regional resolutions to cap effort in the main commercial fishing fleets targeting albacore tuna on a pan-Pacific basis. The measures being considered will be principally applied to the surface hook-and-line and baitboat vessels of the major harvesting nations (e.g., Japan, Taiwan).

**Comment:** The 10 degree offset circle hook/mackerel-type bait requirement in the proposed EFP was designed to minimize interactions with sea turtles. It has not, however, proven to be effective in reducing bycatch of numerous finfish species.

**Response:** It is important to note that the bycatch gear technology and successful bycatch reduction measures (circle hooks and mackerel or mackerel-type bait) that would be used in this proposed EFP have been implemented in other U.S. fisheries and have been successfully transferred to other SSSL fishing nations. Although the use of circle hooks alone does not appear to appreciably reduce finfish (e.g., blue shark) catch rates but it does appear to lead to increased survivorship (Kerstetter and Graves 2006; Gilman, *et al.* 2006b). The switch from squid bait to mackerel type bait, however, has shown to reduce blue shark catch rates in longline experiments conducted in the Atlantic (Watson, *et al.* 2005). Hawaii SSSL observer records for trips utilizing circle hooks indicate approximately 95 percent of captured blue sharks are released alive (Gilman, *et al.* 2006b). The use of circle hooks and mackerel or mackerel-type bait in these other fisheries has resulted in an increased survivorship, and in some cases reduced capture rates, for incidentally hooked finfish, including blue sharks. However, there is no guarantee that what has been successfully implemented under different oceanographic regimes will necessarily be successful in the California Current oceanographic regime in terms of target catch and/or bycatch reduction. It is for this reason that NMFS is looking at this proposed EFP trial as an initial assessment of SSSL gear as a potential cost effective alternative for reducing bycatch in the West Coast swordfish fishery.

**Comment:** The EFP is not reasonably designed to meet its stated objective. The EFP would authorize only one vessel to fish for swordfish in a data poor fishery. One vessel fishing for one season will not yield statistically significant results that will allow NMFS to reasonably determine whether re-establishing a SSSL fishery for swordfish off the West Coast is a viable option.

**Response:** As discussed in section 1.2 of the EA, the proposed action is to issue an EFP to allow one vessel to explore the commercial viability of fishing with new and innovative longline gear in the EEZ off of Oregon and California during the 2007 fishing season. The collection of preliminary data in a small-scale exploratory fashion is a valid objective under the EFP process as referenced in the HMS FMP and as part of the National EFP Guidelines. The proposed action is not designed to conduct a formal experimental test that would produce statistically significant results to compare bycatch rates of protected species among gear types. To achieve that goal would require, among other things, a larger sample size of sets/vessels spread out over an appropriate spatial/temporal scale, along with control groups fishing with other swordfish gear including DGN and pelagic longline gear of earlier vintage (e.g. J-hooks with squid bait). NMFS recognizes that conducting a large scale experiment which randomizes over vessels and fishing areas is not a realistic option at this time given, among other things, the large number of vessels and the logistical requirements needed to conduct such an experiment. Evaluating the success of the proposed EFP could be measured in two ways. First, success may be evaluated in terms of the degree and condition of unmarketable bycatch discarded during the EFP as well as the degree of interactions with marine mammals, sea turtles, seabirds, and other marine resources relative to the amount of swordfish landed. Second, success could be evaluated by examining the difference between the applicant's operating costs and the ex-vessel revenues of his landed catch. Success will also be measured based on the willingness of the applicant to reapply for an EFP in 2008. NMFS would consider the collection of any new fisheries-dependent information as a successful first step towards providing much needed data to address the uncertainties and risk involved. NMFS is also aware of the highly controversial and charged nature that this EFP and previous discussions on a SSSL fishery (e.g., discussion held during the development of the HMS FMP) have created in California. NMFS also realizes that any effort to develop an experiment that would require several vessels, more sets and a larger spatial/temporal scale is likely not politically acceptable in California at this time. Consequently, NMFS believes that by taking this first step to gather preliminary information in a very limited and controlled fishery trial, NMFS may obtain some information to better inform members of the public.

**Comment:** If the Council wishes to open the leatherback closure area to a longline fishery, it must follow Magnuson Stevens Act (MSA) procedures and not do this under the guise of an EFP.

