UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
PROGRAM PLANNING AND INTEGRATION
Silver Spring, Maryland 20910

APR 15 2011

To All Interested Government Agencies and Public Groups:

Under the National Environmental Policy Act, an environmental review has been performed on the following action.

TITLE: Environmental Assessment for Characterization of the West Coast Deep-set Longline Fishery Operating Outside of the U.S. Exclusive Economic Zone

LOCATION: The high seas off the U.S. West Coast

SUMMARY:

A single deep-set longline fishing vessel based out of the U.S. west coast has been conducting fishing operations on the high seas since 2005 under the authority of the High Seas Fishing Compliance Act and a Highly Migratory Species permit issued under the Pacific Fishery Management Council's (PFMC) Highly Migratory Species Fishery Management Plan (HMS FMP). When the HMS FMP was developed, the PFMC and NOAA Fisheries did not anticipate the development of a deep-set longline fishery based out of the west coast due to the economic and vessel constraints associated with operating far from west coast ports, thus a thorough analysis of the possible impacts to the human environment was not conducted in the environmental impact statement prepared for the HMS FMP. This environmental assessment (EA) provides a detailed characterization and analysis of the existing deep-set longline fishery operating on the high seas based out of the west coast, as well as an analysis of a potential minor expansion of the fishery. Two alternatives were analyzed in this EA: closing the fishery (action alternative), or allowing the fishery to remain open (no action alternative). Impacts to the human environment were found to be insignificant due to the limited size of the fishery (i.e., only one vessel has participated in the fishery since 2005) and the stringent management measures already in place. The preferred alternative for this EA is the no action alternative, which would allow the west coast deep-set longline fishery to continue operating on the high seas in accordance with the management measures established by the PFMC and NOAA Fisheries in Section 6.2.2 of the HMS FMP.

RESPONSIBLE
OFFICIAL: Rodney R. McInnis
Regional Administrator
NOAA Fisheries Southwest Region
501 W. Ocean Boulevard, Suite 4200
Long Beach, Ca 90802
(562) 980-4000

The environmental review process led us to conclude that this action will not have a significant impact on the environment. Therefore, an environmental impact statement was not prepared. A copy of the finding of no significant impact (FONSI), including the environmental assessment, is enclosed for your information.

Although NOAA is not soliciting comments on this completed EA/FONSI we will consider any comments submitted that would assist us in preparing future NEPA documents. Please submit any written comments to the Responsible Official named above.

Sincerely,

Paul N. Doremus, Ph. D.
NOAA NEPA Coordinator

Enclosure

CHARACTERIZATION OF THE WEST COAST DEEP-SET LONGLINE FISHERY OPERATING OUTSIDE OF THE U.S. EXCLUSIVE ECONOMIC ZONE

ENVIRONMENTAL ASSESSMENT

PREPARED BY:

DEPARTMENT OF COMMERCE
NATIONAL MARINE FISHERIES SERVICE
SOUTHWEST REGION
LONG BEACH, CALIFORNIA

SOUTHWEST FISHERIES SCIENCE CENTER
LA JOLLA, CALIFORNIA

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APRIL 2011

Environmental Assessment of the U.S. West Coast Deep-set Longline Fishery on the High Seas

Proposed Action:	To allow the U.S. west coast deep-set longline pelagic tuna fishery to continue operating outside of the U.S. Exclusive Economic Zone.
Type of Statement:	Environmental Assessment
For Further Information:	
National Marine Fisheries Service, Southwest Region:	Craig Heberer (Craig.Heberer@noaa.gov) Fishery Biologist, Chairman, HMS Management Team Elizabeth Petras (Elizabeth.Petras@noaa.gov) Council Liaison for Protected Resources Heidi Hermsmeyer (Heidi.Hermsmeyer@noaa.gov) Natural Resource Management Specialist National Marine Fisheries Service 501 West Ocean Boulevard, Suite 4200 Long Beach, CA 90802 Telephone: (562) 980-4000

Printed: Wednesday, April 13, 2011 | C:\HAH\DSLL EA\DRAFT_DSLL_ EA.docCover Sheet

Abstract

A single deep-set longline fishing vessel based out of the U.S. west coast has been targeting tuna and conducting fishing operations on the high seas since 2005 under the authority of the High Seas Fishing Compliance Act and a Highly Migratory Species permit issued under the Pacific Fishery Management Council's Highly Migratory Species Fishery Management Plan. When the Fishery Management Plan for U.S. west coast fisheries for Highly Migratory Species (HMS FMP) was developed, the Pacific Council and the National Marine Fisheries Service did not anticipate the development of a deep-set longline fishery on the west coast due to the economic and vessel constraints associated with operating far from west coast ports, thus a thorough analysis of the possible impacts to the human environment was not conducted in the Environmental Impact Statement prepared for the HMS FMP. This environmental assessment provides a detailed characterization and analysis of the existing deep-set longline fishery operating on the high seas off the U.S. west coast, as well as an analysis of a potential minor expansion of the fishery. Two alternatives are analyzed in this environmental assessment: closing the fishery (action alternative), or allowing the fishery to remain open (no action alternative). Impacts to the human environment (e.g., effects of the proposed action on protected species, finfish, seabirds, and socioeconomics) were found to be insignificant. The preferred alternative for this environmental assessment is the no action alternative, which would allow the west coast deep-set longline fishery to continue operating on the high seas in accordance with the management measures established by the Council and NMFS in Section 6.2.2 of the HMS FMP (PFMC 2007a).

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List of Acronyms

AMSY	Average Maximum Sustainable Yield
BET	Bigeye Tuna
BO	Biological Opinion
CCS	California Current System
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH	Critical Habitat
CITES	Convention on International Trade in Endangered Species
CPFV	Commercial Passenger Fishing Vessels
CPS	Coastal Pelagic Species
CPUE	Catch Per Unit of Effort
CZMA	Coastal Zone Management Act
DGN	Drift Gillnet
DPS	Distinct Population Segment
DSLL	Deep-set Longline
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EFP	Exempted Fishing Permit
EIS	Environmental Impact Statement
ENSO	El Niño Southern Oscillation
EO	Executive Order
EPO	Eastern Pacific Ocean
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
FONSI	Finding of No Significant Impact
FMP	Fishery Management Plan
FR	Federal Register
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
HSFCA	High Seas Fisheries Compliance Act
IATTC	Inter-American Tropical Tuna Commission
ITS	Incidental Take Statement
IUCN	World Conservation Union
IWC	International Whaling Commission
LOF	List of Fisheries
MBTA	Migratory Bird Treaty Act
MCSST	Multi-Channel Sea Surface Temperature
MMPA	Marine Mammal Protection Act
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSY	Maximum Sustainable Yield
MUS	Management Unit Species
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NPTZ	North Pacific Transition Zone
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
PRA	Paperwork Reduction Act
PRD	Protected Resources Division
RecFIN	Recreational Fisheries Information Network
RFA	Regulatory Flexibility Act
RIR	Regulatory Impact Review
RFMO	Regional Fishery Management Organization
SAFE	Stock Assessment and Fishery Evaluation Report
SAFZ	Subarctic Frontal Zone
SAR	Stock Assessment Report
SCB	Southern California Bight
SSLL	Shallow-set Longline
SST	Sea Surface Temperature
STFZ	Subtropical Frontal Zone
TDR	Time and Depth Recorder
TRP	Take Reduction Plan
TRT	Take Reduction Team
USFWS	United States Fish and Wildlife Service
VMS	Vessel Monitoring Systems
WPFMC	Western Pacific Fishery Management Council
WCPO	Western and central Pacific Ocean
ZMRG	Zero Mortality Rate Goal

Glossary

Biological Opinion: The written documentation of a Section 7 Endangered Species Act consultation.

Biomass: The estimated amount, by weight, of a highly migratory (HMS) population. The term biomass means total biomass (age one and above) unless stated otherwise.

Bycatch: Fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards. Such term does not include fish released alive under a recreational catch and release fishery management program.

Commercial fishing: Fishing in which the fish harvested, either in whole or in part, are intended to enter commerce through sale, barter, or trade.

Council: The Pacific Fishery Management Council, including its Highly Migratory Species Management Team (HMSMT), Highly Migratory Species Advisory Subpanel (HMSAS), Scientific and Statistical Committee (SSC), and any other committee established by the Council.

Eastern Pacific Ocean: The area of the Pacific Ocean bounded by the coastline of North, Central, and South America, and 50° N., 150° W., and 50° S.

Endangered Species Act (ESA): Enacted in 1973, the ESA directs Federal departments and agencies to conserve endangered species and threatened species and utilize their authorities in furtherance of the purposes of the ESA.

Exclusive Economic Zone (EEZ): The zone established by Presidential Proclamation 5030, 3 CFR part 22, dated March 10, 1983, and is that area adjacent to the United States which, except where modified to accommodate international boundaries, encompasses all waters from the seaward boundary of each of the coastal states to a line on which each point is 200 nautical miles (370.40 km) from the baseline from which the territorial sea of the United States is measured. Off the west coast states, the EEZ is the area between 3 and 200 miles offshore.

High Seas: All waters beyond the EEZ of the United States and beyond any foreign nation's EEZ, to the extent that such EEZ is recognized by the United States (Note, this definition is used in the HMS Fisheries Management Plan (FMP) and differs from the definition in the Magnuson-Stevens Act, which defines "high seas" as waters beyond the territorial sea).

Highly Migratory Species: Pelagic species of fish (those that live in the water column as opposed to on the surface or on the bottom) including tunas, sharks, billfish/swordfish and which undertake migrations of significant but variable distances across oceans for feeding or reproduction.

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 the course of a Federal action (e.g., fishing under an FMP).

Incidental Take Statement: A requirement under 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.

Maximum sustainable yield (MSY): The largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions.

Mortality or serious injury: A standard used for measuring impacts on marine mammals under the Marine Mammal Protection Act (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.

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

Overfishing or Overfished: As defined in the Magnuson-Stevens Fishery Conservation and Management Act, the terms "overfishing" and "overfished" mean a rate or level of fishing mortality that jeopardizes the capacity of a fishery to produce the maximum sustainable yield on a continuing basis.

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 that may affect endangered or threatened species 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.

Stock: A group of fish with some definable attributes which are of interest to fishery managers, for example: bigeye tuna stock.

Strategic Stock: A marine mammal stock for which the level of direct human-caused mortality exceeds the potential biological removal level which, based on the best available scientific information, is declining and is likely to be listed within the foreseeable future or is already listed as a threatened or endangered species under the ESA of 1973.

Take: The term is used with respect to protected species (marine mammals, sea turtles, and seabirds), is defined by the applicable statute (Marine Mammal Protection Act, Endangered Species Act, or the Migratory Bird Treaty Act), and the associated implementing regulations.

1.0 INTRODUCTION

1.1 Organization of the Document

This Environmental Assessment (EA) characterizes and analyzes the current and potential future expansion of a west-coast-based deep-set longline (DSLL) pelagic tuna fishery operating on the high seas (proposed action). When the Fishery Management Plan (FMP) for U.S. West Coast Fisheries for Highly Migratory Species (HMS) and accompanying and Environmental Impact Statement (EIS) were 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), shallow-set and DSLL fishing were not considered separate fisheries and the analysis in the HMS FMP was primarily focused on shallow-set longline fishing. At the time, most of the west-coast-based pelagic longline fishing on the high seas consisted of shallow-set longline fishing for swordfish. In addition, there was no distinct DSLL fishery for tuna and it was presumed that the DSLL fishery would not develop primarily due to economic and operational constraints associated with operating out of west coast ports. Thus only a limited analysis of historic DSLL fishing was provided in the HMS FMP and accompanying environmental impact statement. In 2005 a single commercial vessel entered this fishery and has continued seasonally operating with close to 100 percent observer coverage, provided by NMFS, adhering to fisheries management regulations under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), 16 U.S.C. 1801 et seq., the HMS FMP, and the High Seas Fishery Compliance Act (HSFCA), 16 U.S. C. chapter 75.

Potential expansion of the fishery is estimated to be minimal due to the high operational costs (e.g., fuel and labor costs) and vessel constraints associated with fishing outside of the exclusive economic zone (EEZ). Fishing on the high seas requires larger vessels than those used for coastal or near-shore fishing because the trips are longer, require greater ice and fish hold capacity, and the sea conditions can be more challenging. Due to these logistical challenges of fishing on the high seas from west coast ports coupled with the current experimental nature of the fishery, NMFS does not anticipate that additional vessels will participate in this fishery however, up to five additional vessels could enter the fishery as soon as the next three years if regulations and/or poor catches in other west-coast-based fisheries force eligible vessels to seek alternate open-access fishing options available to them. The estimate for the potential expansion of this fishery originated from discussions with the U.S. west coast fishing industry to determine who had the capacity and could be interested in entering the fishery over the next three years. Based on these discussions, the current maximum fleet estimate for the west-coast-based DSLL fishery is a total of six vessels over the next three years. The projected impacts of this fishery are analyzed in Section 4 of this EA using the six vessel estimate.

Because a thorough analysis of the DSLL fishery was not included in the HMS FMP EIS, this EA is being written to evaluate the fishery as required under the National Environmental Policy Act (NEPA). Due to the fact that this fishery operates outside of U.S. territory, NMFS is conducting this analysis according to the directives of E.O. 12144, NAO 216-6, and DAO 216-12. The purpose of this EA is to disclose and evaluate the effects of allowing for the continuation of the open access west coast DSLL pelagic tuna fishery operating on the high seas, and to analyze the impacts of the fishery on the human environment and briefly provide sufficient evidence and analysis for determining whether to prepare an EIS or a finding of no significant impact (FONSI) (40 CFR 1508.9). This document contains the analyses required under NEPA. A separate analysis of the impacts on Endangered Species Act (ESA) listed species was conducted through a Section 7 consultation as required under the ESA.

Environmental impact analyses have four essential components: a description of the purpose and need for the proposed action, 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 sections:

- Section 1 describes the purpose and need for the proposed action and considerations that went into the development of this EA.

- Section 2 outlines the alternatives that have been considered to address the purpose and need of the proposed action.

- Section 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. Section 3.4 describes the protected resources that would be potentially affected by the proposed action.

- Section 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.

- Section 5 details how this action meets 10 National Standards set forth in the MSA (§301(a)).

- Section 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 Sections (7-9) list those who contributed to this EA, information on EA distribution, and the references cited list. Appendix 1 lists the substantive public comments received on the draft EA and NMFS's responses to those comments.

1.2 Proposed Action

The proposed action is to allow for the continuation of the open access west coast DSLL pelagic tuna fishery operating on the high seas. As part of its review of this fishery, NMFS determined that the very limited analysis provided in the HMS FMP EIS did not adequately address the potential impacts of HSFCA permits; therefore, NMFS is conducting this environmental assessment. NMFS has determined that the regulations currently in place are sufficient to meet the need to regulate the current and any reasonably foreseeable fishery; however, NMFS may consider additional regulations and conduct additional NEPA analysis in the future should the fishery develop beyond the scope of this analysis.

1.3 Proposed Action Area

The proposed action area analyzed in this EA is the high seas off the west coast of the United States. The HMS FMP defines the high seas as all waters beyond the EEZ of the United States and beyond any foreign nation's EEZ, to the extent that such EEZ is recognized by the United States. The fishery is expected to operate in a relatively small subset of the eastern Pacific Ocean (EPO)[1]; more specifically, in the area east of 140° W. longitude, north of the equator, south of 35° N. latitude, and outside the U.S. and Mexico EEZ's (beyond 200 nautical miles (nm) offshore). Most, if not all, future DSLL fishing is

[1] The IATTC defines the EPO according to the Antigua Convention Area, which is the area of the Pacific Ocean bounded by the coastline of North, Central, and South America, and 50°N., 150°W., and 50°S.

expected to occur in this small subset of the EPO, based on the assumption that participants in this fishery would use fresh fish boats or vessels without freezer capacity. There is, however, a possibility of one to two larger vessels with freezer capacity entering the fishery in the future. Despite the fact that NMFS has no indication that a vessel with freezer capacity would enter the DSLL fishery, or that fishing would occur outside of this subset of the EPO, this analysis incorporates these possibilities by defining the action area as the high seas. This is also consistent with the description of the DSLL fishery on the high seas found in the HMS FMP. The current regulations do prohibit the use of longline gear from April 1 to May 31 in waters bounded on the south by 0° latitude, on the north by 15° N. latitude, on the east by 145° W. longitude, and on the west by 180° longitude.

1.4 Purpose and Need

The purpose of the proposed action is to continue sustainably managing the DSLL fishery according to the goals and objectives of the HMS FMP based on the thorough evaluation of the fishery's impacts on the human environment. Since 2005, a single commercial vessel has participated in the DSLL fishery on the high seas; therefore, this EA will provide the needed analysis to manage the fishery based on the best available science to ensure that the fishery is consistent with all Federal statutes and management objectives.

1.5 Background

Under California law, it is illegal to fish with longline gear in state waters or to land fish at California ports that were caught with longline gear within the U.S. EEZ off California. Washington State prohibits the use of longline gear within its state waters. The HMS FMP prohibits all longline fishing within the west coast EEZ, and shallow-set longline (SSLL) fishing on the high seas is prohibited except for vessels in possession of a Hawaii pelagics limited entry permit. When the HMS FMP was developed shallow-set and deep-set longline gear was not differentiated, and at the time vessels were not using deep-set longline gear to target tuna and the Council and NMFS did not expect the fishery to develop because of the associated economic constraints. Thus, there is neither a prohibition on DSLL fishing on the high seas, nor an explicit characterization of the fishery in the HMS FMP. However, in 2005 one west-coast-based fishing vessel entered this fishery and has been successfully targeting tuna.

Some small scale and experimental longline fisheries have taken place off the west coast since 1988. An experimental drift longline fishery for sharks occurred within the EEZ from 1988 to 1991. In 1991, there were three longline vessels that fished beyond the EEZ targeting swordfish and bigeye tuna. Those vessels 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, fuel, and fish offloading and transportation services (Vojkovich and Barsky 1998). Consequently, longline vessels seeking an alternative to the Gulf of Mexico longline fishery, but precluded from entering the Hawaii fishery due to a limitation on the number 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 in 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.

In 1987, the Fishery Management Plan for Pelagic Fisheries of the Western Pacific Region (Pelagics FMP) was developed by the Western Pacific Fishery Management Council (WPFMC) and implemented by NMFS. In response to a rapid influx of East Coast longline fishing vessels in the late 1980s, Amendment 4 to the Pelagics FMP extended previous emergency interim rules (56 FR 14866; 56 FR 28116) to arrest the rapid growth of the Western Pacific Region longline fishery. This 1991 amendment established a moratorium on new participants entering the Hawaii-based longline fishery. In 1994, Amendment 7 to the Pelagics FMP replaced the moratorium with a limited entry program for the Hawaii-based longline fishery (59 FR 26979), limiting the fishery to 167 vessels. The limited entry of 167 vessels for this fishery is still in place.

During 1995, only six longline vessels made a high seas trip from a California port, although 35 longline vessels made at least one landing of 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 was able to acquire Hawaii 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 and tuna fishing grounds in the fall and winter that were further east than where 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 Federal district court case *Center for Marine Conservation vs. NMFS*, the court issued an order directing NMFS to complete an 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 Hawaii-based longline fishery's usual fishing grounds. These court-ordered closures essentially closed the SSLL fishery in Hawaii from 2001-2004. As a result, some Hawaii 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 the year, and participation in the DSLL fishery targeting tuna increased. On April 1, 2004, the court vacated the fisheries restrictions after NMFS was challenged in a lawsuit by the Hawaiian Longline Association. The WPFMC developed a plan to re-open the Hawaii SSLL fishery through Regulatory Amendment 3. The regulations became effective April 2, 2004, (69 FR 17329) and increased opportunity in the Hawaii swordfish 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), 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. Commercial landings of tuna have generally been a small share of landings of west coast longline fisheries; however, since the closure of the west-coast-based SSLL fishery for swordfish in 2004, tuna has become the target species for west-coast-based longline fishermen.

Other marketable species that are landed in the deep-set tuna longline catch include, but are not limited to opah (*Lampris regius*), mahi mahi (*Coryphaena hippurus*), escolar (*Lepidocybium flavobrunneum*), and pomfret (*Taractichthys steindachneri)*. Relatively few sharks, in proportion to those caught, have been marketed from the high seas fishery. The major shark bycatch in this fishery is blue shark, which is discarded for economic reasons because the flesh quickly deteriorates after death. Other incidental catch of concern includes striped marlin, sea turtles, seabirds, and marine mammals.

Longline fishing allows a vessel to distribute effort over a large area to harvest fish that are not concentrated in great numbers. Overall catch rates in relation to the number of hooks are generally low. In general, longline gear consists of a continuous main line set on the surface and supported in the water column horizontally by floats with branch lines connected at intervals to the main line. Plastic floats are commonly used; in addition, radio buoys are also used to keep track of the mainline. A line shooter is used on deep-sets to deploy the mainline faster than the speed of the vessel, thus allowing the longline gear to sink to its target depth (average target depth in the Hawaii-based DSLL fishery targeting tuna on the high seas from 2003-2007 was 191 m) (PIFSC 2008). The main line is typically 30 to 100 km (18 to 60 miles) long. A minimum of 15, but typically 20 to 30, weighted branch lines (gangions) are clipped to the mainline at regular intervals between the floats. Each gangion terminates with a single baited hook. The branch lines are typically 11 to 15 m (35 to 50 ft) long. Saury, sardines, or mackerel are used for bait. Lightsticks are not typically attached to the gangions on this type of longline set. Longline vessels typically make a single gear haul (i.e., set) each day and DSLL gear is generally set in the morning and retrieved in the afternoon (Ito and Machado 2001). From 2003-2007 the Hawaii-based DSLL fishery on the high seas averaged approximately 2,050 hooks per set, and the average soak time was 19 hours (PIFSC 2008).

Table 1–1. Commercial landings (round weight in mt) in the west coast longline fisheries, 1981–2008.