**Response:** The current Pacific Leatherback Conservation Area was not established as a permanent closure area for all gear types and fisheries. The Pacific Leatherback Conservation Area was established to prohibit DGN fishing in a time/area stratum coinciding with historic leatherback turtle presence while the animals are in either a foraging or migratory mode. NMFS has no information between the interactions of leatherback turtles and the current SSSL gear requirements in the California Current to impose a similar closure for this gear. NMFS believes that a more precautionary approach for collecting preliminary data would be to incorporate very conservative controls and mitigation measures (e.g., take caps, effort controls, and 100 percent observer coverage) into the EFP. NMFS does not believe that undertaking an FMP amendment as implied by the author is a reasonable way to proceed at this time given the lack of data and information that would be required to address an amendment or regulatory change. The EFP process, under authority of the MSA (16 U.S.C.1801 et seq.), provides the best route for collection of preliminary data in a risk adverse manner.

**Comment:** This action does not comply with bycatch provisions contained in the MSA requiring NMFS to manage fisheries so that bycatch levels are minimized and avoided to the extent practical.

**Response:** National Standard 9 of the MSA requires that "conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch" (16 U.S.C. § 1851(9)). Restricting effort in a fishery by its very nature serves to reduce overall bycatch levels. NMFS has several strong mandates for fish and protected species bycatch reduction, including the MSA, ESA, and MMPA. The full retention and use of bycatch species is

encouraged by NMFS to minimize waste in fisheries. Bycatch, as defined by the MSA (16 U.S.C. § 1802 (2)), “means fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards”. Requiring retention of all species caught does not necessarily eliminate the problem of bycatch and NMFS is aware that it is critical to account for all catch—including target catch, bycatch, and retained incidental catch. The bycatch species in question, however, would not be caught in numbers that would generate a resource conservation concern under the proposed EFP effort levels (i.e., maximum of 67,200 hooks of effort). The use of circle hooks and mackerel or mackerel-type bait has proven in other domestic and international longline fisheries to significantly increase the survival of incidentally captured and released species, including certain species of turtles, sharks and billfish.

**Comment:** The EFP will put additional pressure on non-target finfish species such as striped marlin that are not actively managed by the Council, and are currently the subject of scientific concern.

**Response:** Striped marlin is one of 13 HMS FMP management unit species. The status of striped marlin is reviewed periodically by scientists from the IATTC and other regional scientific bodies. The overall Eastern Pacific stock is not currently listed as overfished or experiencing overfishing. There are no domestic or international quotas in place at this time. Commercial harvest of striped marlin is prohibited under the HMS FMP. At this time, there is no harvest guideline recommended for the seasonal influx of fish, which occurs in the U.S. EEZ at the edge of the species’ range. A very conservative take cap of 12 striped marlin is being recommended for the proposed EFP as a means to constrain the take of this species. The use of circle hooks has been shown to be less likely to cause serious bleeding or be lodged in areas other than the mouth for striped marlin captured by recreational fishermen in California equating to increased survivorship for released fish (Domeier, *et al.* 2003). Similar findings were demonstrated with blue marlin captured in pelagic longline fisheries in Hawaii (Kerstetter, *et al.* 2003).

**Comment:** Longlines are one of the “largest impacting technologies of reducing the squid’s predators besides also blindly killing endangered species”. This is cause for alarm because Giant Humboldt Squid are increasing in numbers and are “extremely effective predators of most of California’s favorite fished species including salmon, rockfish, kelp, many bass species and nearly any juvenile fish”.

**Response:** NMFS is aware of the reported recent increase of Humboldt squid off the U.S West Coast. Humboldt squid briefly appeared off of California during an El Niño event in 1997. The squid again appeared in 2002, during another El Niño event and remained in the area. It is not known whether the continued presence of Humboldt squid off the West Coast is temporary or a long term shift in their distribution. NMFS observers are currently collecting swordfish stomachs aboard DGN fishing vessels operating in the U.S. West Coast EEZ in an effort to determine the composition of swordfish diet.

**Comment:** An increase in effort as proposed in the EFP, coupled with the estimated recreational fisheries catch, will likely exceed the harvest guidelines for certain species, like thresher shark.

**Response:** Information regarding the catch and effort for most HMS shark species taken in California recreational fisheries is collected by State samplers. Private boaters catch thresher sharks as they migrate from Baja California, Mexico, to Oregon and Washington in the spring and early summer months. From 1982 to 2004, private boaters caught on average 2,000 fish annually. Since 2001, annual catch estimates have ranged from 2,000 to 4,000 fish. However, some uncertainty exists with these catch estimates due to a low number of sampler contacts with fishers. NMFS and the Council recognize the need to collect additional and more accurate data on the private recreational catch and effort of HMS sharks in California and are currently entertaining several alternatives to meet that need, including support of research and monitoring proposals being considered by State and Federal funding agencies. The HMS FMP established harvest guidelines for common thresher and short-fin mako sharks and stipulated that if the harvest

guidelines were exceeded for either of these species, NMFS would work with the Council and its Advisory Bodies to address the situation and craft an appropriate plan of action. Using observer data from the Hawaii-based SSL gear fishery as a proxy for potential thresher shark take under the maximum effort scenario of the proposed EFP demonstrates a very low projected take (see table 4.1, p. 102). The distribution and abundance of thresher sharks in the proposed EFP action area will most likely be different than those in the proxy Hawaii fishery and catches may likewise be different. The proposed EFP would allow the preliminary gathering of catch data for target and non-target species in an area where very little or no data currently exists.

**Comment:** Issuing the EFP would be wholly incompatible with the HMS FMP.

**Response:** Several of the stated management goals and objectives of the HMS FMP deal with the desire to promote conservation and sustainable use of HMS fisheries utilized by West Coast-based fishers who contribute to the food supply, economy, and health of the nation. The goals and objectives include the desire to provide a long-term, stable supply of high-quality, locally caught fish to the public; minimize economic waste and adverse impacts on fishing communities to the extent practicable when adopting conservation and management measures; provide viable and diverse commercial fisheries for HMS based in West Coast ports; and give due consideration for traditional participants in the fisheries. The HMS FMP contemplates a similar EFP approach to investigating the potential of SSL gear to be a more conservative alternative to DGN gear.

**Comment:** The EFP application proposes 4 trips with an estimated 56,000 hooks of effort during the period September through December. However, the July 13, 2007, notice published in the Federal Register regarding potential issuance of this EFP indicates a maximum of 1,200 hooks per set for the 4 trips which equates to 67,200 hooks of effort.

**Response:** The EFP proposal included 56,000 hooks based upon an average of 1,000 hooks per set. In its analysis, NMFS considered the maximum number of hooks that may be set, 1,200 per set or 67,200 total hooks, to determine the maximum effect of the proposed action.

**Comment:** There are no proposed EFP take-limits for white sharks, which are protected by State and Federal law.

**Response:** White sharks are one of several species listed as a prohibited species under the HMS FMP and implementing regulations. Prohibited species are to be released immediately back to the water and may not be landed unless previous authorization has been obtained for retaining incidentally captured specimens for educational and/or scientific collecting purposes. Based on the best available information, NMFS does not anticipate any significant catch of white sharks in the proposed action. If catches do occur, however, the applicant will be bound by the applicable State and Federal regulations to safely and expeditiously release the sharks back to the water. Post-trip observer records would be analyzed to assess if a significant number of prohibited species were being encountered and appropriate mitigation measures and/or additional conservation actions would be implemented should additional EFP fishing be considered and approved.

**Comment:** Despite the scale of effort to be authorized under the EFP, there is no experimental design to meet the EFP's stated purpose. The EFP will place additional fishing pressure on species already subject to overfishing, yet provide no meaningful data.

**Response:** NMFS is viewing the EFP as a precautionary first step in a potential multi-phase process to assist in constructing future management decisions. Specifically, fishing in the area under the EFP would provide preliminary information on: the commercial viability of fishing for swordfish using modified SSL gear,

circle hook performance, and a first look at target and bycatch species composition. Further information would be generated for allowing some preliminary comparison of the ratios of bycatch to unit weight of swordfish caught.

**Comment:** The proposed EFP is requested to “determine if longline gear is an economically viable HMS harvest substitute for DGN gear. Additionally, the EFP is for the purposes of determining “environmental effects, including the potential impacts to protected species”. This does not meet the regulatory criteria for issuance of an EFP within the categories enumerated at 50 CFR 660.745.

**Response:** NMFS National EFP Guidelines state that a NMFS Regional Administrator may authorize, “for limited testing, public display, data collection, exploratory, health and safety, environmental cleanup, and/or hazard removal purposes, the target or incidental harvest of species managed under an FMP or fishery regulations that would otherwise be prohibited” (50 CFR 600.745(b)). This requires issuance of an EFP, which is the proposed course of action that NMFS, in conjunction with the Pacific Council’s recommendation, is pursuing. This EFP satisfies the data collection and exploratory aspects of the regulations.

## NEPA

**Comment:** The issuance of the EFP would violate the environmental review provisions of NEPA. NEPA’s purpose to guarantee that agencies take a hard look at the environmental consequences of their actions before these action occurs... NMFS has completely reversed this process by deciding it wishes to allow pelagic longlining in the area currently closed to such fishing to protect numerous species. Such prejudging of the outcome completely taints the NEPA process and is unlawful.