		Sharks					Tunas									
Year	Sword-fish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue	Albacore	Yellow-fin	Bigeye	Bluefin	Other	Dorado	Ground-fish	Coastal Pelagics	Other	Total
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	2	1		<0.5	<0.5	<0.5	<0.5	7	19
1984	12	3		<0.5	2		2	<0.5	<0.5	1	<0.5	3	2	<0.5	5	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						40		3	46
1988	<0.5	1			152	1				<0.5			25	<0.5	6	185
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	<0.5	2	<0.5	<0.5	<0.5	3		23	78
1992	63	2		<0.5	2	<0.5	1			<0.5	<0.5		21	<0.5	2	91
1993	27	<0.5			1	<0.5	<0.5	2	3	<0.5		1	1	1	2	38
1994	722	19		3	20	12	49	4	40	6	5	32	4	<0.5	16	932
1995	271	11		1	7	5	4	5	48	4		5	8	2	5	376
1996	346	2			5	<0.5	3	4	59	3	2	9	6	<0.5	5	444
1997	663	4		2	3	<0.5	6	2	77	2	2	1	32	<0.5	2	796
1998	418	3			4	<0.5	9	2	48	38	9	1	9	1	24	566
1999	1,325	5			7		66	4	103	44	11	17	1		3	1,586
2000	1,873	5	<0.5	<0.5	7	<0.5	23	<0.5	83	16		41	12		10	2,070
2001	1,749	20		1	7	2	22	16	52	5	<0.5	15	7	<0.5	54	1,950
2002	1,331	2			3	41	1	2	10	1		<0.5	12	<0.5	1	1,404
2003	1,810	<0.5			3		2	<0.5	29	<0.5	<0.5	1	4		4	1,853
2004	898	1		<0.5	2		2	<0.5	22		9	1	13	<0.5	3	951
2005	**	**			**		**	**	**		**	**	**		**	**
2006	**	**			**		**	**	**	**	**	**	**	**	**	**
2007	**	**		**	**		**	**	**	**	**	**	**	**	**	**
2008	**	**			**		**	**	**		**	**	**		**	**

Source: PFMC 2009 (Table 4–13 in the 2009 HMS SAFE; PacFIN, extracted August 13, 2009).

** Not reported due to data confidentiality requirements based on non-PacFIN data sources (mandatory logbooks, permits, etc.). Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.

Additional processing info: Only fish tickets where at least 1 lb of any HMS (except striped marlin) was landed for the longline fishery were used.

Landings in lb are converted to round weight in metric tons (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

2.1 Alternative 1 – No Fishery

This alternative would close the current open access west-coast-based DSLL fishery operating on the high seas, which currently consists of one vessel. To implement this alternative, the Council process would be initiated to amend the HMS FMP, and NMFS would need to publish regulations that would close the west-coast-based DSLL fishery.

2.2 Alternative 2 – No Action Alternative – Continue Fishery (Preferred)

This alternative would allow the open access west coast DSLL pelagic tuna fishery to continue operating on the high seas. Taking into consideration the current level of participation and potential entrants into the fishery, it was estimated that up to six vessels may enter the fishery. If the fishery were to expand beyond the scope of this analysis, additional NEPA analysis would be necessary. The current terms and conditions of the fishery are listed here and can also be found in Section 6.2.2 of the amended HMS FMP and apply to all fishing on the high seas by west coast longline fishing vessels. Longline vessels operating on the high seas outside the EEZ are currently subject to the same controls that applied to Hawaii-based longline fishing vessels holding longline permits in 2003. The limitations and specifications for the fishing area, gear configuration, sea turtle and seabird mitigation measures, skipper workshops, and vessel monitoring systems (VMS) are consistent with current Federal regulations applicable to vessels fishing under the WPFMC's Pelagics FMP (50 CFR 665 Subpart C) and the PFMC's HMS FMP (50 CFR 660 Subpart K).These are as follows:

1. 100 percent observer coverage, paid for by NMFS. Requiring 100 percent observer coverage would allow independent verification of total catch (including bycatch), protected species takes and interactions, and the area of operation.
2. Fishing is only authorized on the high seas (all waters beyond the EEZ of the United States and beyond any foreign nation's EEZ, to the extent that such EEZ is recognized by the United States).
3. From April 1 through May 31, a vessel may not use longline gear in waters bounded by the equator and 15º N. latitude, and 145º W. longitude and 180º W. longitude[2].
4. Utilizing DSLL gear configuration:
    a. No fewer than 15 branchlines may be set between any two floats (10 branchlines if using basket gear).
    b. Longline gear must be deployed such that the deepest point of the main longline between any two floats (i.e. deepest point in each sag of the main line is at a depth greater than 100m below the sea surface).
    c. No light stick (any light emitting device for attaching underwater to the longline gear) may be possessed on board a vessel. The use of light sticks may attract turtles.
    d. A vessel may not use longline gear to fish for or target swordfish north of the equator (0° latitude); landing or possession of more than 10 swordfish per trip is prohibited.
    e. The length of each float line possessed and used to suspend the main longline beneath a float must be longer than 20 m.
5. While fishing for management unit species north of 23º N. latitude a vessel must (seabird avoidance and mitigation measures):

[2] This time/area closure was put into place by NMFS to reduce fisheries interactions with protected species in 2002. The court vacated this decision but it was never removed from the HMS FMP regulations. NMFS is currently looking into how to remove this closure since it is no longer valid.

a. Maintain a minimum of two cans (each sold as 0.45 kg or 1 lb size) containing blue dye on board the vessel during a fishing trip.
b. Use completely thawed bait. Completely thawing and dying bait dark blue reduces seabirds' ability to see the bait by reducing the bait's contrast with the sea surface.
c. Use only bait that is dyed blue of an intensity level specified by color quality control card issued by NMFS.
d. Retain sufficient quantities of offal for the purpose of discharging the offal strategically in an appropriate manner. Sufficient quantities of offal must be available in order to strategically attract seabirds to an area where hooks are not being set in order to prevent seabirds from becoming entangled and caught in the longline.
e. Remove all hooks from offal prior to discharging the offal.
f. Discharge fish, fish parts or spent bait while setting or hauling longline gear on the opposite side of the vessel from where the longline is being set or hauled
g. Use a line-setting machine or line-shooter to set the main longline (unless using basket gear).
h. Attach a weight of at least 45 g to each branch line within 1 m of the hook
i. Remove the bill and liver of any swordfish that is incidentally caught, sever its head from the trunk and cut it in half vertically, and periodically discharge the butchered heads and livers overboard on the opposite side of the vessel from which the longline is being set or hauled.

6. Line clippers, dip nets, and bolt cutters meeting NMFS's specifications must be carried aboard each vessel for releasing turtles (specifications vary by vessel size).
7. Proper release and handling of turtles and seabirds[3]. Following the sea turtle and seabird handling, resuscitation, and release procedures for accidentally hooked or entangled sea turtles and seabirds minimizes injury and promotes survival of the animals.
8. Vessel operators must attend a protected species workshop each year. These workshops are aimed at raising awareness of fishermen to the proper methods for avoiding, handling and dehooking protected species.
9. Requirement for VMS.

2.3 Alternatives Eliminated from Detailed Study

Another management option that was discussed during the scoping process involved allowing for the continuation of the west-coast-based DSLL pelagic tuna fishery on the high seas, but limiting the number of vessels that could enter the fishery using a limited entry permit system. This alternative was eliminated from detailed study after discussing the potential expansion of the fishery with the HMS Advisory Subpanel (including members of industry) and estimating that at most, only five additional vessels would be interested in and capable of entering the fishery over the next three years. This EA analyzes the impacts of the estimated maximum amount of effort in the fishery (six vessels); if the fishery develops beyond the scope of this analysis additional NEPA analysis would be required and a limited entry program may be reanalyzed as an option for managing the fishery.

[3] Full description of all applicable measure are in 50 CFR Part 660, see 66 FR 63630 (turtles) and 67 FR 34408 (seabirds).

3.0 AFFECTED ENVIRONMENT

3.1 Introduction

This EA considers the effects of the alternatives on different parts of the human environment, which are referred to as environmental components. Three environmental components have been identified for further evaluation and discussion in these sections: target and non-target finfish, protected species (marine mammal, sea turtle and seabird species), and the socioeconomic environment (fishermen, processors, consumers, bait, fuel, fishing gear, etc.).

3.1.1 Data Sources

Since there has not been a long history of U.S. vessels DSLL fishing on the high seas, and NMFS cannot disclose observer data related to the current west-coast-based DSLL fishery because only one vessel is participating in the fishery and that information is strictly confidential[4], the characterizations of other comparable longline fisheries are presented to project impacts of this fishery. Given the similarity in gear and techniques between the west-coast- and Hawaii-based DSLL fisheries, Hawaii's DSLL fishery records provide the best approximation of the west-coast-based DSLL fishery.

3.1.1.1 Hawaii-based DSLL Fishery (2003-2007)

The following is a brief description of the Hawaii-based DSLL fishery targeting tuna on the high seas, using data from observed trips that occurred from the beginning of 2003 through the end of 2007. Data was extracted from 17,334 observed sets during 1,385 trips. The area of fishing operations occurred between the latitudes of 1.345º N – 35.443º N. and the longitudes of 137.922º W - 173.62º W.

For the purposes of understanding general aspects of the DSLL fishing gear configurations, ranges will be given where applicable. Mainline material generally consists of monofilament line ranging from 2mm-6.4mm in diameter. Fishing depths were between 13 m and 728 m but averaged about 191 m. Tuna are normally targeted deeper than 100 m but 1,156 of the sets were made shallower than this, most likely because the tuna were spotted at this depth on a scanner.

The number of hooks per set ranged from 85 to 4,110, and averaged 2,050 hooks per set. The total number of hooks observed was 35,526,205. Bait consisted of mackerel (1.1 percent, or 198 sets), mixed (17.1 percent, or 2,972 sets), sardine (30.9 percent, or 5,364 sets), saury (49.9 percent, or 8,654 sets), and other (0.8 percent, or 146 sets).

Soak times ranged from less than one hour up to 86 hours, with an average soak time of 19 hours. Vessel speed, when reported, ranged from less than one knot to nine knots, and averaged seven knots. Temperatures observed during set times ranged from 60.5 to 91° Fahrenheit (begin set sea surface temperature), and averaged 78.4° Fahrenheit.

3.1.1.2 West-Coast-Based DSLL Fishery Outside of the EEZ (2005-present)

The west-coast-based DSLL fishery operating outside of the EEZ since 2005 has only included one vessel to date. This vessel has had close to 100 percent observer coverage since the fishery began so that NMFS could adequately characterize the impacts of DSLL fishing in this area. For the purposes of this EA the

[4] Section 118(d)(8) of the MMPA provides for the maintenance of confidentiality, as does NMFS implementing regulations, 50 CFR §229.11, and NOAA Administrative Order 216-100.

data from 2005-present for this vessel cannot be disclosed for confidentiality reasons; however, it will be used qualitatively to highlight some of the differences of the Hawaii-based DSLL fishery.

3.2 Climate and Biophysical Factors Contributing to Baseline Effects

3.2.1 Tuna Movements Correlated to Oceanographic Conditions

Oceanic fronts are characterized by steep gradients in temperature and salinity and tend to be associated with high biological productivity. These fronts serve as habitat and foraging areas for swordfish, tunas, seabirds and sea turtles. In the North Pacific two major frontal regions important to the tuna fisheries occur, the subarctic frontal zone (SAFZ) occurs between 40° and 43° N. latitude, and the subtropical frontal zone (STFZ) occurs 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). This oceanographic feature creates ideal fishing conditions for the tuna fishery within the proposed action area during the winter and spring months. Within these zones fronts develop, persist, and shift seasonally in complex patterns (Seki, *et al.* 2002). Seki, *et al.* (2002) identifies 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° Celsius sea surface temperature (SST) isotherm and 34.8 isohaline (line of equal salinity) while the SSTF can be identified by the 20° Celsius isotherm and 35.0 isohaline and 24.8 isopycnal (line of equal density) (Seki, *et al.* 2002). Large geological features such as islands and seamounts can create divergences and convergences which concentrate tuna prey species. Tuna species are also attracted to upwelling zones along ocean current boundaries such as the transition zone west of the California Current System (CCS).

Studies on the movements of bigeye tuna have shown similar patterns in vertical and horizontal migrations related to temperature and oxygen (Bertrand, *et al*. 2002; Sibert, *et al*. 2003; Dagorn, *et al*. 2000). Bigeye tuna are able to withstand a range of sea temperatures (10-26º C) and their unique anatomy and physiology allow them to forage at the surface and at depth (Holland, *et al*. 1992; Holland and Sibert 1994). The depth distribution for bigeye tuna can range between the surface and 600 m but they may spend most of their time around 250-400 m (11-20º C) depending on the latitude. Bigeye tuna will migrate up and down throughout this vertical range during the day spending a longer period of time at depth in the morning hours (Dagorn, *et al*. 2000). In the North Pacific the hook depth to catch tunas is usually shallower than in tropical areas because the temperatures are cooler at a shallower depth. Bigeye tunas can also forage in low oxygen waters giving them an advantage over other tuna species that are not capable of tolerating these conditions. Horizontal movements of tagged bigeye tuna were tracked throughout several months to a year and the data showed high site fidelity to geographical points of attraction such as weather buoys, seamounts, and islands (Sibert, *et al*. 2003).

Yellowfin and albacore tuna are caught at shallower depths than bigeye tuna and are not as tolerant of low temperatures and oxygen levels (Bertrand, *et al*. 2002). Albacore and yellowfin tuna are both found throughout the action area and make up a large proportion of the overall tuna catch other than bigeye tuna.

3.2.2 Climate Variability

Two meso-scale climate phenomena likely affect frontal activity and the distribution of tuna, other target and non-target finfish, and protected species that may be caught in the proposed action area. 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 during El Niño years. During the strong El Niño event from 1997 to 1999, striped marlin were recorded off the Oregon coast (Field and Ralston 2005). A related condition is termed La Niña and results in inverse conditions such as an 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 CCS. Etnoyer, *et al.* (2004) found the Northeast Pacific was less active in terms of front concentration and persistence during El Niño and relatively more active during La Niña.

Longer period cycles, which are partially identified by an index termed the Pacific Decadal Oscillation (PDO), also have important ecological effects in the CCS. Regime shifts indicted by the PDO have a periodicity operating at both 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 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 the west coast. This has apparently resulted in a further decline in the productivity of some fish populations in the Northeast 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 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 (i.e., an El Niño during a PDO warm phase) can be intensified. 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 Northeast 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).

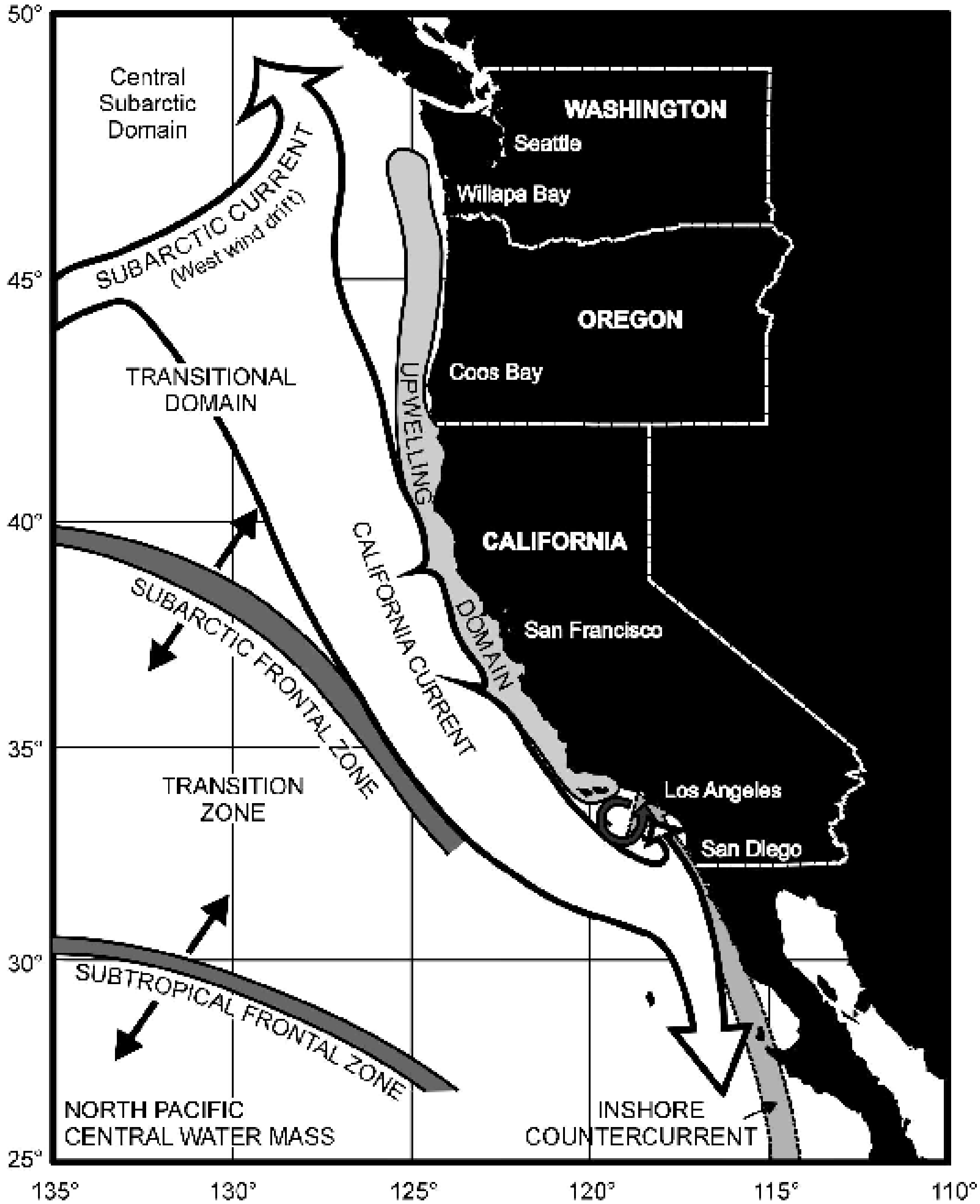

Figure 3–1. Major current and water mass systems that influence essential fish habitat of highly migratory management unit species in the U.S. west coast EEZ.

3.2.3 Climate Change

The following is a summary of Section 3.1.2 of the EA prepared by NMFS for the implementation of the decisions of the fifth regular session of the WCPFC (NMFS 2009b). Climate change can affect the marine environment by impacting the established hydrologic cycle (a change in precipitation and evaporation rates) (Roessig, *et al*. 2004). Climate change has been associated with other effects to the marine environment, including rising water temperatures, as well as related changes in ice cover, salinity, oxygen levels, and circulation (IPCC 2007a). These effects are leading to shifts in the range of species, changes in algal, plankton, and fish abundance (IPCC 2007b), and causing damage to coral reefs (Scavia, *et al*. 2002). Climate change is also increasing the incidence of disease in aquatic organisms (Roessig, *et al*. 2004). Studies on plankton ecosystems, demonstrate that climate change is affecting phytoplankton, copepod herbivores, and zooplankton carnivores, which cause affects to ecosystem services, such as oxygen production, carbon sequestration, and biogeochemical cycling (Richardson, *et al*. 2004). These studies concluded that fish, seabirds, and marine mammals will need to adapt to a changing spatial distribution of primary and secondary production within pelagic marine ecosystems (Richardson, *et al*. 2004).

Studies conducted by Perry, *et al*. (2005) indicate that climate change is impacting marine fish distributions, which in turn may have important ecological impacts on fish as well as important impacts on commercial fisheries. How climate change can impact commercial fisheries include: (1) increases in ocean stratification leading to less primary production, which in turn leads to less overall energy for fish production; (2) decreases in spawning habitat frm shifts in areas of well-mixed water zones leading to decreased stock sizes; and (3) changes in currents that may lead to changes in larval dispersals and retention, which could lead to decreases in stock sizes (Roessig, *et al*. 2004).

3.3 Finfish, Billfish and Sharks

This section describes the baseline conditions of the finfish species likely to be caught within the proposed action area. The baseline conditions include the range of fisheries contributing to mortality of the stocks, reviews fishery catches on a stock basis, and summarizes what is currently known about stock status.

3.3.1 Baseline Description of Fisheries in the Proposed Action Area

The target species for the proposed action are pelagic tunas, including bigeye, yellowfin, skipjack, and albacore tunas. Baseline descriptions are provided for tuna species, and several major non-target finfish species included as HMS management unit species (MUS) (Table 3–1) under the HMS FMP (PFMC 2003). 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 MUS (PFMC 2003). These FMP categories are used to organize the discussion of the current condition of finfish stocks that may be affected by the proposed action. The amended 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 2007a).

There are numerous foreign fisheries that operate throughout the Pacific Ocean using, among other gears, pelagic longline, pole-and-line, purse seine, and troll gears. By comparison, U.S. fisheries generally harvest a small fraction of the total Pan-Pacific harvest of HMS. The U.S. catch of tuna in the EPO (with all gear types combined) has averaged about 2.6 percent of the total catch of tuna in the EPO from 2002 to 2006; in 2006 the U.S. catch of tuna in the EPO was only about 0.2 percent of the total tuna catch in the EPO (IATTC 2007). The purse seine fishery contributes approximately 94 percent of the tuna caught in the EPO while the rest comes from longlining, gillnetting, trolling and recreational fisheries (PFMC 2007b). The U.S. tuna longline fishery contributes less than one percent (on average 0.03 percent from 2002 to 2006) of the total tuna landings in the EPO.

Description of past and present longline fisheries taking place outside the U.S. west coast EEZ are presented followed by a brief description of pertinent non-longline fisheries that interact and harvest HMS species.

Table 3–1 HMS FMP management unit species.

Common Name	Scientific Name
striped marlin	*Tetrapturus audax*
swordfish	*Xiphias gladius*
common thresher shark	*Alopias vulpinus*
pelagic thresher shark	*Alopias pelagicus*
bigeye thresher shark	*Alopias superciliosus*
shortfin mako shark	*Isurus oxyrinchus*
blue shark	*Prionace glauca*
North Pacific albacore	*Thunnus alalunga*
yellowfin tuna	*Thunnus albacares*
bigeye tuna	*Thunnus obesus*
skipjack tuna	*Katsuwonus pelamis*
northern bluefin tuna	*Thunnus orientalis*
Dorado(a.k.a.mahimahi, dolphinfish)	*Coryphaena hippurus*

3.3.1.1 U.S. Pacific Longline Fisheries

Hawaii Longline Fleet (NMFS 2009b)

Fleet Characteristics

The Hawaii-based limited entry longline fishery has the largest U.S. longline fleet operating in the Convention Area. The fleet has historically operated, and continues to operate, in two distinct modes based on gear deployment: deep-set longline by vessels that target primarily bigeye tuna and shallow-set longline by those that target swordfish. Fishing effort is mainly exercised to the north and south of the Hawaiian Islands between the Equator and 40° N and longitudes 140° and 180° W. However, the majority of deep-set fishing occurs south of 20° N. Most DSLL and SSLL fishing occurs in the U.S. EEZ around Hawaii, Palmyra, Kingman, Johnston and Jarvis Islands, and in adjacent high seas waters.

Management

The Hawaii-based longline fishery is managed through the FMP for the Pelagic Fisheries of the Western Pacific Region developed by the Western Pacific Fishery Management Council (WPFMC) pursuant to the MSA. The primary regulations implementing the FMP, as set forth at 50 CFR Part 665, are summarized in Table 3-2. These regulations were amended by a Final Rule published in the Federal Register on December 10, 2009, which removed the annual limit on the number of fishing gear deployments (sets) fir the Hawaii-based SSLL fishery, and increased the annual number of allowable incidental interactions that occur between the fishery and loggerhead sea turtles from 17 to 46 (74 FR 65460). This amendment is reflected in Table 3-2. The HSFCA and the WCPFC Implementation Act (WCPFCIA) also regulate this fishery.

Existing regulations set the annual limit for leatherback sea turtle (*Dermochelys coriacea*) interactions with the gear being fished by Hawaii longline vessels at sixteen and the annual limit for loggerhead sea turtle (*Caretta caretta*) interactions at seventeen. Once either limit is reached, the shallow-set component of the longline fishery is closed (50 CFR §665.33).

Table 3–2. Requirements for the Hawaii-based longline fleet.

<table>
<tr><th colspan="2">Both Shallow-Set and Deep-Set Longline Requirements</th></tr>
<tr><td colspan="2">
▪ Carry on board a Hawaii Longline Limited Access Permit established under 50 CFR § 665.21 for Pelagic Fisheries of the Western Pacific Region. There are 164 transferable permits;
▪ A maximum vessel length of 101 feet is permitted;
▪ All U.S. vessels that fish on the high seas are required to have a permit issued by NMFS in accordance with the HSFCA. Permits are valid for five years and require that vessels fish on the high seas in accordance with international conservation and management measures recognized by the United States;
▪ Complete a NMFS Daily Longline Fishing Log sheet for each set after each fishing day;
▪ Carry NMFS-owned and operated VMS units;
▪ Carry a NMFS observer, if requested by the Pacific Islands Regional Office;
▪ Follow sea turtle mitigation techniques and requirements;
▪ Cease fishing if fishery is closed as a result of reaching sea turtle interaction limit (46 per year for loggerhead and 16 per year for leatherback); and
▪ Seabird mitigation techniques: When deep-setting or shallow-setting north of 23° N latitude or shallow-setting south of 23° N latitude, owners and operators of vessels registered for use under a Hawaii Longline Limited Access Permit, must either:
1. side-set according to 50 CFR § 665.35 (a)(1);
2. or fish in accordance with 50 CFR § 665.35 (a)(2).
</td></tr>
<tr><th>(a)(1). Side setting</th><th>(a)(2). Alternative to side setting</th></tr>
<tr><td>
▪ Mainline must be at least 1 meter forward from the stern of the vessel;
▪ Mainline and branch lines must be set from the port or the starboard side of the vessel;
▪ If a shooter is used it must be mounted at least 1 meter forward from the stern of the vessel;
▪ Branch lines must have weights with a minimum of 45 grams;
▪ One weight must be connected to each branch line within one meter of each hook;
▪ If seabirds are present, gear must be deployed so that baited hooks remain submerged; and
▪ A bird curtain must be deployed.
</td><td>
▪ Discharge fish and offal on the opposite side of the vessel where the longline gear is being set or hauled when seabirds are present;
▪ Retain sufficient fish, offal, and bait for the purpose of strategically discharging it;
▪ Remove all hooks from fish, offal, or spent bait;
▪ Remove the bill and liver of any swordfish that is caught, sever its head, and cut it down the middle;
▪ Use completely thawed bait, dyed blue;
▪ Maintain a minimum of 2 cans of blue dye on board the vessel; and
▪ Follow the requirements for deep-setting and shallow-setting below (a and b).
</td></tr>
<tr><th>a. Deep-Setting North of 23°</th><th>b. Shallow-Setting</th></tr>
<tr><td>
▪ Employ a line shooter; and
▪ Attach a weight of at least 45 grams to each branch line within 1meter of the hook.
</td><td>
▪ Deploy gear at least 1 hour after local sunset and complete deployment no later than local sunrise, using the minimum vessel lights; and
▪ Follow short-tailed albatross handling techniques.
</td></tr>
</table>

Source: NMFS 2009b.

Catch and Effort

The recent characteristics, annual catch, effort, and ex-vessel revenue of the Hawaii-based longline fleet are summarized in Table 3-3.

The rapid growth of the fishery in the 1990s and the effects of the closure of the shallow-set component of the fishery from 2001-2004 are clearly seen. Also evident is the reduction in shark bycatch brought about by the combined effects of the prohibition of shallow-setting in 2001 and passage of the Shark Finning Prohibition Act of 2000 (SFPA) (Pub. L. No. 106-557). In April 2004, NMFS reopened the swordfish-targeting segment (shallow-set) of the Hawaii longline fishery under new federal rules. In 2005, 2007, and 2008, 76 percent, 76 percent, and 77 percent, respectively, of the available shallow-set certificates were used.

Table 3–3. Annual effort, catch, and ex-vessel revenue in the Hawaii longline fishery, 1996-2007.

Year	Active vessels	Trips	Tuna-directed trips	Swordfish-directed trips	Hooks set (million)	Total catch (mt)	Bigeye tuna catch (mt)	Sword-fish catch (mt)	Yellow-fin tuna catch (mt)	Ex-vessel revenue(in mill., $2007)
1996	103	1,100	657	92	14.4	9,781	1,787	2,502	630	54.9
1997	105	1,125	745	78	15.6	12,320	2,449	2,881	1,141	64.0
1998	114	1,140	760	84	17.4	12,998	3,226	3,263	722	59.6
1999	119	1,137	776	65	19.1	12,872	2,719	3,100	473	60.0
2000	125	1,103	814	37	20.3	10,789	2,644	2,815	1,205	61.3
2001	101	1,034	987	4	22.4	7,167	2,356	235	1,033	40.0
2002	100	1,163	1,163	0	27.0	7,888	4,388	309	560	45.7
2003	110	1,215	1,215	0	29.9	8,008	3,593	137	823	45.9
2004	125	1,338	1,332	6	32.0	8,380	4,325	249	707	47.7
2005	124	1,496	1,397	99	35.0	10,578	4,979	1,600	735	64.4
2006	127	1,401	1,341	60	35.3	9,762	4,429	1,167	962	57.0
2007	129	1,462	1,381	81	40.2	11,208	5,779	1,715	846	62.7
5 year average	123	1,382	1,333	49	34.5	9,587	4,621	974	815	55.5

Source: WPFMC 2009.

Economics

In 2009, the U.S. Hawaii-based longline fleet consisted of 131 FMP-permitted vessels. Out of these 131 vessels, 117 also had a high seas fishing permit (issued under the HSFCA). Vessels range from 16 to 25 m in length and can carry an average of 98 mt of fresh fish. Crew size ranges from four to six. The maximum duration of a fishing trip for vessels targeting tuna for the fresh fish market in Hawaii is three weeks. Some of the newer vessels in the fleet are larger and have onboard ice systems, allowing for greater range than in the past.

In recent years, Hawaii's commercial pelagic fisheries have been greatly affected by a series of court decisions that led to the adoption of regulatory measures primarily aimed at conserving federally-listed ESA species. In 2001, the total catch and ex-vessel value decreased by about 3,747 mt and $20.1 million, respectively, primarily as a result of the implementation of court-ordered measures that eliminated the swordfish portion of the Hawaii longline fishery (Table 3-3). Swordfish, the largest component of the landings by volume in 2000, was a negligible component of the fishery from 2001 until the reopening of the swordfish shallow-set fishery in 2004. For these reasons, the period prior to 2005 is probably not a good indication of future fishing activity.

In 2006, the Hawaii-based longline fleet landed 9,775 mt for an ex-vessel value of approximately $54 million. This total represents an average gross revenue per vessel in 2006 of about $403,000, compared to the 2005-2007 average of $444,000 per vessel (Table 3-3).

West Coast Longline Fishery

Fleet Characteristics

Longline vessels based on the U.S. west coast fish primarily in the EPO and at the current time are restricted to fishing outside of the west coast EEZ. Given this restriction, there have been very few active west coast-based longline vessels since 2004 except for a single west-coast-based vessel which has been operating out of southern California ports since 2005. This vessel primarily targets tuna species using DSLL gear with a percentage of swordfish and other HMS taken incidentally. This vessel is considered a large-scale longline vessel (greater than 24 meters in length). At the present time, DSLL fishing by west-coast-based vessels must take place outside of the U.S. EEZ. The high operational costs, time constraints and safety considerations of fishing outside the EEZ will most likely keep participation in this fishery at a minimum.

Management

Longline vessels based out of the U.S. west coast are managed under the FMP for U.S. west coast Fisheries for HMS developed by the PFMC. The HMS FMP prohibits all pelagic longline fishing inside the west coast U.S. EEZ. Shallow-set longline fishing in the adjacent high seas areas, including west of 150° W. longitude is prohibited by the HMS FMP and the ESA (50 CFR 223.206(d)(9)). Longline vessels operating on the high seas outside the EEZ are subject to the following controls set forth at 50 CFR Part 660:

1. Line clippers, dip nets, and bolt cutters meeting NMFS' specifications must be carried aboard each vessel for releasing turtles (specifications vary by vessel size);
2. A vessel may not use longline gear to fish for or target swordfish north of the equator; landing or possession of more than ten swordfish per trip is prohibited;
3. The length of each float line possessed and used to suspend the main longline beneath a float must be longer than 20 m (65.6 feet or 10.9 fathoms);
4. From April 1 through May 31, a vessel may not use longline gear in waters bounded by 0° latitude and 15° N latitude, and 145° W longitude and 180° W longitude;
5. No light stick may be possessed on board a vessel;
6. When a longline is deployed, no fewer than 15 branch lines may be set between any two floats;
7. Longline gear must be deployed such that the deepest point of the main longline between any two floats is at a depth greater than 100 m below the sea surface;
8. While fishing for management unit species north of 23° N latitude, a vessel must:
    (a) Maintain a minimum of two cans containing blue dye on board the vessel during a fishing trip;
    (b) Use completely thawed bait to fish for Pacific pelagic management unit species;

(c) Use only bait that is dyed blue of an intensity level specified by a color quality control card issued by NMFS;
(d) Retain sufficient quantities of offal for the purpose of discharging the offal strategically in an appropriate manner;
(e) Remove all hooks from offal prior to discharging the offal;
(f) Discharge fish, fish parts, or spent bait while setting or hauling longline gear on the opposite side of the vessel from where the longline is being set or hauled;
(g) Use a line-setting machine or line-shooter to set the main longline;
(h) Attach a weight of at least 45 grams to each branch line within one meter of the hook; and
(i) Remove the bill and liver of any swordfish that is incidentally caught, sever its head from the trunk and cut it in half vertically, and periodically discharge the butchered heads and livers overboard on the opposite side of the vessel from which the longline is being set or hauled.

All U.S. vessels that fish on the high seas are required to have a permit issued by NMFS in accordance with the HSFCA. Permits are valid for five years and require that vessels fish on the high seas in accordance with international conservation and management measures recognized by the United States. Other management measures include requirements for the proper release and handling of turtles and seabirds, the requirement for vessel operators to attend a protected species workshop each year, and the requirement for VMS.

Estimates of catch and ex-vessel revenues in the west coast longline fishery since 2005, which would be indicative of current conditions, are confidential and may not be publicly disclosed because of the small number of vessels in the fishery (PFMC 2008).

3.3.1.2 Foreign Tuna Fisheries in the EPO (IATTC 2009)

Document IATTC-80-05 provides a more detailed description of the fishery for tunas in the EPO, assessments of the major stocks of tunas and billfishes that are exploited in the fishery, and an evaluation of the pelagic ecosystem in the EPO, in 2008[5] (IATTC 2009). The report is based on data available to the IATTC staff in April 2009, and provides data on catches by gear type, species, and flag state.

The average annual retained catch of yellowfin tuna in the EPO by purse-seine and pole-and-line vessels during 1993-2007 was about 267,000 mt (range: 167,000 to 413,000 mt). The preliminary estimate of 186,000 mt of retained catch in 2008 by purse seine vessels is 9 percent greater than that of 2007, but 30 percent less than the average for 1993-2007. The purse seine fishery accounts for the majority of the retained catch of yellowfin in the EPO. During 1993-2007 catch of yellowfin tuna in the EPO by longline vessels remained relatively stable, averaging about 19,000 mt (range: 8,000 to 30,000 mt), or about 7 percent of the total retained catches of yellowfin. Yellowfin are also caught by recreational vessels, as incidental catch in gillnets, and by artisanal fisheries; during 1993-2007 they averaged about 1,000 mt.

A preliminary estimate of the retained catch of bigeye tuna by purse seine vessels in the EPO in 2008 is about 76,000 mt. The preliminary estimate of the longline catch in the EPO in 2008 is 19,000 mt. The total catch of bigeye tuna in the EPO for 2008 was about 97,000 mt, of which about 95,000 mt were retained. Thus, the purse seine fishery accounted for a little less than 80 percent of the total retained catch of bigeye tuna in 2008, while the longline fishery accounted for about 20 percent. Prior to 1994, the average annual retained catch of bigeye taken by purse-seine vessels in the EPO was about 8,000 mt.

[5] Available on the following IATTC website: http://www.iattc.org/PDFFiles2/IATTC-80-05-Tunas-and-billfishes-in-the-EPO-2008.pdf

Following the development of FADs, the annual retained catches of bigeye increased from 35,000 mt in 1994 to between 44,000 and 95,000 mt during 1995-2007. During 1979-1993, prior to the increased use of FADs and the resulting greater catches of bigeye by purse-seine vessels, the longline catches of bigeye in the EPO ranged from 46,000 to 104,000 mt (average: 74,000 mt) about 89 percent, on average, of the retained catches of this species from the EPO. During 1994-2007 the annual retained catches of bigeye by the longline fisheries ranged from about 31,000 to 74,000 mt (average: 51,000 mt), an average of 45 percent of the total catch of bigeye in the EPO.

The preliminary estimate of the retained catch of skipjack tuna in the EPO for 2008 is 296,000 mt, which is 64 percent greater than the average of 181,000 mt for 1993-2007, and one percent less than the previous record-high retained catch of 311,000 mt in 2006. Small amounts of skipjack are caught with longlines and other gears. Most of the skipjack catch in the Pacific Ocean is taken in the WCPO. The majority of skipjack tuna is caught by purse seine vessels in the EPO (295,530 mt were retained in 2008), and much smaller amounts of skipjack are caught with longlines and other gears.

Roughly 80 percent of the yellowfin, skipjack, bigeye and other tunas caught by purse seine and pole and line in 2008 came from the fleets of Ecuador (36 percent), Mexico (21 percent), Panama (14 percent), and Venezuela (9 percent).

Table 3–4. Estimates of the retained catches of tunas and bonitos, by flag, gear type, and species, in metric tons, in the EPO, 2008.

Flag Country	Gear Type[4]	Yellowfin	Skipjack	Bigeye	Pacific Bluefin	Albacore	Black Skipjack	Bonitos nei[3]	Tuna nei[3]	Total
China	LL	*	*	885	*	*	*	*	*	885
Ecuador	PS	18,800	144,058	41,162	*	*	110	23	88	204,241
Japan	LL	*	*	11,938	*	66	*	*	*	12,004
Korea	LL	*	*	4,150	*	7	*	*	*	4,157
Mexico	LL	2	*	*	0	*	*	*	*	2
	LP	812	499	*	15	*	*	9	*	1,335
	PS	84,703	21,432	328	4,392	10	3,366	6,960	40	121,231
Nicaragua	PS	5,831	6,003	846	*	*	3	0	0	12,683
Panama	LL	*	*	*	*	*	*	*	933	933
	PS	27,152	42,452	11,357	*	*	47	66	4	81,078
Peru	NK	172	278	*	*	*	7	*	113	570
Taiwan	LL	*	*	1,986	*	*	*	*	*	1,986
Venezuela	PS	21,257	26,910	3,179	*	*	57	9	3	51,415
Vanuatu	LL	*	*	346	*	*	*	*	*	346
Other[1]	PS[2]	28,103	54,675	18,781	*	*	2	5	0	101,566

[1] This category is used to avoid revealing the operations of individual vessels or companies
[2] Includes Colombia, El Salvador, Guatemala, Honduras, Peru, Spain, United States and Vanuatu.
[3] Not elsewhere included (nei)
[4] LL: longline; NK: unknown; PS: purse-seine; LP: pole-and-line
Source: IATTC 2009.

3.3.1.3 U.S. Non-longline Fisheries

U.S. Tuna Purse Seine Fishery

There are two components to the U.S. tuna purse seine fishery: large vessels (greater than 400 short tons (st)[6] 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 EPO has been greatly reduced over the past 20 years so that in 2007, there were one to two large purse seine vessels in the U.S. tuna purse seine fleet (50 CFR Part 300).

The small vessel tuna purse seine fleet, based primarily out of southern California ports, is a multi-fishery fleet that fishes within the U.S. west coast EEZ most of the year, reliant primarily on coastal pelagic species (CPS) such as sardines, mackerel, and squid. The southern California fleet opportunistically fishes for tropical tunas when the tunas migrate further north and within the range of these vessels, which are not equipped for long-range excursions. Specifically, yellowfin and skipjack tunas seasonally (during the months of August, September, and October) migrate within range of these vessels, and bluefin and albacore tunas are also periodically landed. However, predicting the movements of these tuna species is uncertain. For example, in 2006, neither yellowfin nor skipjack tunas ventured close enough to the range of the southern California small purse seine fleet, resulting in zero landings (50 CFR Part 300). There are approximately 61 small purse seine vessels with limited entry permits under the CPS FMP[7]; however, only about 5-10 of these vessels were targeting tuna in recent years. The CPS fishery is under a limited entry program when operating south of 39º N. latitude pursuant to the 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.

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. The total catch (all fishing gears combined) of North Pacific albacore was about 62,000 mt in 2005, the lowest observed catch since the early 1990s. During the past five years, fisheries based in Japan accounted for 66 percent of the total harvest, followed by fisheries in the United States (16 percent), Chinese Taipei (8 percent), and Canada (7 percent). In 2006, 632 U.S. troll vessels fished in the North Pacific albacore fishery and landed 12,749 round mt of albacore. (PFMC 2007b).

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.

3.3.2 Current Stock Status of Target and Non-target Finfish Species

HMS stock assessments are periodically carried out by scientists from Pacific-based regional fisheries management organizations (RFMOs) such as the IATTC and the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific (ISC). 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).

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6 The IATTC uses short tons in its stock status reports. 400 short tons is equal to about 363 metric tons.
7 http://www.pcouncil.org/cps/cpsback.html

3.3.2.1 Target Tuna Species

The target species are tunas, including bigeye, yellowfin, skipjack, and albacore tunas. The majority of the tuna catch in the EPO is made up of bigeye, yellowfin tuna, and skipjack tunas, with a smaller contribution from albacore

Detailed information and a wealth of references on the biology, taxonomy, population dynamics, and distribution of target tuna species are available in Section 3 of the EA prepared by NMFS PIRO in July 2009[8] (NMFS 2009b).

Table 3-5 summarizes NOAA Fisheries official status of the main fish stocks being targeted. The table expresses overfishing and overfished status in terms of the status determination criteria specified in the relevant FMPs, as required by the MSA; they are as reported in the Report on the Status of U.S. Fisheries for 2008 (NMFS 2009; quarterly updates for certain stocks are available at www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm). Under MSA, NMFS and the regional fishery management councils are required to set overfished and overfishing thresholds for individual stocks.

Table 3–5. Stock status summary of select highly migratory fish stocks in the Pacific Ocean for 2008[9].

Species	Stock	Overfishing?	Overfished?
Bigeye tuna (*Thunnus obesus)*	Pacific	**Yes**	No
Skipjack tuna *(Katsuwonus pelamis)*	western central Pacific	No	No
	eastern tropical Pacific	No	No
Yellowfin tuna (*Thunnus albacares)*	western central Pacific	No	No
	eastern Pacific	**Yes**	No
Albacore tuna (*Thunnus alalunga*)	North Pacific	Unknown	Unknown

Source: NMFS 2009.

As shown in Table 3-5 above, using the MSA stock status determination criteria, overfishing is occurring on bigeye tuna throughout the Pacific, but the bigeye tuna stock is not overfished. Langley, *et al*. (2008) concluded that biomass has been sustained due to above-average recruitment since about 1990, with exceptionally high recruitment during 1995−2005 and with peak in recruitment in 2000. In recent years, bigeye tuna recruitment is estimated to have declined to approximately the long-term average. Overfishing is taking place to the yellowfin tuna stock in the EPO; it is estimated to be near or at full exploitation.

8 Available on the following NMFS PIRO website: http://www.fpir.noaa.gov/Library/IFD/AX60%20-%20Final%20WCPFC5%20EA%20-%20July%202009.pdf.

9 A stock that is subject to overfishing means that fishing is occurring at a rate or level that jeopardizes the capacity of a stock to produce MSY, the largest long term average catch or yield that can be taken from a stock under prevailing ecological and environmental conditions on a continuing basis. Overfishing is considered to be occurring if the fishing mortality rate is found to have been greater than the maximum fishing mortality threshold for at least one year. The maximum fishing mortality threshold can be set at a single number (a fishing mortality rate) or as a function of spawning biomass or other measure of reproductive potential. A stock that is overfished is one whose size is sufficiently small that a change in management practices is required in order to achieve an appropriate level and rate of rebuilding. The stock is considered to be overfished if the stock size falls below the minimum stock size threshold at any time. The minimum stock size threshold should equal one-half the maximum MSY stock size or the minimum stock size at which rebuilding to the MSY level would be expected to occur within ten years if the stock or stock complex were exploited at the maximum fishing mortality threshold (50 CFR § 600.310(d)).

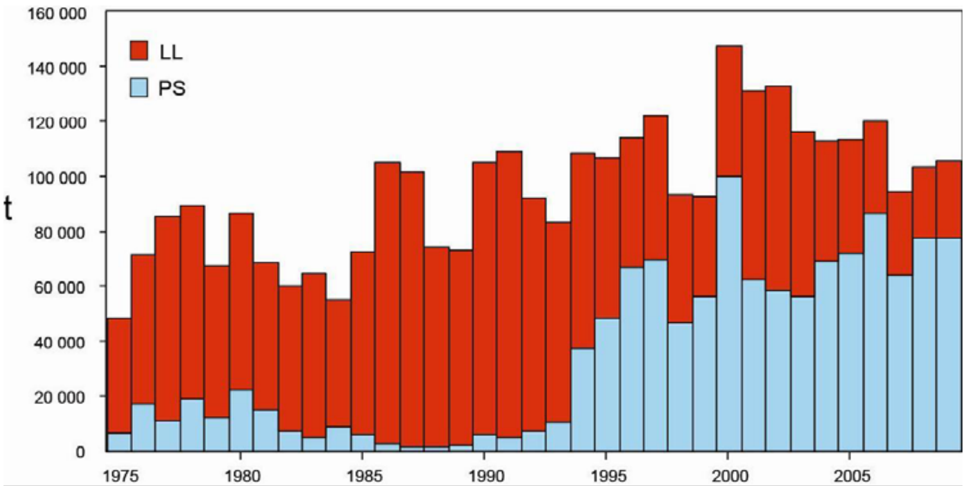
Some of the following summaries (e.g., bigeye, yellowfin, skipjack tunas) are based on international stock assessments that do not reflect Table 3-5; however, these are the most recent stock assessments that have undergone thorough stock assessment review panels.