**Response:** By preparing an environmental assessment, including the results of formal consultation under ESA and various other environmental and socio-economic related laws and regulations, NMFS is complying with the requirements of NEPA. In considering the request to issue an EFP, NMFS is responding as required in accordance with the provisions of the MSA and following established National EFP Guidelines.

**Comment:** NMFS is in violation of NEPA by failing to prepare a full Environmental Impact Statement (EIS) for the EFP. An EIS must be prepared if, among other things, “substantial questions are raised as to whether a project...may cause significant degradation of some human environmental factor. Several of the CEQ “significance factors” triggering the need to prepare an EIS are met by the proposed EFP.

**Response:** Through preparation of the EA and associated analyses, NMFS will determine the likelihood of significant effects on the human environment and whether a finding of no significant impact or the need to prepare an EIS is the most appropriate action.

**Comment:** The “cumulative effects” analysis in the draft environmental assessment is not sufficient in this case where the fisheries often act as a single unit.

**Response:** NMFS recognizes the broader ecosystem considerations the question raises. There is a concerted effort at State, Federal, and international levels to move towards ecosystem-based management strategies that will cater for these broader spectrum considerations. At the present time, extensive data to support these efforts is lacking and the cumulative effects analysis in the draft EA utilized the best available information. In addition, there is very little quantitative information available on the bycatch and other fishery-dependent impacts from foreign HMS fisheries upon which to strengthen the cumulative effects analysis. Very little quantitative information exists on the bycatch and other fishery-dependent impacts from foreign HMS fisheries. NMFS is actively engaged in finding solutions to address these data

gaps by partnering with regional and international organizations and governments to develop monitoring tools such as VMS and international observer programs.

**Comment:** Rather than inform the public as required by NEPA as to what actual NEPA document the Agency will rely upon for environmental review and decision making, NMFS simply mentions the existence of an EA used by the Council. If NMFS intends to rely upon this EA, it needs to explicitly state such intentions and recirculate the document for public comment.

**Response:** NMFS has worked closely with staff from the Pacific Fishery Management Council and our Southwest Fishery Science Center in the development of the draft and final EA for this action. The public had ample opportunity to review and provide comment on the draft EA and the final EA was improved based on upon the comments received. The proposed action and suite of alternatives in the final EA have not appreciably changed to such an extent that the impacts were not within the range of impacts described in the draft EA. As such, NMFS believes it has properly met the public disclosure requirements as outlined by NEPA.

**Comment:** The Hawaii and California-based fleets fish in the same manner, often in the same area, and catch the same turtles. In addition, the fleets consist of many of the same boats as they have a history of moving back and forth to avoid closures. The cumulative effects analysis in the draft EA is not sufficient as the Hawaii- and California-based longline fisheries often act as a single unit.

**Response:** There are no SSL fishing fleets currently working out of California. The draft EA reviewed past observer catch records from both fleets in question. The more relevant question centers around the pertinent changes that switching from J-hooks and squid bait to circle hooks and mackerel bait had on the rates of target and non-target catch, including protected species catch. NMFS did analyze these changes and showed a significant increase in the post-hooking survivorship for bycatch species (e.g., sea turtles and sharks) when circle hooks and mackerel bait were employed versus the traditional J-hooks and squid bait previously utilized.

### **Socio-Economic Considerations**

**Comment:** If NMFS is legitimately interested in seeking out more sustainable alternatives for targeting Pacific swordfish stocks, the agency should focus its energy and resources on researching ways to expand the high value, low volume, no-bycatch California harpoon fishery.

**Response:** The U.S. harpoon fishery does not have the growth potential to take-over as the sole swordfish harvesting gear in the U.S. EEZ to meet current demand. Harpoon vessel fishing trips vary according to fishing success, fish carrying capacity, and preservation capability and are largely confined to a relatively small area encompassed by the SCB. Fish are sighted either finning or jumping at the surface or swimming just beneath the surface. Since sightings are of fish on or near the surface, good weather conditions and calm seas are required for successful fishing.