Bigeye (*Thunnus obesus*) (Aires-da-Silva and Maunder 2010)

Stock status of bigeye tuna in the EPO is assessed every 1–2 years by the IATTC. The latest assessment was conducted in 2010 (Aires-Da-Silva and Maunder 2010). The *Stock Synthesis III* assessment model, an integrated statistical age-structured stock assessment model, was used with available data through December 2009. The assessment is based on the assumption that there is a single stock of bigeye in the EPO, and that there is limited exchange of fish between the EPO and the WCPO. Four sensitivity analyses were conducted which analyzed the sensitivity to the steepness of the stock-recruitment relationship, the average size of the older fish, assuming lower and higher values of adult natural mortality for both females and males, and using data for only the late period of the fishery (1995-2009). The base case assessment used a Richards growth model and fitted to CPUE time series for floating-object and longline fisheries, and assumed, among other things, that there is no relationship between stock and recruitment and the average size of older fish is fixed at 185.5 cm. Furthermore, it was assumed that the western limit of the bigeye stock distribution was 150° W. longitude. Results of the base case assessment indicate that the spawning biomass of bigeye tuna in the EPO was above the level associated with MSY, and the recent fishing mortality rates are estimated to be below the level corresponding to MSY. At the beginning of January 2010, the spawning biomass ratio (the ratio of the spawning biomass at that time to that of the unfished stock; SBR) was about 0.26, which is about 37 percent higher than the level corresponding to MSY, thus the stock is not considered overfished. If fishing mortality is proportional to fishing effort, and the current patterns of age-specific selectivity are maintained, the level of fishing effort corresponding to MSY is about 13 percent higher than the current (2007-2009) level of effort, thus the stock is also not considered subject to overfishing.

All sensitivity analyses indicate that, at the beginning of 2005, the bigeye spawning biomass had initiated a recovery trend. Although the results from the base case model show that, at the beginning of 2010, the stock was not subject to overfishing or in an overfished condition, this is subject to uncertainty and mainly dependent on the following assumptions: 1) the steepness of the stock recruitment relationship; 2) the average size of the older fish in the population; 3) the levels of adult natural mortality; and 4) the historic period of the bigeye exploitation used in the assessment.

The floating object fishery, which consists of purse seine fishermen who set nets on tuna schools associated with floating objects (either man-made fish aggregating devices known as FADs, or natural debris known as flotsam), began to increase in importance in the EPO in 1993. Purse seine sets on floating objects are known to yield catches of 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 in general catches larger individuals. Based in part on previous IATTC bigeye tuna stock assessment, NMFS has determined that the bigeye tuna stocks are subject to overfishing.



Source: IATTC 2010.
* LL – Longline; PS – Purse seine.

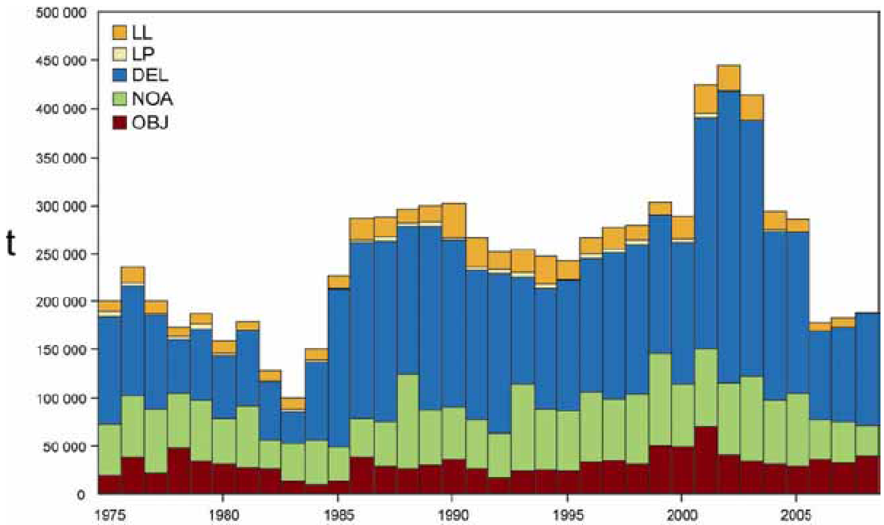
Figure 3-2. Total catches (retained catches plus discards) of bigeye tuna by the purse-seine fisheries, and retained catches for the longline fisheries, in the eastern Pacific Ocean, 1975-2009. The purse-seine catches are adjusted to the species composition estimate obtained from sampling the catches. The 2009 catch data are provisional.

Yellowfin (*Thunnus albacares*) (Maunder and Aires-Da-Silva 2010)

Stock status of yellowfin tuna in the EPO is assessed every 1–2 years by IATTC. The IATTC conducted the latest stock assessment of the EPO stock of yellowfin tuna in 2010 (Maunder and Aires-Da-Silva 2010). The *Stock Synthesis III* assessment model was used with available data through December 2009. The assessment is based on the assumption that there is a single stock of yellowfin in the EPO, and that there is limited exchange of fish between the EPO and the WCPO. The assessment for 2009 is identical to that of 2008 except for updated and new data.

The 2009 base case assessment, which does not include a stock-recruitment relationship, indicates that at the beginning of 2010 the spawning biomass ratio of the yellowfin stock in the EPO was above the level corresponding to MSY, thus the stock is not overfished. Effort levels are estimated to be less than those that would support the MSY, and recent catches are below the MSY level. In addition, the recent fishing morality rate (*F)* was below the level corresponding to MSY, thus the stock is also not subject to overfishing. The MSY calculations indicate that, theoretically, at least, catches could be increased if the fishing effort were directed toward longlining and purse-seine sets on yellowfin associated with dolphins. Under recent levels of fishing mortality (2007-2009), the spawning biomass is predicted to slightly decrease, but remain above the level corresponding to MSY. Fishing at F_{msy} is predicted to slightly reduce the spawning biomass below the level corresponding to MSY, but then increase above it. Fishing at the level of fishing mortality corresponding to MSY is predicted to produce slightly higher catches.

If a stock-recruitment relationship is assumed, the outlook is more pessimistic, and current biomass is estimated to be below the level corresponding to MSY. The status of the stock is also sensitive to the value of adult natural mortality and the assumed length of the oldest age modeled (i.e., 29 quarters).



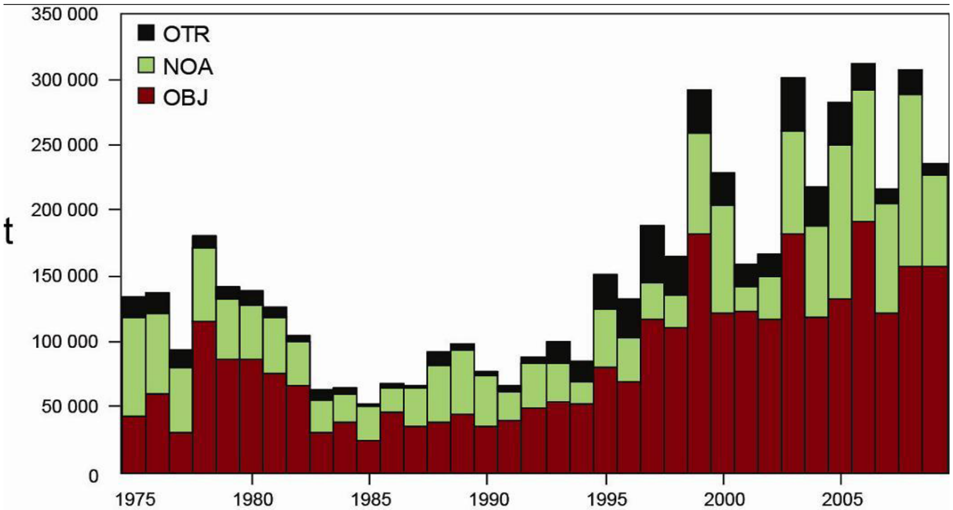
Source: IATTC 2009 (Not updated in 2010).
*LL – Longline; LP – Pole and Line; DEL – Purse Seine Sets on Dolphins; NOA – Unassociated Purse Seine Sets; OBJ – Purse Seine Sets on Floating Objects.

Figure 3-3. Total catches (retained catches plus discards) for the purse-seine fisheries, and retained catches for the pole-and-line and longline fisheries, of yellowfin tuna in the eastern Pacific Ocean, 1975-2008. The purse-seine catches are adjusted to the species composition estimate obtained from sampling the catches. The 2008 catch data are provisional.

Skipjack (*Katsuwonus pelamis*) (Maunder 2010)

Stock status of skipjack tuna in the EPO is assessed every 1–2 years if deemed necessary by the IATTC. Skipjack tuna is a notoriously difficult species to assess due to skipjack's high and variable productivity (i.e., annual recruitment is a large proportion of total biomass thus it is difficult to detect the effect of fishing on the population). This is particularly true for the EPO stock due to the lack of age-frequency data and the limited tagging data. The most recent assessment of skipjack in the EPO (Maunder and Harley 2005) is considered preliminary because it is not known whether the catch per day fished for purse-seine fisheries is proportional to abundance. The results from that assessment are more consistent among sensitivity analyses than the earlier assessments which suggest that they may be more reliable. Neither the biomass- nor fishing mortality-based reference points, nor the indicators to which they are compared, are available for skipjack in the EPO.

In 2007, the IATTC developed a simple stock assessment model to evaluate indicators of skipjack biomass, recruitment, and exploitation rate and used simple indicators of stock status based on relative values of fishery data, such as, CPUE, average weight of fish caught, and effort (Maunder and Deriso 2007). In 2010, Maunder updated the indicators to include data for 2009. Indicators of biomass, recruitment, and CPUE for the unassociated purse seine fishery are near the healthy reference levels; whereas, indicators for effort, exploitation rate, and average fish weight are near the unhealthy reference levels. Theoretically, average fish weight could be low due to either above average recruitment or high exploitation rates. The indicators have yet to detect any adverse consequences of relatively high exploitation rates. The results of the simple stock assessment model were similar to the 2005 assessment and there still appears to be no conservation concern for skipjack in the EPO.



Source: IATTC 2010.
*OTR – All other gears combined; NOA – Unassociated Purse Seine Sets; OBJ – Purse Seine Sets on Floating Objects.

Figure 3-4. Total catches (retained catches plus discards) of skipjack tuna by the purse-seine fisheries on floating objects and unassociated schools, and by other fisheries combined, in the eastern Pacific Ocean, 1975-2009. The purse-seine catches are adjusted to the species composition estimate obtained from the sampling of catches. The 2009 catch data are provisional.

North Pacific albacore (*Thunnus alalunga*) (ISC 2007; ISC 2009)

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 full stock assessment was finalized by the working group in December 2006. 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.

No formal update of stock status has been conducted since the 2006 assessment. However, at its July 2009 meeting, the Albacore Working Group undertook a qualitative update using available fisheries data from 2006 to 2008 and concluded that a new stock assessment will be necessary to fully understand the implications of the new data available since the last stock assessment. In addition, nominal albacore effort in most fisheries appears to have declined since 2005 and catches since 2004 (with the exception of 2007) have been substantially lower than in the previous decade (ISC 2009).

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.

3.3.2.2 Non-target Finfish Species

Overview

The purpose of this section is to discuss the stock status of fish species that make up a significant part of the overall finfish catch in Hawaii- and west-coast-based DSLL fisheries. Although tuna species are the target species in DSLL fishing, there are also significant catches of non-target finfish. The review of species below includes commercially important finfish species managed under the HMS FMP and bycatch species that constituted a significant part of the catch but are not managed by the HMS FMP.

The criteria used for determining major non-target finfish species were any species that had a CPUE for 1,000 hooks of 0.05 or higher, and had been observed in the west-coast-based fishery. Table 3-6 shows the CPUE values for the Hawaii-based DSLL fishery. Some of the CPUEs shown for various species in this table may not be an entirely accurate representation of the west-coast-based fishery because there are physical and biological oceanographic differences between the two regions; however, the relative proportions of species caught in the Hawaii- and west-coast-based DSLL fisheries are similar. Care was taken to consider only those species that would likely have a high CPUE for the west-coast-based DSLL fishery.

Table 3–6. Total observed catch for the Hawaii-based DSLL fishery on the high seas (2003-2007).

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Species Caught	Total Observed Catch (HI DSLL)	CPUE (catch/1,000 hooks)
Barracuda, Great	2,686	0.076
Bonyfish, Unidentified	526	0.015
Dogfish, Velvet	365	0.010
Dolphinfish (Corado, Mahimahi)	73,837	2.078
Escolar, Smith's	24,538	0.691
Lancetfish, Longnose	174,837	4.921
Mackerel, Black (Escolar, Longfin)	483	0.014
Mackerel, Snake	39,634	1.116
Marlin, Indo-Pacific Blue	4,659	0.131
Marlin, Striped	20,601	0.580
Mola, Slender	2,102	0.059
Oilfish	895	0.025
Opah	13,543	0.381
Pomfret, Brama	868	0.024
Pomfret, Dagger	1,705	0.048
Pomfret, Sickle	56,228	1.583
Remora	9,506	0.268
Sailfish	354	0.010
Shark, Bigeye Thresher	5,889	0.166
Shark, Blue	82,589	2.325
Shark, Crocodile	1,249	0.035
Shark, Oceanic Whitetip	2,074	0.058
Shark, Shortfin Mako	2,419	0.068
Shark, Silky	1,438	0.040
Shark, Unidentified	999	0.028
Shark, Unidentified Thresher	605	0.017
Spearfish, Shortbill	15,614	0.440
Stingray, Pelagic	5,850	0.165
Swordfish, Broadbill	6,913	0.195
Tuna, Albacore	14,108	0.397
Tuna, Bigeye	143,885	4.050
Tuna, Skipjack	29,299	0.825
Tuna, Unidentified	1,598	0.045
Tuna, Yellowfin	34,575	0.973
Wahoo	19,113	0.538

Note: Finfish species with CPUE less than 0.010 were not shown. Species is italics most likely do not occur in the proposed action area; these species are generally found further west where the majority of the Hawaii DSLL fishing occurs.
Data source: PIFSC 2008.

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 DSLL 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 the maximum sustainable yield (MSY), because these species have low productivities and are vulnerable to overfishing. Stocks of the 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's recommendations.

Family Carcharhinidae (NMFS 2009b)

This is one of the largest and most important families of sharks, with many common and wide-ranging species found in all warm and temperate seas. The silky shark (*Carcharhinus falciformis)* is one of the three most abundant pelagic sharks, along with the blue (*Prionace glauca*) and oceanic whitetip sharks *(C. longimanus)* (Compagno 1984). Not surprisingly, silky and oceanic whitetip sharks are two of the most abundant species caught by the purse seine fishery (Molony 2005). Stevens (1996) estimated 84,000 metric tons of silky sharks were caught in the international Pacific Ocean high-seas fisheries (purse seine, longline, and drift-net). Oshiya (2000) conducted a stock assessment of Pacific silky sharks, with an estimated Pacific Ocean-wide standing stock of 170,000 to 240,000 metric tons, from which 15,000 and 20,000 metric tons is caught annually by longline vessels. Stevens (1996) roughly estimated 50,000 to 239,000 metric tons of oceanic whitetips were caught by the international Pacific Ocean high-seas fisheries (purse seine, longline, and drift-net) in 1994. There have been no quantitative assessments of Pacific oceanic whitetip shark populations published to date.

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 drift gillnet (DGN) gear, but rarely taken by other commercial HMS gears. On the high-seas, blue sharks have been caught with longline gear in the U.S. 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.

For the North Pacific blue shark population, a range of examples of what might be considered "plausible" 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 not subject to overfishing or approaching an overfished state (Sibert, *et al*. 2006). The blue shark is currently listed as "near threatened", a lower risk status, by The World Conservation Union (IUCN) due to the impact of annual fisheries mortality (mainly of bycatch) on the world population, and the concern over the removal of such large numbers of this likely keystone predator from the oceanic ecosystem; however, monitoring data are inadequate to assess the scale of any population decline[10].

Family Lamnidae

This family of sharks is both coastal and oceanic, ranging from temperate to tropical zones of the Atlantic, Pacific, and Indian Oceans. Lamnid sharks, such as crocodile sharks *(Pseudocarcharius kamoharia*) and short-fin mako sharks *(Isurus oxyrhinchus)* are occasionally taken in pelagic fisheries.

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° Celsius, 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, *et al.* 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 recreational catches peaking in 1987 at about 21,600 fish. Since 2001, annual recreational catch estimates have ranged from 3,000–14,700 fish, with a percentage of sharks successfully released by southern California fishermen favoring catch-and-release versus harvest (PFMC 2007b; personal communication with C. Sepulveda, Pfleger Institute of Environmental Research, 2006). In 2005 it is estimated that recreational anglers fishing from private vessels in U.S. EEZ waters kept 14,000 shortfin mako sharks, and released alive 7,000; and in 2006 it is estimated that 5,000 shortfin mako sharks were kept, and 6,000 were released alive (PFMC 2007b). It is important to note that catch estimates from RecFIN must be used with caution because sampling anglers that pursue HMS is an occurrence and as such can lead to unusually high or low catch estimates with high variances.

[10] IUCN Red List of Threatened Species: http://www.iucnredlist.org/search/details.php/39381/summ.

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", a lower risk status, because the shortfin mako shark is subject to significant bycatch and targeted fisheries in some areas and has a relatively low reproductive capacity; however, the species is very wide-ranging and has a relatively fast growth rate.

Status of Major Non-target Billfish

Striped marlin (*Tetrapturus audax*) (ISC 2007)

Stock status of striped marlin in the EPO was assessed by IATTC in 2003. The Marlin Working Group of the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC) also conducted an assessment of the North Pacific striped marlin population status in 2007 (ISC 2007). The stock structure of striped marlin in the Pacific Ocean is not well known. An analysis of trends in CPUE in several sub areas suggest that the fish in the EPO constitute a single stock thus that is an assumption of 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, it is prohibited for commercial anglers to target striped marlin within 50 nm of the coast in order 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)[11]. 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.

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.

[11] The IATTC uses short tons in its stock status reports. 1 short ton is equal to 0.9072 metric ton.

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 mortality rates not be increased above current levels.

A new assessment is scheduled to be completed by the ISC in 2011. The new assessment will consider a multi-stock hypothesis, probably a two stock scenario.

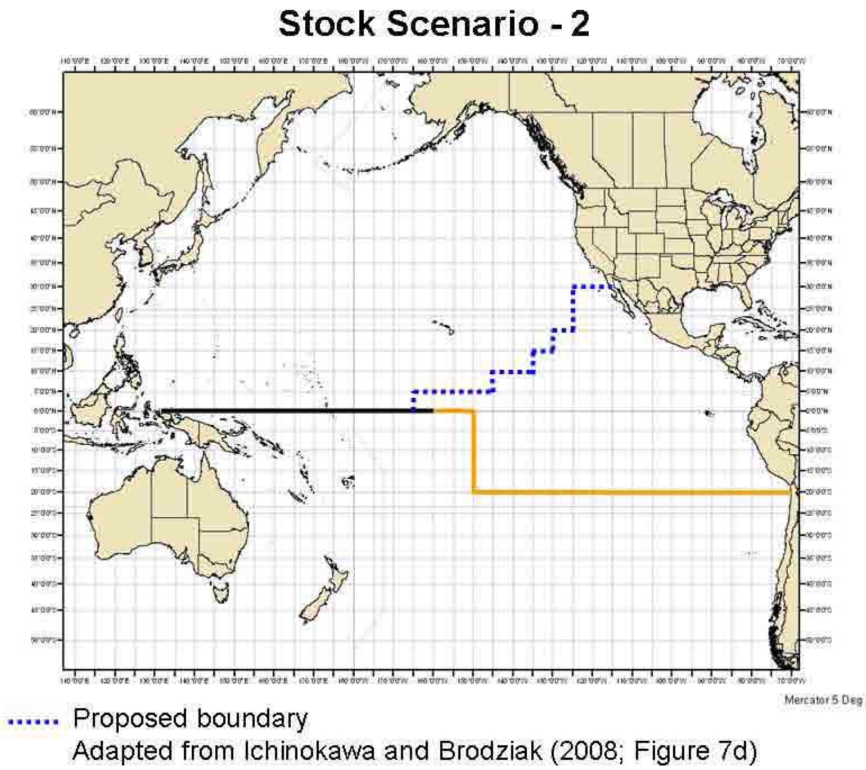
Swordfish (*Xiphias gladuis*) (ISC 2009)

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 WCPO. The recent analysis conducted by the ISC indicates that there are two stocks separated by an irregular boundary extending from Mexico to the southwest and including sections of the eastern South Pacific extending to 20°S latitude (ISC 2009; Figure 3-5). Available evidence (i.e., genetic analyses) supports the two-stock hypothesis and consequently stock status and conservation advice should be based on the two-stock scenario.

The exploitation rate for the WCPO stock has fluctuated during the period 1951-2006, but has remained below the level required for MSY (ISC 2009). The probability that the exploitation rate in 2006 exceeded the exploitation rate at MSY is low at one percent. Projecting exploitable biomass through 2010 by assuming a constant 3-year (2004-2006) average exploitation rate for the fishery and fishing operations largely remaining unchanged, results in exploitable biomass levels above BMSY and sufficient to sustain recent levels of catch.

Similarly, the exploitation rate of the EPO stock during the period 1951-2006 has remained well below the level required for MSY (ISC 2009). The probability that this rate in 2006 exceeded the exploitation rate at MSY is also low at one percent. Projecting exploitable biomass forward until 2010 by assuming a constant 3-year (2004-2006) average exploitation rate and fishing operations to those observed in 2006, results in exploitable biomass levels above BMSY which is sufficient to sustain recent levels of catch.

The WCPO and EPO stocks of swordfish are healthy and well above the level required to sustain recent catches.



Source: ISC 2009.

Figure 3–5. Stock Scenario-2. Two North Pacific swordfish stocks with boundaries according to ISC/08/BILLWG-SS/04.

Status of Major Non-target Finfish

Dorado (*Coryphaena hippurus*)

Dorado are predominantly a warm water tropical species that are seasonally present in variable numbers 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 and there are no HMS FMP harvest guidelines recommended at this time (PFMC 2003). Between 1981 and 2007, the annual U.S. west coast catch of dorado by commercial vessels was less than 45 round mt, and the annual range was from less than 0.5 round mt to 43 round mt (PFMC 2007b). This species is more important in the recreational private sport fishery, which has accounted for an average of 5,000 fish caught annually along the Pacific coast for the years 2002-2006, and the California Commercial Passenger Fishing Vessel Fleet (CPFV), which accounts for an average of about 11,000 fish caught annually in California and Mexico water for the years 2002-2006.

Dorado are a 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 EPO 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 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). The bycatch of pelagic stingray in the longline fishery is not marketable and therefore discarded.

Smith's Escolar (*Lepidocybium flavobrunneum*)

The black escolar occurs throughout the world's oceans and are distributed between 40º N. and 40º 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 2007b). The bycatch of escolar in the longline fishery is marketable, and it is generally retained and sold.

Longnose lancetfish (*Alepisaurus ferox)*

Longnose lancetfish range from Alaska to Chile and are considered almost worldwide in distribution ranging from temperate to tropical seas. The longnose lancetfish have been found from the surface down to 1829 m. They are prey for sharks, marlins, tunas, opahs, and other predatory fish that are commercially important. There is no commercial fishery for longnose lancetfish, but this fish is considered bycatch for other fisheries such as bottom and pelagic trawls, driftnets, longlines and other fishing gear.

Opah (*Lampris guttatus*)

The opah is distributed worldwide and throughout the Pacific basin in temperate and tropical seas (Japan to the Gulf of Alaska to the Gulf of California). All life stages of this species are pelagic and oceanic, occurring from the sea surface to a depth of 1,680 ft. Seasonal movements are not well known in the Pacific. Although not much is known about their basic reproductive habits, anecdotal evidence suggests a spring spawning window. The size of the opah population off the coast of California, and whether local subpopulations exist, is not known at this time.

The opah is an oceanic predator that has been caught on tuna longlines in the western Pacific Ocean as well as by those fishing for albacore and salmon (Barut 1999). Between 1990 and 1999, over 660 mt of opah were landed in California, with annual landings ranging from 37 mt to 112 mt. The highest landings of the decade occurred in 1998; associated with the 1997–98 El Niño. Although the majority of opah landed in California since 1990 were landed from San Luis Obispo County and south (about 50 percent from San Diego County alone), landings were reported as far north as Crescent City. A small number of opah are caught and retained by the west-coast-based DSLL fishery.

Sport fishermen targeting albacore from British Columbia to Baja California occasionally catch opah. Within California, many sport caught opah are taken from the northern Channel Islands south to the Coronado Islands, just below the United States-Mexico border.

Wahoo (*Acanthocybium solandri*)

Wahoo are commercially important pelagic fish that occur in both tropical and subtropical waters in the Indian, Pacific, and Atlantic Oceans. Wahoo are often taken with billfish in both commercial and recreational fisheries, and landed as incidental catch (Hyde, *et al.* 2005). Wahoo are harvested and sold as commercially important incidental catch by U.S. longline and surface troll vessels fishing in warmer waters, where this species is predominantly found (e.g., the U.S. west-coast-based DSLL fishery, and the Hawaii and American Samoa pelagic fisheries). Wahoo are a seasonally important game fish for the San Diego-based charter recreational fishery that targets them on long range trips (8-14 days) to the islands, banks, and ridges inside and adjacent to the EEZ of Mexico's Baja Peninsula.

Sickle Pomfret (*Taractichthys steindachneri*)

The sickle pomfret is frequently caught on tuna longlines in the warm waters of the Pacific and Indian Oceans. They are commonly found at the shelf edge and considered oceanic and highly migratory. There are several species of pomfrets (Bramidae), known locally in Hawaii by the generic term “monchong”, that are taken as incidental catch in the Hawaii-based longline fishery. The most common species taken in open water is the bigscale pomfret (*Taractichthys steindachneri*). In California, pomfret have been found from Point Conception and south (Itano 2004). They are retained and sold by the west-coast-based DSLL fishery.

Shortbill Spearfish (*Tetrapturus angustirostris*)

There is no special fishery for spearfish; they are caught incidentally by longliners and occasionally by surface troll. They bycatch of shortbill spearfish is marketable, and is generally retained. There is currently no available stock assessment for shortbill spearfish. The shortbill spearfish is an Istiophorid billfish. Nakamura (1985) described the shortbill spearfish as an oceanic pelagic fish which does not generally occur in coastal or enclosed waters but is found offshore. Boggs (1992), conducting research in 1989 on longline capture depth, obtained the highest catch rates at depths of 120-360 m, with a few fish caught at depths of 280-360 m. In another survey in 1990, the highest catch rates were shallower (40-80 m deep) with no catch below 200 m. Similarly, Nakano, *et al.* (1997), analyzing catch depth data from research cruises in the mid-Pacific, classes shortbill spearfish among fish for which catch rates declines with depth. The hypothetical habitat for this fish may be described as open ocean epipelagic and mesopelagic waters from the surface to 1,000 m in the tropics and subtropics.

Spearfish are heterosexual and no sexual dimorphism is reported. Shortbill spearfish apparently spawn in winter months in tropical and subtropical waters between 25° N. and 25° S. latitude. Kikawa (1975) noted that unlike other billfish, spawning does not “take place in large groups over a very short period of time, but probably is continuous over a long period and over broad areas of the sea.”

3.3.2.3 Prohibited Finfish 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 3–7 lists the prohibited non-HMS 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.

There have been recorded interactions of great white sharks in the Hawaii-based SSLL fishery based on observer records. 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.

None of these prohibited species have been observed taken in the west-coast-based DSLL fishery and none are anticipated to be taken by the proposed action. Descriptions of the stock status of great white and basking sharks are included because of the interactions observed in the Hawaii-based SSLL fishery. For a detailed description and the stock status of other prohibited species refer to the 2007 SAFE document (PFMC 2007b).

Table 3–7. HMS FMP prohibited species.

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

Great White Shark (*Carcharodon carcharias*)

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 several interactions with great white sharks in the DGN fishery. Most are retained as incidental catch, or discarded if dead. There have also been some instances in which live great white sharks incidentally caught by commercial fishermen were given to the Monterey Bay Aquarium for its Great White Research Project[12]. The project has two primary goals: tagging and field studies, and exhibiting a great white shark to promote public understanding and protection of white sharks.

Basking Shark (*Cetorhinus maximus*)

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.

3.4 Protected Species

This section provides an evaluation of protected species likely to be affected by the west-coast-based DSLL fishery on the high seas, and information about the current environmental baseline for these species. Within the action area, all sea turtle species and some seabirds are protected under the ESA (listed as threatened or endangered). Takes of marine mammals on the high seas in U.S. fisheries is covered under the Marine Mammal Protection Act (MMPA). Not all protected species are likely to be affected by the DSLL fishery; encounters between marine mammals and sea turtles with DSLL are very rare (Gilman and Kobayashi 2007); therefore, this section includes an analysis of the available information to determine which species are most likely to be affected. The primary source of information is the Hawaii-based DSLL fishery observer data from the high seas. There are only limited observed sets in the area where most west-coast-based DSLL effort is expected to occur (i.e., east of 140° W. longitude). To supplement the Hawaii-based DSLL observer data, observer records from the west-coast-based and Hawaii-based SSLL fisheries were reviewed to assist in determining species that may be in the area. However data from SSLL fisheries cannot be used to estimate likely takes in the DSLL fishery due to the differences in marine mammal and sea turtle biology (some species are very unlikely to regularly dive to depths of 100 meters or more, thus would be unlikely to get hooked by gear; although, entanglements in gear is not impossible). Information on the distribution and abundance of marine

[12] http://www.montereybayaquarium.org/cr/whiteshark.asp

mammals and sea turtles, particularly within the area east of 140° W. longitude, is used to augment quantitative assessments. Where possible, marine mammals are identified by stock as described in the annual stock assessment reports. Similarly, where possible, sea turtles are identified by the nesting population.

3.4.1 Marine Mammals

All the marine mammals that may be found in the proposed action area are listed below. The marine mammal species shown on this list were selected based on their distribution west of the west coast EEZ. Because most fishing effort is expected to occur east of 140° W. longitude, it is most likely that U.S. west coast stocks will occur in the area of fishing, however, because fishing effort may expand across the entire north Pacific, Hawaiian stocks that may be encountered in an enlarged fishing area are listed.

Complete descriptions of all of these stocks can be found in the Pacific Stock Assessment Report (SARs; Carretta, *et al*. 2009) and the Alaska SARs (Angliss and Allen 2009). All marine mammals are protected under the MMPA and managed under that statute on a per stock basis.

Cetaceans

Dall's porpoise (*Phocoenoides dalli*) – CA/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, Hawaiian stock, eastern tropical Pacific (ETP) stock
Rough-toothed dolphin (*Steno bredanensis*) – Hawaiian Stock
Pantropical spotted dolphin (*Stenella attenuata*) – Hawaiian Stock, ETP stock
Spinner dolphin (*Stenella longirostris*) – Hawaiian Stock. ETP stock
Fraser's dolphin (*Lagenodelphis hosei*) – Hawaiian Stock, ETP stock
Melon-headed whale (*Peponocephala electra*) – Hawaiian Stock
Bottlenose dolphin offshore stock (*Tursiops truncatus*) – CA/OR/WA stock, Hawaiian stock, ETP stock
Short-beaked common dolphin(*Delphinus delphis)* – CA/OR/WA stock, ETP stock
Northern right whale dolphin (*Lissodelphis borealis*) – CA/OR/WA stock
Striped dolphin (*Stenella coeruleoalba*) – CA/OR/WA stock, Hawaiian stock, ETP stock
Short-finned pilot whale (*Globicephala macrorhynchus*) – CA/OR/WA stock, Hawaiian stock, ETP stock
Sperm whale (*Physeter macrocephalus*) – CA/OR/WA stock, Hawaiian stock
Dwarf sperm whale (*Kogia sima*) - CA/OR/WA stock, Hawaiian stock
Pygmy sperm whale (*Kogia breviceps*) - CA/OR/WA stock, Hawaiian stock
Killer whale (*Orcinus orca*) – eastern North Pacific offshore stock, Hawaiian stock
Pygmy killer whale (*Feresa attenuate*) – Hawaiian stock
False killer whale (*Pseudorca crassidens*) – ETP stock
Mesoplodont beaked whales (*Mesoplodon* spp.) - CA/OR/WA stock

Hubbs' beaked whales
Gingko-toothed whale
Stejneger's beaked whales
Blainville's beaked whales (including Hawaiian stock)
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, Hawaiian stock

Baird's beaked whale (*Berardius bairdii*) – CA/OR/WA stock
Longman's beaked whale (*Indopacetus pacificus*) – Hawaiian stock
Blue whale (*Balaenoptera musculus)* – eastern North Pacific stock, western North Pacific stock
Fin whale (*Balaenoptera physalus*) - CA/OR/WA stock, Hawaiian stock
Bryde's whale (*Balaenoptera edeni*) – Hawaiian stock
Minke whale (*Balaenoptera acutorostrata*) – Hawaiian stock
Humpback whale (*Megaptera novaeangliae*) – eastern and central North Pacific stocks
North Pacific right whale (*Eubalaena glacialis*) – eastern North Pacific stock
Sei whale (*Balaenoptera borealis)* - eastern North Pacific stock, Hawaii stock

The ESA-listed marine mammals under NMFS's jurisdiction are listed below (Table 3-8). Under the ESA, marine mammals are generally listed based upon the global population and not by stocks (as under the MMPA), although some distinct population segments (DPS) are listed (i.e., the eastern North Pacific resident killer whale DPS).

Table 3–8. Threatened or endangered species listed under the ESA of NMFS's jurisdiction and occurring in the Pacific high seas.

Marine Mammals	Status
Blue whale *(Balaenoptera musculus)*	Endangered
Fin whale *(Balaenoptera physalus)*	Endangered
Humpback whale *(Megaptera novaeangliae)*	Endangered
Sei whale *(Balaenoptera borealis)*	Endangered
Sperm whale *(Physeter macrocephalus)*	Endangered

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

Very little observer information is available for the area where most fishing activity is expected to occur (i.e., east of 140° W. longitude, and from the equator to 35° N. latitude); therefore, data from other fisheries is used to generally characterize the level of anticipated takes and species composition along with what is known of the distribution and abundance of marine mammal species.

Interactions between marine mammals and longline fishing are rare events and therefore difficult to predict. Most of the longline interactions with marine mammals are attributed to odontocetes (toothed whales, dolphins or porpoises) 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*. 2006). Forney and Kobayashi (2007) reviewed the Hawaii-based longline fishery (shallow- and deep-sets combined); 24,542 sets were observed, and 67 marine mammal interactions were observed. Within the tuna longline fishery, there were 43 observed marine mammal takes in 20,375 observed sets. Of these 43 animals, there were 6 immediate mortalites, 29 animals seriously injured, and 8 released without injury (Forney and Kobayashi 2007). Table 3-9 shows the U.S. Hawaii longline deep-set and shallow-set longline interactions for 2006-2008.

Table 3–9. Marine mammal interactions with the U.S. Hawaii-based deep- and shallow-set longline fisheries for 2006-2008.

Species	Released dead	Released injured	Released unknown	Fishery method
2006				
Bottlenose dolphin		1		Deep-set
Risso's dolphin		2		Deep-set
False Killer whale		4		Deep-set
Short-finned Pilot whale		2		Deep-set
Striped dolphin	1			Deep-set
Unidentified cetacean		2		Deep-set
Unidentified dolphin		2		Deep-set
Bottlenose dolphin		1		Shallow-set
Humpback whale		1		Shallow-set
Risso's dolphin	1	1		Shallow-set
2007				
Unidentified cetacean		1		Deep-set
False Killer Whale		4		Deep-set
Short-finned Pilot Whale		1		Deep-set
Unidentified dolphin		1		Deep-set
Risso's dolphin	1			Deep-set
Bottlenose dolphin		3		Shallow-set
Risso's dolphin		3		Shallow-set
2008				
Unidentified cetacean		2		Deep-set
Unidentified whale		3		Deep-set
Short-finned Pilot Whale		3		Deep-set
False Killer Whale		2		Deep-set
Risso's dolphin		1		Deep-set
Spotted dolphin	1			Deep-set
False Killer Whale		1		Shallow-set
Humpback Whale		1		Shallow-set
Risso's dolphin	1	3		Shallow-set
Pygmy Sperm Whale		1		Shallow-set
Striped dolphin		1		Shallow-set
Unidentified Whale		1		Shallow-set

The shallow-set data for 2007 covers the first three quarters only.
Source: NMFS Pacific Island Regional Observer Program; NMFS 2009b.

In the historical California SSLL fishery only two marine mammals were observed taken in 469 sets, one Risso's dolphin and one unidentified dolphin. This suggests that the likelihood of marine mammal takes in the DSLL fishery operating outside the west coast EEZ is very low for two reasons. First, take rates in SSLL gear are estimated to be higher than take rates in DSLL gear (Forney and Kobayashi 2007); therefore, given the low observed bycatch in the SSLL, it is reasonable to believe that bycatch in the DSLL will be even lower or non-existent. While the two gear types are not directly comparable, this data does provide the closest existing proxy, in terms of area fished. However, there are a number of caveats to using the SSLL data to predict marine mammal interactions: the SSLL fishery occurred generally north of the area where most DSLL fishing effort is considered likely to occur and most effort was made in the area during the fourth quarter, while most effort in the DSLL is expected to occur in the first and second quarters. Nonetheless, this does provide insight into the possible presence of marine mammals in an area that could be utilized by the DSLL and suggests that takes would be expected to be very low.

Finally, surveys from the EPO were reviewed to determine which marine mammal species may be within, and east and south of the area where most DSLL effort is likely to occur. This information is important to consider given the abundance of marine mammal species in the area. The EPO is a highly dynamic area with equatorial currents, equatorial countercurrent, the Costa Rica dome, the California Current to the north, and the Peru Current to the south all feeding into the equatorial currents. As described in Section 3.2.1, tuna are found in dynamic areas such as these utilizing the oceanography to forage on a variety of prey. Four species of dolphins are known to have winter distributions that overlap with the DSLL fishery area: spotted dolphins, spinner dolphins, striped dolphins, and common dolphins (Reilly 1990). Surveys of dolphins in the EPO are conducted by the SWFSC and the most recent survey information is provided in Table 3–10.

Table 3–10. Survey information of dolphins in the ETP

Species/stock	Population estimate
Northern offshore spotted dolphin	736,737
Western/southern offshore spotted dolphin	627,863
Coastal spotted dolphin	149,393
Eastern spinner dolphin	612,662
Whitebelly spinner dolphin	441,711
Striped dolphin	1,470,854
Rough-toothed dolphin	47,921
Short-beaked common dolphin	1,098,429
Bottlenose dolphin	277,568
Risso's dolphin	76,595

Of these species, spotted dolphins and spinner dolphins have been observed foraging in the same areas as tunas (Reilly 1990). Of these species, Risso's, spotted, and bottlenose dolphins have been observed entangled in the Hawaii-based DSLL fishery; although, at very low levels. The most recent population estimates of Risso's, spotted, and bottlenose dolphins in the waters fished by the Hawaii-based DSLL fishery is given in Table 3–11.

Table 3–11. Population estimates of dolphins in waters fished by the Hawaii-based DSLL fishery.

Species/Hawaii stock	Population estimate
Risso's dolphin	2,351
Spotted dolphin	10,260
Bottlenose dolphin	3,215
Spinner dolphin	2,805

Source: Caretta, *et al.* 2009.

All marine mammals are protected under the MMPA. Pursuant to the MMPA, NMFS has promulgated specific regulations that govern the incidental take of marine mammals during fishing operations (50 CFR § 229). The regulations designate three categories of fisheries, based on relative frequency of incidental serious injuries and mortalities of marine mammals in each fishery:

- Category I designates fisheries with frequent serious injuries and mortalities incidental to commercial fishing;
- Category II designates fisheries with occasional serious injuries and mortalities;
- Category III designates fisheries with a remote likelihood or no known serious injuries or mortalities

The Hawaii-based longline fishery is divided into deep-setting and shallow-setting which are classified as Category I for the deep-set portion and Category II for the shallow-set portion of the fishery[13]. The west coast-based longline fisheries and the EPO purse seine fishery are classified as Category II (73 Fed. Reg. 73032, December 1, 2008[14]).

3.4.2 Sea Turtles

The four species of sea turtles that may be found in the proposed action area are listed along with their status in Table 3-12.

Table 3–12. Sea turtles within the proposed action area.

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

3.4.2.1 Species of sea turtles most likely affected by the proposed action

All four species of sea turtles have been observed incidentally taken in longline fisheries in the Pacific Ocean. As noted previously, the current DSLL fishery is currently subject to 100 percent observer coverage; however, these records are confidential, and not considered sufficient to estimate possible impacts of a larger DSLL fleet (up to six vessels) over an expanded area. Therefore, a variety of resources were used in determining which species may be exposed and affected by the DSLL fishery. Records from the existing Hawaii-based DSLL fishery were reviewed, along with records from the Hawaii- and west-coast-based SSLL fisheries, and finally a review of the abundance and distribution of the species was considered.

Due to the lack of observer records from the proposed action area, a quantitative assessment of sea turtle impacts for this action were derived using observer data from the Hawaii-based DSLL fishery as a proxy (NMFS 2005). Although the DSLL fishery has a lower sea turtle interaction rate compared to the SSLL swordfish fishery, the mortality rates are higher because most sea turtles cannot reach the surface to breathe once hooked by DSLL gear. The nature of the DSLL interaction is shown in Tables 3-13 and 3-14. A majority of the sea turtles do not survive interactions with DSLL gear because they cannot reach the surface to breathe once entangled or hooked. Most of the interactions with hard-shelled sea turtles involved being hooked primarily in the mouth due to their attraction to the bait on the hooks. Leatherbacks are more commonly hooked externally (i.e., on the flippers, shoulders, or shell).

[13] The deep-set longline fishery is categorized as a Category I fishery due to the level of takes of false killer whales.
[14] Available on the following NMFS website: http://www.nmfs.noaa.gov/pr/pdfs/fr/fr73-73032.pdf.

Table 3–13. Summary description of observed sea turtle takes in the Hawaii-based DSLL fishery from 2003-2006.

Species (total number)	Dead	Released injured	Released alive	Entangled	Hooked	Unknown	Mouth	Front Flipper	Ingestion
Green (4)	4				4	1	1	2	
Leatherback (7)	3	4		3	6			6	
Olive Ridley (39)	38	1			39	2	25	4	8
Loggerhead (4)	1	2	1	1	3		2		1

Note: Only animals that were released alive were included in the "Gear Attached" section of the table
Source: PIFSC 2007.

In 2005, the NMFS Pacific Islands Regional Office (PIRO) conducted a Section 7 consultation on the Hawaii-based DSLL fishery. This fishery set an estimated 35,055,119 hooks in 2005 and the projected levels of sea turtle takes in the Hawaii DSLL fishery were based upon that level of effort and observed takes in 2004 and 2005.

Table 3–14. Number of turtles expected to be taken or killed in the Hawaii-based deep-set longline fishery over a period of three consecutive years.

	Number captured	Number killed
Greens	21	18
Leatherbacks	39	18
Loggerheads	18	9
Olive Ridleys	123	117

Source: NMFS 2005.

In order to better estimate the likelihood of marine mammal and sea turtle takes in the proposed DSLL fishery, other fisheries that occur in the same general area were considered, including the SSLL fishery. However, there were very few observed SSLL sets made in the waters south of 35° N. latitude and east of 140° W. longitude, the area where most of the fishery activity is expected to occur. Further, most of the 469 observed SSLL sets made between October 2001 and February 2004 does not match the timing of the DSLL (i.e., December through May). No other longline fisheries occur in the area described as likely to have the highest level of DSLL activity (i.e., from the equator to 35° N. latitude and east of 140° W. longitude).

The following sections provide brief status descriptions of the sea turtle species considered most likely to be affected by the continued operation of the west-coast-based DSLL fishery. Complete status descriptions can be found in previous documents including NMFS's 2004 Biological Opionion (BO) on the HMS FMP. Updates of that data are provided as available for sea turtles.

Green Turtles

Green turtles are found throughout the world, occurring primarily in tropical and, to a lesser extent, subtropical waters (NMFS and USFWS 1998a). The breeding populations of the green turtle off the coast of Florida and the Pacific coast of Mexico are listed as endangered, while all others green turtles are listed as threatened. Green turtles are generally found in warm waters, temperatures greater than 18° Celsius, which is within the temperature range of preferred tuna habitat. In the Pacific Ocean this species occurs in nesting aggregations within the eastern, central, and western regions (NMFS 2005). Using a precautionary approach, Seminoff, *et al*. (2002) estimates that the global green turtle population has declined by 34 percent to 58 percent over the last three generations (approximately 150 years); although, actual declines may be closer to 70 percent to 80 percent. Causes for this decline include harvest of eggs, harvest of subadults and adults, incidental capture by fisheries, loss of habitat, and disease. A more complete review of the most current information on green sea turtles is available in the Five Year Status Review document published in 2007 by the U.S. Fish and Wildlife Service and NMFS[15].