Swordfish caught by harpoon fill a high-end (luxury consumption) market niche, different from swordfish caught by DGN or longline gear. The harpoon fishery is very selective and operates with practically no bycatch. However, because the fishery is highly dependent on suitable environmental conditions for locating swordfish on the surface, the fishery cannot be readily transported to other locations lacking these conditions (i.e., north of Point Conception). Consequently, due to the low catch rates in the fishery and the greater efficiency of the DGN fishery (see table A-1 below) NMFS believes that an increase in the fleet size or catch of this boutique-market fishery for replacing the DGN fishery is neither feasible nor realistic. The expansion limitations include, among others, a narrow band of favorable waters and time periods for sighting and harpooning swordfish (i.e., basking swordfish in the SCB), the negative economic constraints based on

increased fuel consumption and operational costs for this gear type, and the narrow market niche for the product.

Besides the harpoon fishery, DGN and SSSL are the only other known commercial gears used to harvest swordfish. Without the ability to meet the U.S. demand from domestic commercial fishing effort, imports from foreign sources would fill the void. Foreign fleets operate under less stringent management and conservation measures; hence an increase in foreign fishing swordfish effort would potentially exacerbate the endangered marine turtle mortality problem<sup>29</sup>.

While not as selective as harpoon gear, NMFS finds that ever since the agency adopted new bycatch reduction technologies and measures, SSSL gear has become far more selective. This fact has been substantiated by NMFS's own research as well as the research of others and has been extensively published in peer-reviewed scientific journals (Watson, *et al.* 2005).

**Table A-1. West Coast total and West Coast harpoon swordfish landings (round mt)<sup>30</sup>.**

Year	Total Swordfish Landings	Harpoon Swordfish Landings	% Harpoon to Total Landings
1990	1,236	65	5.26%
1991	1,029	20	1.94%
1992	1,546	75	4.85%
1993	1,767	169	9.56%
1994	1,700	157	9.24%
1995	1,161	97	8.35%
1996	1,191	81	6.80%
1997	1,459	84	5.76%
1998	1,408	48	3.41%
1999	2,033	81	3.98%
2000	2,657	90	3.39%
2001	2,195	52	2.37%
2002	1,714	90	5.25%
2003	2,135	107	5.01%
2004	1,186	69	5.82%
2005	294	73	24.83%

**Comment:** The proposal would reward and subsidize a special interest and degrade and desecrate the public interest.

**Response:** NMFS would not be subsidizing any special interest group as suggested by the commenter. NMFS would be providing a properly trained and qualified fisheries observer; otherwise, the applicant is assuming all additional costs that would be incurred to carry out the EFP under the strict terms and conditions applicable. It should also be noted that there is a high consumer demand for swordfish.

<sup>29</sup> Since leatherback and loggerhead turtles are transboundary species, an increase in fishing effort outside the U.S. EEZ due to a transfer of demand not met by U.S. EEZ fishing effort could potentially result in increased marine turtle bycatch.

<sup>30</sup> SAFE Document "Status of the U.S. West Coast Fisheries for Highly Migratory Species through 2005: Stock Assessment and Fishery Evaluation" (September 2006), Pacific Fishery Management Council, Portland, OR.

Between 1989 and 2005, the U.S. annual demand for swordfish (i.e., U.S. landings plus imports) ranged from 10,948 metric tons (mt) to 23,114 mt, averaging 16,556 mt. During this period, U.S. landings averaged 6,444 mt (about 39 percent of demand) and imports averaged 10,111 mt (61 percent). Landings of swordfish in the United States have shown a general pattern of decline from the early 1990s through the early 2000s, with landings in 2005 of 3,039 mt at only 28 percent of the record landings of 10,851 recorded in 1993. In contrast, the share of U.S. swordfish demand supplied by imports increased from 35 percent in 1993 to 77 percent of the total in 2005. In 2005, U.S. imports of swordfish were 10,187 mt, valued at about \$77 million. Singapore, Panama, Canada, and Chile are the dominant suppliers of imports. Over the entire period from 1989 through 2005, imports increased from rough parity with U.S. landings to over three times the level of domestic landings in recent years.

Based on an April 2007 assessment, the Monterey Bay West Coast Seafood WATCH program<sup>31</sup> has listed U.S. domestic longline-caught swordfish as a “Good Alternative” from the standpoint of whether the fisheries which caught them are “healthier for ocean wildlife and the environment.” By contrast, Seafood WATCH places imported longline caught swordfish on their “Avoid” list since there are no integrated international laws to reduce bycatch and these international longline fleets are contributing heavily to the long-term decline of threatened or endangered species such as sea turtles and seabirds. By contrast, due to strict bycatch regulations and management oversight in the U.S. domestic longline fleet, swordfish from our domestic fleet is listed as a “Good Alternative”.

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<sup>31</sup> <http://www.mbayaq.org/cr/seafoodwatch.asp>