Eastern Pacific - Distribution and Abundance of Nesting Females

The primary green turtle nesting grounds in the eastern Pacific are located in Michoacán, Mexico, and the Galapagos Islands, Ecuador (NMFS and USFWS 1998). Here, green turtles were widespread and abundant prior to commercial exploitation and uncontrolled subsistence harvest of nesters and eggs. Sporadic nesting occurs on the Pacific coast of Costa Rica. Analysis using mitochondrial DNA (mtDNA) sequences from three key nesting green turtle populations in the eastern Pacific indicates that they may be considered distinct management units: Michoacán, Mexico; Galapagos Islands, Ecuador, and Islas Revillagigedos, Mexico (personal communication with P. Dutton, NMFS SWFSC, 2003).

Table 3–15. Estimates of current green turtle nesting rookeries in the eastern Pacific Ocean.

Eastern Pacific Ocean	Units[1]	Years	Abundance	Trend
Revillagigedos Islands, Mexico	AN	1999-2002	90	Stable
Michoacan, Mexico	AF	2000-2006	1395	Increasing
Central American Coast	AN	late 1990s	184-344	Uncertain
Galapagos Islands	AF	2001-2006	1650	Stable

[1]AN = Annual number of nests. AF = Number of females nesting annually.
Data source: 2007 Five Year Status Review.

The most current information on the status of eastern Pacific green turtle nesting is given in Table 3-15. This indicates that three of the four known significant populations appear to be stable or increasing. Nesting along the Central American coast has not been well described or documented as of yet.

Green turtles are also known to migrate long distances from nesting areas to feeding grounds. Green turtles that were satellite tagged at the French Frigate Shoals nesting site showed an eastward migration to the main Hawaiian islands off Oahu in 26 days, traveling far from shore and over waters thousands of meters deep (Balazs, *et al*. 1994). The EPO population of green turtles has been reported to stay close to shore and have relatively small home ranges. In the Gulf of California, a group of green turtles that were tagged with radio and sonic telemetry transmitters showed a range of diving depths including dives to greater than 40 m. This population of turtles did not leave the Gulf of California throughout the summer study months (Seminoff, *et al*. 2002). In 2005, there were 1.4 estimated mortalities of green turtles in the purse seine fishery (IATTC 2006).

Central Pacific - Hawaii

[15] www.nmfs.noaa.gov/pr/pdfs/species/greenturtle_5yearreview.pdf.

Green turtles in Hawaii are considered genetically distinct and geographically isolated; although, the nesting population at Islas Revillagigedos in Mexico appears to share the mtDNA haplotype that commonly occurs in Hawaii. Since the establishment of the ESA in 1973, the nesting population of Hawaiian green turtles has shown a gradual but definite increase (Balazs 1996; Balazs and Chaloupka 2004). In three decades the number of nesting females at East Island (French Frigate Shoals) increased from 67 nesting females in 1973 to 467 nesting females in 2002. Unfortunately, the green turtle population in the Hawaiian Islands area is afflicted with a tumor disease, fibropapilloma, which is of an unknown etiology and often fatal, as well as spirochidiasis; both of these diseases are major causes of strandings of this species.

Loggerhead Turtles

Loggerheads are currently listed as threatened as a global species. On July 16, 2007, NMFS and USFWS received a petition from the Center for Biological Diversity and Turtle Island Restoration Network requesting that loggerhead turtles in the North Pacific Ocean be reclassified as a distinct population segment (DPS) with endangered status and that critical habitat be designated. On November 16, 2007, NMFS and USFWS received a petition from the Center for Biological Diversity and Oceana requesting that loggerhead turtles in the Northwest Atlantic Ocean be reclassified as a DPS with endangered status and that critical habitat be designated. NMFS and USFWS published a 90 day finding that the petitions presented substantial information and that the petitioned actions may be warranted. A biological review team (BRT) was convened in February 2008 and tasked with determining whether DPS's exist and assessing the extinction risk of each DPS. In August 2009, the BRT published the results of their analysis. They concluded that the nine identified population segments meet the standard for being considered a DPS; they are both discrete from other conspecific population segments and significant to the species to which they belong, *Caretta caretta* (Conant *et al.* 2009).

The BRT has identified the following nine loggerhead DPS's distributed globally and their status:
(1) North Pacific Ocean DPS – currently at risk of extinction
(2) South Pacific Ocean DPS - currently at risk of extinction
(3) North Indian Ocean DPS - currently at risk of extinction
(4) Southeast Indo-Pacific Ocean DPS - currently at risk of extinction
(5) Southwest Indian Ocean DPS - not currently at immediate risk of extinction
(6) Northwest Atlantic Ocean DPS - currently at risk of extinction
(7) Northeast Atlantic Ocean DPS - immediate risk of extinction
(8) Mediterranean Sea DPS - immediate risk of extinction
(9) South Atlantic Ocean DPS - not currently at immediate risk of extinction

Populations in the action area

In the Pacific Ocean, loggerhead turtles are represented by the North Pacific nesting aggregation (located in Japan) which is comprised of separate nesting groups (Hatase, *et al.* 2002) and a smaller South Pacific nesting aggregation that occurs in Australia (Great Barrier Reef and Queensland), New Caledonia, New Zealand, Indonesia, and Papua New Guinea. Clutch size averages 110 to 130 eggs, and one to six clutches of eggs are deposited during the nesting season (Dodd 1988). The average re-migration interval is between 2.6 and 3.5 years (NMFS and USFWS 1998) and adults can breed up to 28 years (Dobbs 2002). More information is available in the Five Year Status Review document published in 2007 by the US Fish and Wildlife Service and NMFS[16].

[16] www.nmfs.noaa.gov/pr/pdfs/species/loggerhead_5yearreview.pdf

For loggerheads, the transition from hatchling to young juvenile occurs in the open sea, and evidence from genetic analyses and tracking studies show that this part of the loggerhead life cycle involves trans-Pacific developmental migration (Polovina, *et al*. 2003). Large aggregations (numbering in the thousands) of mainly juveniles and subadult loggerheads are found off the southwestern coast of Baja California, over 10,000 km from the nearest significant nesting beaches (Nichols, *et al.* 2000; Pitman 1990). Genetic studies have shown these animals originate from a Japanese nesting subpopulation (Bowen, *et al.* 1995) and their presence reflects a migration pattern probably related to their feeding habits (Eckert 1993). While these loggerheads are primarily juveniles, carapace length measurements indicate that some of them are 10 years old or older.

Satellite tracking of loggerheads has provided insight into their behavior and distribution in the Pacific Ocean. Loggerheads exhibit shallow dive patterns with more than 90 percent of their dives within the top 40 m of water, which is shallower than the hook depth range of DSLL fishing gear (hook depths of 100 m or more below the water's surface) (Polovina, *et al*. 2004). Satellite tracking of loggerheads indicates that they occupy a wide range of SSTs from 15–25° C while in the central North Pacific Ocean; although, tracks of turtles within narrowly defined temperature bounds were also observed (Polovina, *et al.* 2004). Satellite tracking indicates that loggerheads tagged and released from North Pacific fisheries and 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; Polovina, *et al.* 2006). Satellite tracks of juvenile loggerheads in the NPTZ end at approximately 130° W. longitude, which is the eastern boundary of the Sub-Arctic and Sub-Tropical gyre in which the NPTZ is found (Polovina, *et al*. 2004). This area is within the proposed action area and on the western edge of the California Current. Researchers speculate that when the gyre meets the southbound California Current, objects in the gyre, including juvenile loggerheads, are moved into the waters off Baja (Nichols, *et al.* 2000). Many juvenile loggerheads spend years in the near shore, primarily feeding off Baja California, Mexico. As adults, 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 which suggests they may be utilizing the Sub-tropical front at 25–30° N. latitude (Nichols, *et al*. 2000).

In the western Pacific Ocean, the only major nesting beaches are in the southern part of Japan (Dodd 1988). Balazs and Wetherall (1991) speculated that 2,000 to 3,000 female loggerheads nested annually in all of Japan. From nesting data collected by the Sea Turtle Association of Japan since 1990, the latest estimates of nesting females on almost all of the rookeries are as follows: 1998 - 2,479 nests; 1999 - 2,255 nests; 2000 - 2,589 nests. Considering multiple nesting estimates, Kamezaki, *et al*. (2003) estimated that approximately less than 1,000 female loggerheads return to Japanese beaches per nesting season. Matsuzawa (2006) has updated nesting numbers from 2001-2004 to 3,122, 4,035, 4,519, and 4,854, respectively. Snover (2008) cited Matsuzawa (2008) in her estimates of the total adult nesting population. The Sea Turtle Association of Japan reported over 10,000 nests laid in 2008 (personal communication with I. Kinan, NMFS, 2009). Over the short term, the last ten years, nesting appears to be increasing. However, these data are not sufficiently long term to conclude a trend in the population. Snover (2008) estimated that the total number of adult females in the Japanese nesting population was 2,915 for the period 2005-2007 (this assumed a clutch frequency of 3.49 females per year).

Leatherback Turtles

The leatherback turtle is listed as endangered under the ESA throughout its global range. Spotila, *et al.* (1996) estimated that the global population of female leatherback turtles in 1995 was only 34,500 nesting females (confidence interval: 26,200 to 42,900); however, this number is likely an underestimate as recent population estimates for the North Atlantic alone range from 34,000 to 90,000 adult leatherbacks. The population estimates in the Pacific are lower than the Atlantic. In the eastern Pacific Ocean, nesting counts indicate that the population has continued to decline since the mid 1990s, leading some researchers to conclude that the leatherback is on the verge of extinction in the Pacific Ocean (Spotila, *et al*. 1996; Spotila, *et al*. 2000). However, the status of western Pacific leatherbacks appears to be less dire. Recently published estimates of breeding females suggest that the western Pacific population is 2,700 to 4,500 adult females (Dutton, *et al*. 2007). This number is substantially higher than the population estimate of 1,775 to 1,900 western Pacific breeding females published in 2000 and used to predict possible extinction in the Pacific (Spotila, *et al*. 2000). The larger population estimate is due to adding in a number of nesting females from beaches that were not previously included in population estimates and thus were not indicative of a positive growth trend in the population. Leatherbacks are highly migratory, exploiting convergence zones and upwelling areas in the open ocean, along continental margins, and in archipelagic waters (Morreale, *et al*. 1994; Eckert 1998; Eckert 1999). For a more complete review of leatherbacks, see the Five Year Status Review document published in 2007 by the U.S. Fish and Wildlife Service and NMFS[17].

Migratory routes of leatherback turtles originating from eastern and western Pacific nesting beaches are not entirely known. However, satellite tracking of post-nesting females and foraging males and females, as well as genetic analyses of leatherback turtles caught in U.S. Pacific fisheries or stranded on the west coast of the United States suggests that the leatherbacks found off the U.S. west coast are from the western Pacific nesting populations. Leatherbacks forage off central California, generally at the end of the summer, when upwelling relaxes and SSTs increase. 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 178 leatherbacks (CV=0.15) were present between the coast and roughly the 50 fathom isobath off California. Abundance over the study period was variable between years, ranging from an estimated 20 leatherbacks (1995) to 366 leatherbacks (1990) (Benson, *et al*. 2007). Other observed areas of summer leatherback concentration include northern California and the waters off Washington through northern Oregon, offshore from the Columbia River plume. Foraging areas of leatherbacks in the high seas is not known; although, based upon limited satellite tracking of turtles tagged off California, the animals move southwest off the coast, generally moving towards waters south of Hawaii.

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 (Spotila, *et al*. 1996; NMFS and USFWS 1998; 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 and 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.

Western Pacific Nesting Populations of Leatherback Turtles

Leatherbacks in the western Pacific nest at Indonesia, Papua New Guinea, the Solomon Islands, Vanuatu, with limited leatherback nesting activity in Vietnam, Thailand, Fiji, and Australia. Malaysia was once the site of an enormous leatherback nesting population, which is now considered functionally extinct with only two to three females returning annually to nest each year. The largest nesting populations are in northern Indonesia at Jamursba-Medi and Wermon beaches.

Leatherbacks nest on Jamursba-Medi beach during April through September, with a peak in June, July, and August (Suarez, *et al*. 2000; Hitipeuw, *et al*. 2007). A summary of data collected from leatherback

[17] www.nmfs.noaa.gov/pr/pdfs/species/leatherback_5yearreview.pdf.

nesting surveys from 1981 to 2005 for Jamursba-Medi has been compiled, re-analyzed, and standardized and is shown in Table 3-16 (Hitipeuw and Maturbongs 2002; Hitipeuw 2003; Hitipeuw, *et al*. 2007). The annual counts of nests in 2006, 2007, and 2008 are provided by the SWFSC.

Table 3–16. Estimated numbers of female leatherback turtles nesting on Jamursba-Medi beach, along the north coast of the State of Papua.

Survey Period	# Nests	Adjusted # Nests	Estimated # of Females[3]
Sept. 1981	4,000+	7,143[1]	1,232 - 1,623
April - Oct. 1984	13,360	13,360	2,303 - 3,036
April - Oct. 1985	3,000	3,000	658 - 731
June - Sept. 1993	3,247	4,091[2]	705 - 930
June - Sept. 1994	3,298	4,155[2]	716 - 944
June - Sept. 1995	3,382	4,228[2]	729 - 961
June - Sept. 1996	5,058	6,373[2]	1,099 -- 1,448
May - Aug. 1997	4,001	4,481[4]	773 -- 1,018
May - Sept. 1999	2,983	3,251	560 – 739
April - Dec., 2000	2,264	No	390 – 514
March - Oct., 2001	3,056	No	527 – 695
March - Aug. 2002	1,865	1,921	331 – 437
March – Nov. 2003	3,601	2,904	621 – 818
March – Aug, 2004	3,183	3,871	667 – 879
April – Sept. 2005	2,666	2,562	441 - 582
April – Oct 2006	2,133		
April – Oct 2007	2,490		
April – Oct 2008	1,601		

Source: Hitipeuw and Maturbongs 2002; Hitipeuw 2003; Hitipeuw, *et al*. 2007.

[1]The total number of nests reported during aerial surveys was adjusted to account for loss of nests prior to the survey. Based on data from other surveys on Jamursba-Medi, on average 44 percent of all nests are lost by the end of August.

[2]The total number of nests have been adjusted based on data from Bhaskar's surveys from 1984-85 from which it was determined that 26 percent of the total number of nests laid during the season (4/1-10/1) are laid between April and May.

[3]Based on Bhaskar's tagging data an average number of nests laid by leatherback turtles on Jamursba-Medi in 1985 was 4.4 nests per female. This is consistent with estimates for the average number of nests by leatherback turtles during a season on beaches in Pacific Mexico, which range from 4.4 to 5.8 nests per female. The range of the number of females is estimated using these data.

[4]Number adjusted from Bhaskar, where percentage of nests laid in April and September is 9 and 3 percent, respectively, of the total nests laid during the season.

Nesting of leatherbacks on Wermon beach primarily takes place during the austral summer, but occurs throughout the year, from October through September, with a peak in December through March (Thebu and Hitipeuw 2005). In recent years, the beach has been monitored during much of the nesting season, including the peak period, and researchers have documented approximately 2,000 – 3,000 nests per year (Thebu and Hitipeuw 2005; Hitipeuw, *et al*. 2007), which may equate to several hundred females nesting per year (given 4.4 to 5.8 nests per female). Given shorter monitoring periods in past studies, it is difficult to analyze any trends for this nesting beach (see Table 3-17).

Table 3–17. Number of leatherback turtle nests observed along Wermon beach.

Monitoring Period	# Nests	Source
Nov. 23 – Dec. 20, 1984 and Jan. 1 – 24, 1985	1,012	Starbird and Suárez 1994; Suárez, *et al*. 2000
Dec. 6 – 22, 1993	406	Starbird and Suárez, 1994; Suárez, *et al*. 2000
Nov. 2002 – June 2003	1,442	Hitipeuw 2003b
Nov. 2003 – Sept. 2004	2,881	Thebu and Hitipeuw 2005
Oct. 2004 – Sept. 2005	1,980	Personal communication with C. Hitipeuw, World Wildlife Fund, 2006
Oct. 2006 – April 2007	1,319	SWFSC
Oct. 2007 – April 2008	912	SWFSC
Oct. 2008 – April 2009	859	SWFSC

Eastern Pacific Nesting Populations of Leatherbacks

Leatherback nesting populations are declining at a rapid rate along the Pacific coast of Mexico and Costa Rica. Leatherbacks have been documented nesting as far north as Baja California Sur and as far south as Panama, with few areas of high nesting (personal communication with L.M. Sarti, UNAM, 2002).

Costa Rica

Since 1988, leatherback turtles have been studied at Playa Grande (in Las Baulas), the fourth largest leatherback nesting colony in the world. During the 1988-89 season (July-June), 1,367 leatherback turtles nested on this beach, and by the 1998-99 season, only 117 leatherback turtles nested (Spotila, *et al*. 2000). The last four nesting seasons have shown continued declines, with only 69 nesting females during the 2001-02 season, and 55 nesting females during the 2002-03 season. Scientists speculate that the low turnout during 2002-03 may be due to the "better than expected season in 2000-01 which temporarily depleted the reproductive pool of adult females in reproductive condition following the El Niño/La Niña transition" (personal communication with R. Reina, Drexel University, 2003). The number of females nesting in 2003-04 was 159 turtles, while during 2004-05, only 49 females nested. As of February 3, 2006, 107 individual leatherbacks had nested at Playa Grande (personal communication with P. Tomillo, Drexel University, 2006). There have also been anecdotal reports of leatherbacks nesting at Playa Caletas and Playa Coyote.

Mexico

The decline of leatherback subpopulations is even more dramatic off the Pacific coast of Mexico. Surveys indicate that the eastern Pacific Mexican population of adult female leatherback turtles has declined from 70,000[18] in 1980 (Spotila, *et al*. 1996) to approximately 60 nesting females during the 2002-03 nesting season, the lowest seen in 20 years (personal communication with L.M. Sarti, UNAM, June 2003). A summary of total leatherback nestings counted and total females estimated to have nested along the Mexican coast from 2000 through 2006 is shown in Table 3-18.

Table 3–18. Annual number of estimated leatherback nestings (# nests) from 2000-2005 on index beaches and total nesting beaches.

Index beach	2000-01	2001-02[1]	2002-03[2]	2003-04[3]	2004-05[4]	2005-06[4]
Primary Nesting Beaches (40-50% of total nesting activity)						
Mexiquillo	624	20	36	528	42	190*
Tierra Colorada	535	49	8	532	57	292*
Cahuitan	539	52	73	349	31	230*
Barra de la Cruz	146	67	3	275	28	121*
Total - primary index beaches	1,957	188	120	1,684	158	833*
Total - Mexican Pacific	4,513	658	n/a	4,045	n/a	n/a

[1]Source: Personal communication with L.M. Sarti, UNAM, 2002, index beaches and totals.
[2]Source: Personal communication with L.M. Sarti, UNAM, December 2003, index beaches and totals.
[3]Source: García, *et al*. 2004.
[4]Source: Personal communication with L.M. Sarti, UNAM, 2006 [*note that these numbers are preliminary].

Olive Ridley Turtle

Although the olive ridley turtle is regarded as the most abundant sea turtle in the world, olive ridley nesting populations on the Pacific coast of Mexico are listed as endangered under the ESA; all other populations are listed as threatened. Olive ridley turtles occur throughout the world, primarily in tropical and subtropical waters. Nesting aggregations in the Pacific Ocean are found in the Mariana Islands, Australia, Indonesia, Malaysia, and Japan (western Pacific), and Mexico, Costa Rica, Guatemala, and South America (eastern Pacific). Like leatherback turtles, most olive ridley turtles lead a primarily pelagic existence (Plotkin, *et al*. 1993), migrating throughout the Pacific, from their nesting grounds in Mexico and Central America to the North Pacific. While olive ridleys generally have a tropical to subtropical range, with a distribution from Baja California, Mexico to Chile (Silva-Batiz, *et al*. 1996), individuals do occasionally venture north, some as far as the Gulf of Alaska (Hodge and Wing 2000). A more complete review of current information can be found in the Five Year Status Review document published in 2007 by the U.S. Fish and Wildlife Service and NMFS[19].

Olive ridleys are usually found in warm waters, 23-28° Celsius, often within equatorial or nearby waters (Polovina, *et al*. 2004). Sightings of olive ridley turtles from tuna purse seine vessels (1990-2002) in the EPO show turtles from 15º S. to 30º N. latitudes and spotted as far as 145º W. longitude (IATTC 2004). Shaded areas on the map (Figure 3-6) show different levels of fishing effort with darker shading

[18] This estimate of 70,000 adult female leatherback turtles comes from a brief aerial survey of beaches by Pritchard, who has commented: "I probably chanced to hit an unusually good nesting year during my 1980 flight along the Mexican Pacific coast, the population estimates derived from which have possibly been used as baseline data for subsequent estimates to a greater degree than the quality of the data would justify" (Spotila, *et al*. 1996).

[19] www.nmfs.noaa.gov/pr/pdfs/species/oliveridley_5yearreview.pdf.

representing higher effort. This map cannot be used to represent overall distribution of olive ridley turtles for this area, but in areas where there is more effort and less turtles, or less effort and more turtles, we can infer some natural distribution.

A main nesting population occurs along the north-east coast of India in the Indian Ocean. Another major nesting population exists in the eastern Pacific on the west coast of Mexico and Central America. Both of these populations use the North Pacific as foraging grounds (Polovina, *et al*. 2004). Recent genetic information indicates that 75 percent of the Hawaii-based longline fisheries interactions with this species are from the eastern Pacific subpopulations, and 25 percent are from the Indian and western Pacific rookeries (personal communication with P. Dutton, NMFS SWFSC, 2005).

Eastern Pacific Ocean

The largest known arribadas in the eastern Pacific are off the coast of Costa Rica (~475,000 - 650,000 females estimated nesting annually) and in southern Mexico (~1,000,000+ nests/year at La Escobilla, in Oaxaca (Márquez, *et al*. 2005)).

Mexico

The nationwide ban on commercial harvest of sea turtles in Mexico, enacted in 1990, has improved the situation for the olive ridley. Surveys of important olive ridley nesting beaches in Mexico indicate increasing numbers of nesting females in recent years (Márquez, *et al*. 1995; Arenas, *et al*. 2000). In La Escobilla, Mexico, conservation measures, such as increased nesting beach protection and closure of the turtle fishery have led to a dramatic increase in the once largest nesting population in the world. The number of olive ridley nests has increased from 50,000 in 1988 to over 700,000 in 1994 to more than a million nests in 2000 (Márquez, *et al*. 2005).

Costa Rica

In Costa Rica, 25,000 to 50,000 olive ridleys nest at Playa Nancite and 450,000 to 600,000 turtles nest at Playa Ostional each year (NMFS and USFWS 1998). In an 11-year review of the nesting at Playa Ostional, (Ballestero, *et al*. 2000) report that the data on numbers of nests deposited is too limited for a statistically valid determination of a trend; however, there does appear to be a six-year decrease in the number of nesting turtles. The greatest single cause of olive ridley egg loss comes from the nesting activity of conspecifics on *arribada* beaches, where nesting turtles destroy eggs by inadvertently digging up previously laid nests or causing them to become contaminated by bacteria and other pathogens from rotting nests nearby. In addition, some female olive ridleys nesting in Costa Rica have been found afflicted with the fibropapilloma disease (Aguirre, *et al*. 1999).

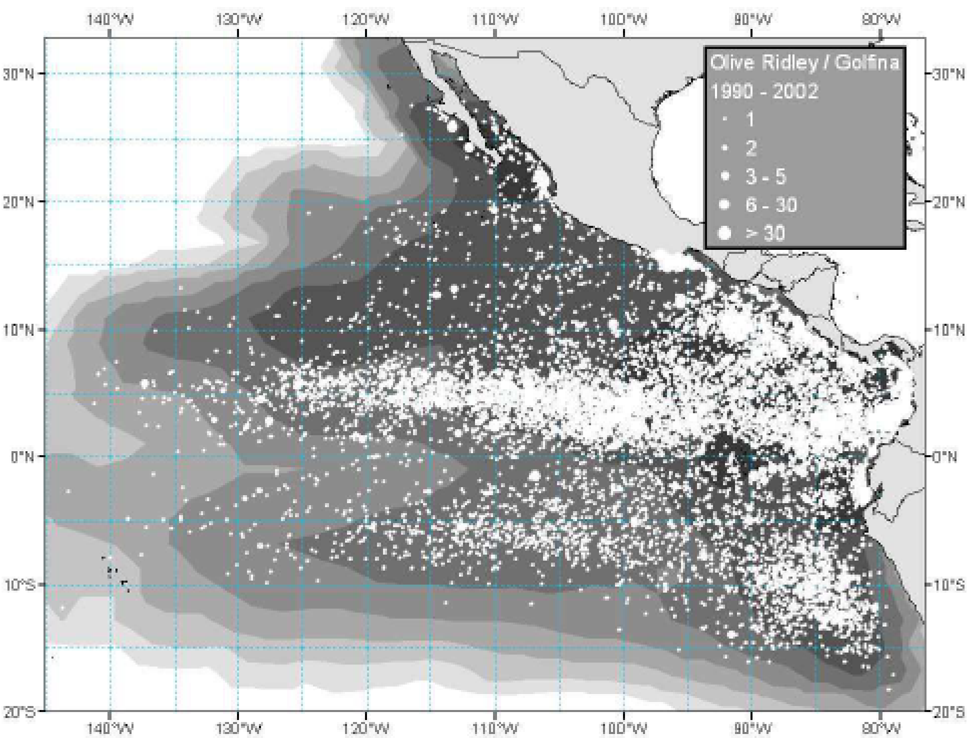
Western Pacific Ocean

In the western Pacific, olive ridleys are not as well documented as in the eastern Pacific, nor do they appear to be recovering as well. There are small documented nesting sites in Indonesia, Thailand, and Malaysia. In Indonesia, extensive hunting and egg collection, in addition to rapid rural and urban development, have reduced nesting activities, and locals report daily trading and selling of sea turtles and their eggs in the local fish markets (Putrawidjaja 2000). The main threats to turtles in Thailand include egg poaching, harvest and subsequent consumption or trade of adults or their parts (i.e., carapace), indirect capture in fishing gear, and loss of nesting beaches through development (Aureggi, *et al*. 1999).

Olive ridleys live within two distinct oceanic regions including the subtropical gyre and oceanic currents in the Pacific. The gyre contains warm surface waters and a deep thermocline preferred by olive ridleys. The currents bordering the subtropical gyre, the Kuroshio Extension Current, North Equatorial Current and the Equatorial Counter Current all provide for advantages in movement with zonal currents and location of prey species (Polovina, *et al*. 2004).

Satellite tracking of ten juvenile olive ridleys caught in Hawaii-based longline gear over a period of five years from 1997-2001, provides more insight into the movement patterns of this species. The olive ridley turtles moved between 130° W. and 150° W. longitude and south of 28° N. latitude. The overall latitudinal range for these turtles was 8º N. and 31º N. latitudes (Polovina, *et al*. 2004). In another study, two olive ridleys were equipped with a depth recorder to record diving depth. Dives to a depth of 150 m occurred approximately once a day for 20 percent of the days surveyed, and 10 percent of the time was spent at a depth greater than 100 m (Polovina, *et al*. 2002). The target depth for tuna is generally 100 to 300 m, thus olive ridleys are considered likely to encounter DSLL fishing gear due to their pattern of deep dives.

Hawaii-based DSLL data shows 38 observed takes of olive ridley turtles over the 2002 to 2006 time period. As noted above, juvenile olive ridley turtles (from western Pacific nesting grounds) are known to forage in the area surrounding and south of the Hawaiian Islands, where the majority of the Hawaii-based DSLL fishing effort is taking place (Figure 3-6). There is limited information about movements of turtles from the eastern Pacific nesting grounds. In a study from Mexico, one large male olive ridley turtle off the coast of Mexico was tagged with satellite telemetry and was followed for four months. In those four months the male traveled south from 17º N. to 7º N. latitudes and west to 120º W. longitude (Beavers and Cassano 1996).



Source: IATTC 2004.

Figure 3–6. Distribution of sightings of olive ridley turtles reported by observers aboard tuna purses-seine vessels, 1990-2002.

Fishery Effects

Longline Fishery

Sea turtles are subject to take in U.S. and international fisheries. For each of the U.S. Pacific fisheries, that take sea turtles, Section 7 consultations have been conducted. In the Hawaii-based SSLL fishery, which has 100 percent observer coverage, a sea turtle cap is imposed upon the fishery which is equal to the ITS developed by NMFS. In 2004 and 2005, the fishing year was completed without reaching the turtle caps. However, in 2006, an unexpected high level of loggerhead takes occurred, forcing the fishery to be shut down on March 20, 2006 (see Table 3-19). In 2008, there were no takes of loggerheads.

In 2009, NMFS published Amendment 18 to the Hawaii pelagic FMP. This amendment removes the set limit for the shallow-set longline fishery. The set limit adopted in 2004 was 2,120 per year. Without the set limit, it is anticipated that up to 5,550 sets could be made annually. Based upon this maximum effort estimate, Amendment 18 also includes revised limits on the annual incidental take of loggerheads and leatherbacks. The new turtle cap for loggerheads is 46 interactions per year; the cap for leatherbacks remains 16. The numbers of sea turtle interactions in the SSLL since it re-opened in 2004 are shown in Table 3-19.

Table 3–19. Sea turtle interactions in the shallow-set Hawaii-based longline fishery.

	Leatherbacks	Loggerheads	Greens	Olive Ridley
Annual limits	16	46	*n/a*	*n/a*
2009	9	3	1	0
2008	2	0	1	2
2007	5	15	0	1
2006**	1	17*	0	0
2005	8	12	0	0
2004	1	1	0	0

*Due to confidentiality rules, there was no report in the fourth quarter and no annual report in 2007.
**The fishery was closed on March 20, 2006, when it reached the 2006 annual limit for loggerhead takes.

Based upon the incidental take statement in the October 15, 2008, biological opinion, Table 3-20 shows the anticipated take and mortality in the Hawaii shallow-set longline fishery over the next three years.

Table 3–20. Number of sea turtle interactions and mortality expected in the shallow-set longline fishery during fishing operations under Amendment 18 to the Hawaii-based Pelagics FMP.

	Leatherbacks	Loggerheads	Greens	Olive ridleys
Annual take	16	46	1	4
Annual mortality	4	10	1	1
Take over three years	48	138	3	12
Mortality over three years	11	29	1	3

The Hawaii-based deep-set longline fishery has been observed taking ESA-listed sea turtle species, although at much lower rates than the shallow-set longline fishery. Interaction numbers are given in Table 3-21.

Table 3–21. Sea turtle interactions in the Hawaii-based deep-set longline fishery targeting tuna.

	Percent observer coverage	Leatherbacks	Loggerheads	Greens	Olive ridleys
2009	20.6	1	0	0	1
2008	21.7	4	0	0	3
2007	20.1	1	1	0	7
2006	21.2	2	0	2	11
2005	26.1	1	0	0	4
2004	24.6	3	0	1	13

For all U.S. fisheries in the Pacific, if the take of sea turtles exceeds the ITS, re-initiation of consultation is required and if necessary, emergency rules can be implemented to close the fishery to protect ESA-listed species. Very few international fisheries have observer programs, so takes of sea turtles in most fisheries is unknown. A complete review of fisheries that are known to take, or may take, leatherback sea turtles is provided in the NMFS 2004 BO on the HMS FMP (NMFS 2004b).

Foreign tuna longline fleets in the Pacific have a significant effect on sea turtles. It is difficult to quantify the impacts 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 on Japanese, Korean, or Australian distant water fisheries (NMFS 2004b). From these low observer rates, it has been estimated that 2,182 sea turtles are taken, and 500–600 turtles mortalities occur annually in the various tuna longline fisheries in the central and western Pacific (NMFS 2004b). The species taken, in order of highest to lowest occurrence: olive ridley, green, leatherback, loggerhead, and hawksbill (NMFS 2004b). The Japanese tuna longline fleets reported taking 166 leatherbacks in 2000 (IATTC 2004); it is unknown where in the EPO these takes occurred.

Non-Fishery Effects

A number of anthropogenic actions may affect sea turtle populations including poaching of eggs, killing of female turtles at nesting beaches, human encroachment on nesting beaches, incidental capture in fishing gear, beach erosion, climate change and microclimate-related impacts at nesting sites (e.g., loss of trees due to deforestation and sub-optimal incubation conditions for eggs in nests). Some natural events that could affect sea turtle populations are egg predation by animals, low hatchling production, and natural disasters (e.g., tsunamis, etc.).

The effects of climate change on sea turtles are just beginning to be studied and are still largely speculative. Nonetheless, long-term changes in climate could have a profound affect on sea turtles. Changes in temperature may affect nesting success; high temperatures while eggs are incubating in the sand may kill the offspring. In addition, the sex of turtles is temperature dependent, that is, 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 and 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 the 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). Studies suggest that leatherbacks do not have the same high level of nesting site fidelity as hard shelled turtles and may be able to better adapt to the loss of habitat by seeking out new nesting areas. Similarly, short-term climate variability may cause an increase in storm or tidal activity that can inundate nesting sites, causing loss of habitat.

Oceanographic changes due to climate change may also affect sea turtle prey availability, migration and nesting. Short term variability in climate such as the ENSO may limit prey due to a reduction in upwelling brought by warm surface waters and limited or no wind. Over the longer term, climate models suggest a number of possible changes in oceanographic conditions, including slowing of the thermohaline circulation, higher precipitation storms, rising SST and rising sea levels (IPPC 2001). Also, as temperature patterns change in oceans, current foraging habitats may shift (McMahon and Hays 2006). 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 sea turtles and the entire marine ecosystem in the Pacific and elsewhere.

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*).

3.5.1 Current Status of Seabird Populations

Three species of albatross are known to occur within the region; short-tailed albatross are 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. latitude 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 2001–2002 (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 WCPO (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 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, 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 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).

3.5.2 Fishing-related Sources of Mortality

3.5.2.1 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 albatross. NMFS observer records from 1994–2000 (based on four percent observer coverage) estimate an average take of 1,380 black-footed 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.

The Hawaii-based tuna, or DSLL 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 g weights on branch lines, thawed and blue-dyed bait, and strategic offal discharge. The west-coast-based DSLL fishery would also be subject to these regulations.

3.5.2.2 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 (larger diameter and more visible cables running to the trawl doors).

3.5.3 Non-fishing-related Sources of Mortality to Seabirds

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 and laysan albatross experience many of the same threats as the short-tailed albatross.

3.6 Socioeconomic Environment

3.6.1 West-Coast-Based HMS Commercial Fisheries for Tuna

The target species of DSLL fishing are bigeye, yellowfin, skipjack and albacore tuna, but to a lesser degree, a variety of other fish species are landed as well. Some of the other species landed by DSLL gear include opah and dolphinfish. Due to the vast assortment of fish catch in the longline fishery, this analysis will focus on the four major tuna species landed from longline gear: bigeye, albacore, yellowfin and skipjack. Since only a minimal amount of bluefin tuna are landed, it will not be analyzed here.

There is currently only one vessel participating in the west-coast-based DSLL fishery, thus data from the west-coast-based DSLL fishery cannot be shown for confidentiality reasons. There will be a general discussion pertaining to the west coast tuna fishery, and data from the Hawaii-based longline fisheries will be used as proxies to provide some insight on how much revenue this fishery may generate in the future. However, it should be emphasized that it is not possible to predict precise revenues without information about the level of allowable effort that might occur in a west coast DSLL fishery.

The socioeconomic characteristics of the west coast commercial HMS fisheries are described in Section 2.2.2, and Section 2.2.5, of the HMS FMP (PFMC 2003); and Section 4.1 of the HMS Stock Assessment and Fisheries Evaluation (SAFE) report (PFMC 2007b). Relevant portions of these descriptions are incorporated below as background on the socioeconomic environment.

A significant portion of the west coast commercial bigeye tuna landings are harvested with DSLL gear. Yellowfin and skipjack tunas also make up a considerable portion of the total DSLL catch (skipjack to a lesser degree); however, higher catches of yellowfin and skipjack are made in the purse seine fishery. Albacore tuna also makes up a portion of the catch in the DSLL fishery; however, the majority of albacore tuna is harvested with surface hook and line. Table 3-22 below shows total west coast tuna landings by HMS and non-HMS gear in metric tons. Table 3-23 shows commercial west coast tuna revenues (2008 $) by all HMS and non-HMS gears. In 2008, total tuna landings were valued at about $29.13 million in revenue, with bigeye accounting for $205,536. It is important to note that both Tables 3-22 and 3-23 include other gear types, so west coast commercial tuna landings by longline gear only makes up a portion of these totals.

Table 3–22. West coast commercial tuna landings (round mt) of HMS by all HMS and non-HMS gears, 1981-2008.

Year	Albacore	Yellowfin	Skipjack	Bigeye	Total
1981	13,712	76,091	57,869	1,168	135,128
1982	5,410	61,769	41,904	2,404	111,487
1983	9,578	55,482	44,591	764	110,415
1984	12,654	35,063	31,251	635	79,603
1985	7,301	15,025	2,977	3,252	28,555
1986	5,243	21,517	1,361	4,731	32,852
1987	3,160	23,201	5,724	50	32,135
1988	4,908	19,520	8,863	6	33,297
1989	2,214	17,615	4,505	1	24,335
1990	3,028	8,509	2,256	2	13,795
1991	1,676	4,178	3,407	7	9,268
1992	4,902	3,350	2,586	7	10,845
1993	6,151	3,795	4,539	26	14,511
1994	10,686	5,056	2,111	47	17,900
1995	6,528	3,038	7,037	49	16,652
1996	14,173	3,347	5,455	62	23,037
1997	11,292	4,775	6,070	82	22,219
1998	13,801	5,799	5,846	53	25,499
1999	9,770	1,353	3,759	108	14,990
2000	9,042	1,158	780	87	11,067
2001	11,194	655	58	53	11,960
2002	10,029	544	236	10	10,819
2003	16,671	465	349	35	17,520
2004	14,540	488	307	22	15,357
2005	9,055	285	523	10	9,873
2006	12,749	77	48	35	12,909
2007	11,586	104	5	13	11,708
2008	11,100	65	3	27	11,195

Source: 2009 SAFE Report (PFMC 2009).

Table 3–23. West coast real commercial ex-vessel revenues (2008 $) from tuna landings by HMS and non-HMS gears, 1981-2008.

Year	Albacore	Yellowfin	Skipjack	Bigeye	Total
1981	70,225,431	261,377,496	175,618,294	4,156,088	511,377,309
1982	19,992,716	185,336,751	100,814,846	3,006,836	309,151,149
1983	29,175,740	141,064,724	86,389,024	109,499	256,738,987
1984	39,252,848	84,484,955	56,548,139	397,821	180,683,763
1985	18,213,856	32,264,679	4,652,252	38,860	55,169,647
1986	13,184,132	38,581,824	1,930,450	192,545	53,888,951
1987	10,512,161	57,151,838	9,074,860	361,838	77,100,697
1988	18,137,261	53,769,907	18,400,293	52,031	90,359,492
1989	7,280,025	40,046,620	7,586,335	4,644	54,917,624
1990	10,322,703	17,249,235	3,490,579	16,123	31,078,640
1991	5,039,146	7,132,289	4,804,327	76,393	17,052,155
1992	20,086,394	6,432,467	2,467,284	78,242	29,064,387
1993	19,968,524	8,231,025	5,603,923	361,086	34,164,558
1994	33,586,584	7,523,409	2,913,340	510,974	44,534,307
1995	18,747,130	4,932,238	7,699,078	419,127	31,797,573
1996	43,148,350	5,121,188	6,318,137	412,595	55,000,270
1997	30,995,832	7,764,671	8,563,358	559,708	47,883,569
1998	28,913,920	8,970,098	7,977,248	416,097	46,277,363
1999	26,417,811	2,182,561	4,085,339	976,841	33,662,552
2000	24,465,276	1,890,439	687,204	820,420	27,863,339
2001	28,637,132	643,570	46,493	443,537	29,770,732
2002	19,287,396	794,007	172,977	117,755	20,372,135
2003	31,726,870	584,930	207,338	340,594	32,859,732
2004	34,149,094	554,961	135,770	183,541	35,023,366
2005	24,457,840	368,420	340,989	70,185	25,237,434
2006	26,451,105	194,153	44,789	228,302	26,918,349
2007	22,875,973	157,939	4,605	100,036	23,138,553
2008	28,795,339	125,553	3,675	205,536	29,130,103

Source: 2009 SAFE Report (PFMC 2009).

Similar to the west coast, the majority of Hawaii commercial bigeye tuna landings are harvested with DSLL gear. More than half of the albacore and yellowfin tuna catch is made with longline gear as well. Skipjack tuna is mostly caught with pole and line, with a smaller portion from longline gear.

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4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Estimating Change in Fishing Effort under the Alternatives

The impact analysis in this EA is based on estimates of the change in fishing effort that would occur under each of the alternatives. The baseline is the current level of fishing effort, which is one vessel operating in the west-coast-based DSLL fishery on the high seas. Alternative 1, which would prohibit DSLL fishing, would result in a decrease in the fishing effort of one vessel, or approximately 133,000 fewer hooks set per year (1,900 hooks/set; 14 sets/trip; 5 trips/year)[20]. Alternative 2, which would allow the fishery to continue operating, would likely result in no change in fishing effort in the short run since the one vessel currently operating in the fishery would most likely continue operations and no additional vessels are expected to enter the fishery in the near future. Since this is an open access fishery, in the long run, there could be a minor increase in fishing effort. We are estimating that five additional vessels could enter the fleet over the next three years, which would lead to approximately 665,000 additional hooks set per year (1,900 hooks/set, 14 sets/trip; 5 trips/year; 5 vessels entering the fishery). This would lead to a fishery with six active vessels setting approximately 800,000 hooks per year (1,900 hooks/set, 14 sets/trip; 5 trips/year; 6 vessels operating in the fishery).

As referenced in the description of the baseline condition in Section 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 the Hawaii DSLL fishery. The Hawaii- and west-coast-based DSLL fisheries are similar in terms of gear and operational methods employed, but the areas fished are not fully comparable due to the differences in the species found in each region, and their distribution based on the oceanographic processes in tropical and temperate habitats. In response to these differences, the west coast data will be discussed qualitatively in order to supplement the quantitative estimations calculated with Hawaii DSLL observer data. The west-coast-based DSLL fishery data is confidential due to the fact that only one vessel is participating in the fishery, thus the actual data cannot be presented.

The impact estimates of the DSLL fishery on finfish, protected species, and seabirds are calculated using the CPUE from the Hawaii observed catch. The CPUE is then multiplied by the estimated average number of sets, trips, and hooks that would be used in the DSLL fishery on the west coast since 2005 in order to project the catch estimates for one vessel (short run), and six vessels (long run) operating in the fishery.

[20] This hook estimate is based on historic West Coast-based DSLL observed trips (PIFSC 2007).

Table 4–1. Annual projected takes of finfish for one vessel (133,000 hooks) and six vessels (800,000 hooks) in a west-coast-based DSLL fishery.

Species Caught	CPUE (catch/1,000 hooks)	CPUE – 1 vessel (catch/133,000 hooks)	CPUE – 6 vessels (catch/800,000 hooks)
Lancetfish, Longnose	4.921	654.54	3,937.08
Tuna, Bigeye	4.050	538.66	3,240.09
Shark, Blue	2.325	309.19	1,859.79
Dolphinfish (Corado, Mahimahi)	2.078	276.42	1,662.71
Pomfret, Sickle	1.583	210.50	1,266.18
Mackerel, Snake	1.116	148.38	892.50
Tuna, Yellowfin	0.973	129.44	778.58
Tuna, Skipjack	0.825	109.69	659.77
Escolar, Smith's	0.691	91.86	552.56
Marlin, Striped	0.580	77.12	463.91
Wahoo	0.538	71.55	430.40
Spearfish, Shortbill	0.440	58.45	351.61
Tuna, Albacore	0.397	52.82	317.69
Opah	0.381	50.70	304.97
Remora	0.268	35.59	214.06
Swordfish, Broadbill	0.195	25.88	155.67
Shark, Bigeye Thresher	0.166	22.05	132.61
Stingray, Pelagic	0.165	21.90	131.73
Marlin, Indo-Pacific Blue	0.131	17.44	104.91
Barracuda, Great	0.076	10.06	60.48
Shark, Shortfin Mako	0.068	9.06	54.47
Mola, Slender	0.059	7.87	47.33
Shark, Oceanic Whitetip	0.058	7.76	46.70
Pomfret, Dagger	0.048	6.38	38.39
Tuna, Unidentified	0.045	5.98	35.98
Shark, Silky	0.040	5.38	32.38
Shark, Crocodile	0.035	4.68	28.13
Shark, Unidentified	0.028	3.74	22.50
Oilfish	0.025	3.35	20.15
Pomfret, Brama	0.024	3.25	19.55
Shark, Unidentified Thresher	0.017	2.26	13.62
Bonyfish, Unidentified	0.015	1.97	11.84
Mackerel, Black (Escolar,Longfin)	0.014	1.81	10.88
Dogfish, Velvet	0.010	1.37	8.22
Sailfish	0.010	1.33	7.97

Note: Calculations are based on an estimated average number of trips per year (5), sets per trip (14) and hooks per set (1,900) in the west-coast-based DSLL tuna fishery using CPUEs derived from Hawaii-based DSLL observer data (see Table 3-6). Species names in italics were not observed taken in the west-coast-based DSLL fishery.

4.2 Direct and Indirect Impacts of Alternatives on Finfish

4.2.1 Evaluation Criteria for Alternatives

To evaluate the potential impacts of the alternatives, a set of criteria were developed to help determine whether the alternatives would be likely to result in significant adverse impacts. 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 substantially contribute to an "overfished" or "overfishing" condition for any of the HMS FMP management unit species?[21]

- 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 for the alternatives, and the corresponding catch based on the CPUE estimates from the Hawaii- and west-coast-based DSLL fishery observer data. Table 4-1 provides effort estimates in number of sets associated with the alternatives. The CPUE used for each finfish species was calculated using catch data for the Hawaii-based DSLL fishery.

4.2.2 Direct and Indirect Impacts of Alternative 1 – No Fishing

Given that there is only one vessel currently operating in the west-coast-based DSLL fishery, closing the fishery would likely produce very insignificant overall benefits to finfish populations. The closure of the fishery would lead to approximately 133,000 fewer hooks set per year on the high seas, which would result in fewer finfish being caught. For estimates of the number and species of finfish that are projected to be caught by one vessel operating in the fishery for one year see Table 4-1.

The target species would not necessarily benefit from the reduction of effort associated with closing the west-coast-based DSLL fishery. With trans-boundary species such as tuna migrating across many nations' EEZs and the high seas, fish formerly caught in the fishery are likely to be caught by other nations and imported back into the nation with the closed fishery, creating production and trade leakages and resulting in little or no net conservation gain (Dutton and Squires 2008). In addition, the majority of tropical tuna species in the EPO are caught with purse seine sets. The majority of yellowfin tuna catch is made with purse seine sets associated with dolphins, and the majority of bigeye and skipjack tuna catch is made with purse seine sets on floating objects. Purse seine fishing using fish aggregating devices (FADs) tends to yield more juvenile fish, altering the trophic structure of some populations and causing further ecosystem impacts. In contrast, the longline fishery tends to yield larger fish that are sexually mature and caught at a

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[21] "Substantially contribute" means that if the activity were prohibited (i.e., Alternative 1) there would be a high likelihood that this action alone would result in the cessation of overfishing and/or a high probability that the stock returns to the target biomass.

higher value. Two other marketable species with relatively high CPUEs that could benefit from closing the fishery are dorado and sickle pomfret.

Several bycatch species of concern have high CPUEs, including blue sharks and longnose lancetfish. As stated previously, the biomass of the North Pacific blue shark population appears to be slightly increasing; therefore, the existing west-coast-based DSLL fishery is not considered detrimental to the status of the blue shark population. Little is known about the status of longnose lancetfish populations, but they represent a large amount of the non-marketable catch for the DSLL fishery. Again given the low level of current effort in the west-coast-based DSLL fishery, a small benefit to this population might be realized upon closure of the west-coast-based DSLL fishery.

Alternative 1 would most likely satisfy all of the evaluation criteria and not result in any significant adverse impacts to finfish. Alternative 1 would result in the closure of the west-coast-based DSLL fishery, so there could be a decrease in catch levels, or a transfer of the fishing effort to other fisheries to meet the demand for fresh tuna. Thus, it is unclear whether the impacts of closing the fishery would ultimately be beneficial to finfish stocks because of the decrease in fishing effort, or whether the fishing effort would be transferred to other nations (which may have less stringent bycatch mitigation measures) which would result in either no benefits, or possibly some adverse impacts to finfish stocks.

4.2.3 Direct and Indirect Impacts of Alternative 2 (Maintain Fishing)

Direct impacts to target, non-target, and prohibited finfish species under Alternative 2 would initially be unchanged from the baseline, assuming that in the short run there would most likely not be a change in participation in the fishery, and the one vessel currently operating in the fishery would continue to do so. In the long run, there could be a potential increase in the catch of these species because the fishery is an open access fishery and there is the potential for the fishery to expand. It is estimated that a maximum of five additional vessels could enter the fishery over a three year time period for a total of six vessels operating in the fishery in the long run. Projected catches of target, non-target, and prohibited finfish species are presented in Table 4-1 utilizing the Hawaii-based DSLL observer records. Evaluation of the effects of Alternative 2 includes the entire affected environment, as described in Section 3 of this document.

Catch estimates are provided for the single existing participant (133,000 hooks set per year) and for the potential estimated increase in participation for a total of six vessels (800,000 hooks set per year) operating in the fishery. The estimates utilize the original CPUE that was calculated for all finfish species using the Hawaii-based DSLL observer records. Impacts to target, non-target, and prohibited fish species from the fishery would be minor. A qualitative approach to analyzing the impacts of this fishery on finfish populations based on the projected CPUEs is presented below.

4.2.3.1 Risk of Overfishing

The following question is discussed in this section: "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?" The terms "overfishing" and "overfished" mean a rate or level of fishing mortality that jeopardizes the capacity of a fishery to produce the maximum sustainable yield on a continuing basis (16 U.S.C. 1802 § 104-297).

Target Tuna Species

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 tuna catch under Alternative 2 would not exacerbate either an overfished or an overfishing condition. The two most recent stock assessments indicate that no MUS of the HMS FMP are overfished; however, bigeye tuna (considered a single stock Pacific-wide), and yellowfin tuna (considered two separate stocks in the EPO and WCPO) have been declared subject to overfishing as reported in the Report on the Status of U.S. Fisheries for 2008 (NMFS 2009). However, the most recent IATTC stock assessments for yellowfin and bigeye tuna stocks in the EPO indicate that the stocks are not currently subject to overfishing, or in an overfished condition. Due to the fact that these stocks have a wide distribution and the vast majority of catches are made outside of U.S. waters by vessels from other nations, many management measures intended to end overfishing are implemented through the Regional Fisheries Management Organization (RFMO) framework. RFMO management measures aimed at ending overfishing affect the cumulative impacts of Alternative 2 on finfish, and are further discussed in Section 4.2.4. Member nations, including the United States are obligated to implement these measures for their national fisheries. Within the United States, HMS fishery management in the Pacific Ocean is the responsibility of three regional fishery management councils, WPFMC, the North Pacific Fishery Management Council (NPFMC) and the PFMC, and the adjacent States. Some form of coordination among councils is required because fishers from the different council areas are harvesting the same stocks of HMS, and in some cases are fishing in the same areas, but landing in different locations.

According to Section 304(i) of the MSA (as amended), if a Council is notified that overfishing is occurring on a stock due primarily to international fishing pressure, within one year of the notification date the Council must: 1) develop recommendations for domestic regulations to address the relative impact of fishing vessels of the United States on the stock and, if developed by a Council, the Council shall submit such recommendations to the Secretary of Commerce (or in effect, NMFS); and 2) develop and submit recommendations to the Secretary of State, and to the Congress, for international actions that will end overfishing in the fishery and rebuild the affected stocks, taking into account the relative impact of vessels of other nations and vessels of the United States on the relevant stock.

On December 15, 2004, NMFS notified both PFMC and WPFMC that overfishing was occurring on bigeye tuna Pacific-wide. The PFMC, having fisheries for bigeye tuna in the EPO only, and WPFMC, having fisheries in both the EPO and the WCPO, developed an international strategy that addresses overfishing Pacific-wide. The PFMC's Amendment 1 to the HMS FMP, in combination with WPFMC's Amendment 14 to the Pelagics FMP, address overfishing of bigeye tuna Pacific-wide (50 CFR Part 665). The general recommendations of the PFMC to end overfishing of bigeye tuna, such as focusing on the fisheries with the greatest impacts and on the regions of highest catches and on spawning areas, reducing surplus capacity, and restricting the use of purse seine FADs, are outlined in Section 4.5 of the amended HMS FMP (2007). The specific actions to end overfishing are implemented by multilateral cooperation through RFMOs and are discussed in Section 4.2.4. According to IATTC data, the U.S. longline catch of bigeye tuna in the EPO (including catch from Hawaii and American Samoa) has accounted for less than one percent (on average 0.2 percent) of the total catch of bigeye tuna in the EPO with all gear types combined for the last five years (IATTC 2007).

In a letter dated October 25, 2006, NMFS notified PFMC that overfishing was occurring on the EPO yellowfin tuna stock. In a subsequent letter dated March 30, 2007, NMFS informed PFMC that Section 304(i) to the MSA is applicable to the EPO yellowfin tuna stock; consequently, PFMC submitted recommendations to the Department of State, Congress, and IATTC in similar letters dated March 28, 2008. Because west coast fisheries are a negligible contributor to total fishing effort on the stock, further curtailment of these catches would have no practical effect on ending overfishing. The U.S. longline catch of yellowfin tuna in the EPO (including catch from Hawaii and American Samoa) has accounted for less than one percent (on average 0.0014 percent) of the total catch of yellowfin tuna in the EPO with all gear types combined for the last five years (IATTC 2007).

In August 2005, the Scientific Committee of the Western and Central Pacific Fisheries Commission (WCPFC) reviewed a stock assessment that indicated that yellowfin tuna in the WCPO is subject to overfishing, and on March 16, 2006, NMFS officially notified WPFMC that overfishing was occurring. WPFMC is the agency responsible for overfishing response of the yellowfin tuna stock in the WCPO (16 U.S.C. 1852 § 302; § 104-297). It is highly unlikely that any west-coast-based DSLL fishing would occur in the WCPO due to the economic, time and vessel size constraints previously mentioned (fuel costs, fish and ice hold capacity, sea conditions, safety considerations, etc.). Therefore, Alternative 2 would not exacerbate the overfishing condition of tunas in the WCPO because U.S. catch is only a small percentage of overall catch in the WCPO, there would not be a substantial increase in total U.S. effort or catch from the proposed action, and it is unlikely that any west-coast-based DSLL fishing would occur in the WCPO. If, however, any fishing operations did occur in the WCPO, they would be subject to the management measures established by WPFMC and WCPFC.

Non-target Sharks

Although there are high catch rates of blue sharks in most pelagic longline fisheries, the North Pacific blue shark stock does not appear to be in an overfished or overfishing state. There have been some recent conservation measures that were put in place to protect sea turtles in the Hawaii-based SSLL fishery that have had some positive impacts on blue sharks. The use of circle hooks in SSLL fisheries does not appear to appreciably reduce blue shark catch rates, but does appear to increase survivorship of those that are caught. Hawaii-based SSLL 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. Given this information and the status of this stock, it appears that the west-coast-based DSLL fishery would not create an overfished or overfishing state.

Other Major Non-target Finfish

The other marketable species that represent a large amount of the non-target finfish species that are caught by DSLL fishing are dorado, sickle pomfret, wahoo and escolar. Not much is known about the population status of the sickle pomfret, so it is difficult to say if overfishing is taking place. Since sickle pomfret is not a highly desirable commercial species and a fishery targeting the species does not exist, this is not a species currently managed under the HMS FMP (PFMC 2003). The catch of wahoo and escolar are currently low enough that even with the estimated increase of five vessels, overfishing is highly unlikely. The stock status of dorado is unknown; however, dorado are highly productive and widely distributed throughout the tropical and subtropical Pacific (PFMC 2007c). There are no harvest guidelines recommended for these finfish species and it appears that overfishing would not likely take place as a result of the proposed action (PFMC 2003).

4.2.3.2 Meeting HMS FMP Management Objectives

Target Tuna Species

The HMS FMP management objectives for bigeye, yellowfin, 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. A detailed description of the control rules for these HMS FMP management objectives are presented in the HMS FMP (PFMC 2003). Based on stock status and summary information presented in Section 3.3.2, including the current measures being implemented to address the overfishing conditions that exist for bigeye and yellowfin tuna, the alternatives proposed would not be expected to conflict with any HMS FMP management objectives.

Non-target Sharks

Shortfin Mako Sharks (*Isurus oxyrinchus*)

A harvest guideline of 150 mt has been established under the HMS FMP for shortfin mako shark catch. Utilizing the Hawaii DSLL observer records as a proxy (Table 4-1), the estimated catch of shortfin mako shark for the six vessel estimate (i.e., 800,000 hooks) is 55 sharks. The average round whole weight for shortfin mako sharks caught within the action area, derived from a length-weight conversion formula (Kohler, *et al.* 1996) and utilizing at-sea observer measurements for shortfin mako sharks captured in the DGN fishery, is approximately 37 kg; multiplying the average weight of 37 kg by 55 mako sharks gives an estimated catch of approximately 2.035 mt.

If we take into account the amount of bycatch of shortfin mako sharks in the DGN fishery (35.2 mt), the fishery would still not exceed the HMS FMP harvest guideline of 150 mt. Private recreational boat catch is not well documented, but could contribute a significant amount to the overall shortfin mako catch. However, private boat catch estimates should be used with caution due to the high variances and potentially biased catch estimates. It is also important to note that no interactions with shortfin mako sharks were observed in the west-coast-based DSLL fishery in 2005 and 2006.

Other Major 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.

4.2.3.3 Elevated Conservation Concern for HMS FMP Prohibited Species

Given the low interaction rates and catch probabilities, both for current effort and under the proposed action, the impacts on prohibited species are not likely to elevate conservation concerns for the species in question.

4.2.3.4 Sufficient Monitoring

Currently, the west-coast-based DSLL fishery monitoring protocol requires 100 percent observer coverage for all trips, and observer protocols require monitoring the entire set and haul-back sequences. As such, there would be an adequate amount of monitoring in place to ensure that HMS FMP management objectives are adhered to for the proposed action.

4.2.4 Cumulative Impacts on Finfish

Cumulative impacts are the impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions; cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (43 FR 55990 Sec. 1508.7).

The target and non-target species in the DSLL fishery have a Pacific-wide distribution and are subject to other sources of fishing mortality (e.g., other U.S. domestic fisheries, and to a greater degree, international fishing fleets). These fisheries are described in Section 3. 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. Despite the fact that the majority of the catch and effort from these fisheries occurs outside of the action area, many of the HMS species are considered single stocks in the Pacific, thus fishing mortality of these stocks in other areas of the Pacific would affect these species. In addition, for most of these distant water fishing fleets, little or no data exists regarding catch and bycatch of marine species. Without such information, it is difficult to assess the cumulative impacts of these fisheries on the species under review in this EA.

4.2.4.1 Target Species

The catch and effort data presented for other fisheries that interact with HMS populations, including tuna, are parameters that for the most part are utilized by regional stock assessment scientists, including NMFS scientists, to produce a stock status and other key population level estimates. As detailed under Section 3.3.2.2 of this document, there are overfishing concerns for some tuna species that are being addressed through RFMO's and amendments to FMPs. The proposed action, taken as a very minor component of existing commercial and recreational fisheries throughout the Pacific Ocean, would not significantly increase the total catch of tuna.

IATTC is the RFMO responsible for the conservation and management of HMS in the EPO. NMFS has defined the "Convention Area" to consist of the waters bounded by the coast of the Americas, the 40° N. and 40° S. parallels, and the 150° W. meridian (50 CFR Part 300, Subpart C). At the June 2009 IATTC Meeting the Resolution on a Multiannual Program for the Conservation of Tuna in the Eastern Pacific Ocean in 2009-2011 (Resolution C-09-01) was adopted and entered into force on July 15, 2009. The resolution implements time-area closures for the purse seine fishery and catch limits on bigeye tuna for the longline fishery in the EPO from 2009-2011. Specifically, the resolution obligated IATTC Parties and cooperating non-Parties to prohibit fishing on skipjack, bigeye, and yellowfin tuna in the IATTC Convention Area by all purse seine vessels of greater than 182 metric tons carrying capacity during a closure period of 59 days in 2009, 62 days in 2010, and 73 days in 2011. For 2009, the United States implemented the closure period from November 21, 2009, to January 18, 2010, for its purse seine fleet. In addition, Resolution C-09-01 includes a closure for purse seine vessels in an area to the west of the Galapagos Islands (defined as the area between 96º and 110ºW longitude and 4ºN and 3ºS latitude) between 0000 hours on 29 September to 2400 hours on 29 October in each year. Beginning in 2010, all applicable purse seine vessels will also be required to first retain on board and then land all bigeye, skipjack, and yellowfin tuna caught, except fish considered unfit for human consumption for reasons other than size. For the longline fleet, country-specific catch limits for bigeye tuna were adopted for China, Japan, Korea, and Chinese Taipei for the years of 2009-2011. Other IATTC Parties and cooperating non-Parties are limited to the greater of 500 metric tons or their respective catches of bigeye tuna in 2001. The U.S. catch of bigeye tuna in longline fisheries in the EPO for 2001 was only about 150 metric tons; therefore, the U.S. longline catch limit of bigeye tuna is 500 metric tons in the EPO for 2009-2011. The bigeye tuna catch limit only applies to longline vessels over 24 meters in length. The current vessel participating in the west-coast-based DSLL fishery is greater than 24 meters in length, so its catch of bigeye would be subject to the 500 mt limit in the EPO.

WCPFC is the RFMO responsible for the conservation and management of HMS in the WCPO. Alternative 2 includes an estimated increase of five vessels to the current DSLL fishery, which could potentially increase the U.S. west coast effort and catch in the WCPO; however, at its December 2008 meeting, the WCPFC agreed to Conservation and Management Measure 2008-01, entitled Conservation and Management Measure for Bigeye and Yellowfin Tuna in the Western and Central Pacific Ocean. This measure implements FAD closures and effort limits in the purse seine fishery and catch limits on bigeye tuna for the longline fishery in the WCPO for 2009-2011. The U.S. annual limit on catch of bigeye tuna in the WCPO is 3,763 mt for all U.S. longline vessels. In 2009, the FAD prohibition period will be August 1 through September 30. In 2010 and 2011, it will be July 1 through September 30. Beginning in 2010, all applicable purse seine vessels will also be required to first retain on board and then land all bigeye, skipjack, and yellowfin tuna caught, except fish considered unfit for human consumption for reasons other than size.

In the case of the North Pacific albacore tuna stock, IATTC and WCPFC have called upon member nations to not increase the total level of fishing effort for North Pacific albacore tuna in the EPO. The United States, as a member nation, is developing a plan of action to meet the obligations to limit efforts to current levels in the EPO and WCPO. The U.S. has begun formulating a definition for "current" levels of effort; however, the task has proved to be complex (IATTC 2007). In general, it appears that U.S. commercial landings of albacore have remained fairly stable over the past few years, and recreational landings have decreased substantially since around 2003; however, there is a great deal of uncertainty with the exact numbers of landings due in part to the large, private recreational fleet (PFMC 2007b). In a letter to NMFS dated May 23, 2007, the Council did acknowledge that its Highly Migratory Species Management Team report on current fishing effort demonstrated that U. S. fishing effort on North Pacific albacore was stable and had not increased during the 1996-2005 time period.

4.2.4.2 Major Non-target Species

As stated in Section 3.3.2.2 of this document, the best available science indicates that none of the non-target finfish likely to be taken in the west-coast-based DSLL fishery are in an overfished or overfishing condition. Given the relatively low DSLL effort, the cumulative effect of the proposed action would not increase the regional catch of these species to a level triggering a resource conservation concern.

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., dorado, sickle pomfret, wahoo, escolar, and longnose lancetfish), 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.

4.3 Direct and Indirect Impacts of Alternatives on Protected Species

4.3.1 Direct and Indirect Impacts of Alternative 1

4.3.1.1 Marine Mammals

Alternative 1, which would close the west-coast-based DSLL fishery, would not result in any direct, appreciable benefits to marine mammal species. The species of finfish being harvested (e.g., bigeye, yellowfin, skipjack, albacore) are not species that are a major component of the diet of marine mammals in the area; therefore, closing the fishery would have no indirect effect on marine mammals by increasing their available forage.

4.3.1.2 Sea Turtles

There could be possible benefits to sea turtle populations if Alternative 1 was implemented, however, they would most likely be minimal because the number of takes in the current fishery are so low, and the fishing effort could be transferred to other fisheries, that could have less stringent turtle mitigation measures. As with marine mammals, there are not anticipated indirect beneficial effects expected by closing down the DSLL fishery, since species being targeted by the existing fishery are not prey items for sea turtles.

4.3.2 Direct and Indirect Impacts of Alternative 2

An exposure analysis was conducted to determine which species have the highest risks of exposure and effects on protected species under the proposed action. As described in Section 3.4, it is difficult to project the species that may be affected by the proposed action due the low amount of current fishing effort that has been observed in the action area. Projected takes of sea turtles are shown in Table 4-3. Evaluation of the consequences of Alternative 2 includes the entire affected environment, as described in Section 3 of this document. A qualitative approach to analyzing the impacts of this fishery on protected species populations, based on the projected CPUEs, is presented below.

4.3.2.1 Evaluation Criteria

In an attempt to compare the alternatives, the following questions were developed to judge the effects of each alternative:

1. Would the anticipated level of marine mammal take under the alternative result in serious injuries or mortalities that would significantly affect the current status of the stock?

2. Would the anticipated level of sea turtle take under the alternative result in mortalities that would significantly affect the status of sea turtle populations?

4.3.2.2 Marine Mammals

For the purposes of this analysis, it is assumed that most DSLL activity will occur east of 140° W. longitude and north of the equator to 35° N. latitude. Current population estimates of these species/stocks are provided in Section 3.4.1. Most of these stocks number in the thousands or hundreds of thousands in the EPO; therefore, the very small number of takes would not significantly affect these populations.

As part of the review of the Hawaii-based longline fishery, Forney and Kobayashi (2007) calculated take rates for marine mammals within and outside EEZs for different gear types. A summary of their calculations is shown in Table 4–2. The take rates are provided as animals per 1,000 sets. In order to use this information to approximate marine mammal take levels in a DSLL fishery with up to 800,000 hooks per year, the hook level was converted to sets assuming that one set consists of approximately 2,000 hooks. Thus 800,000 hooks, the maximum number of hooks considered likely to be set, is approximately 400 sets per year for a fleet of up to six vessels. This level of effort is less than half of the 1,000 sets effort measure used by Forney and Kobayashi (2007).

As shown in Table 4–2, at 1,000 sets the take rate in the Hawaii-based DSLL is less than one marine mammal. Thus, at 400 sets there is a very low likelihood of take of marine mammals in the proposed action, based upon what has been observed in the Hawaii longline fisheries and the distribution of the species/stocks within the proposed action area. Only a few marine mammal species may be affected by the preferred alternative, including the short-finned pilot whale, false killer whale, Risso's dolphin, spotted dolphin, and bottlenose dolphin. It is estimated that one or fewer individuals from each of these stocks will be taken in the DSLL fishery. In the case of short-finned pilot whales, the take rate per 1,000 sets is 0.25 (Forney and Kobayashi 2007). Applying this rate to the anticipated total number of sets, 400, that may be set per year in the west-coast-based DSLL fishery suggests that the probability of a take is very low, even over three years; however, the possibility cannot be completely eliminated.

Table 4–2. Take rate of marine mammals per 1,000 sets.

	BE	DD	GG	GM	MD	MN	PC	PM	SA	SL	TT	UC
All areas N=24,542	0.04	0.04	0.37	0.29	0.08	0.12	0.81	0.04	0.04	0.08	0.16	0.65
Outside EEZ N=11,582	0.09	0.09	0.78	0.43	0.00	0.17	0.78	0.00	0.00	0.17	0.17	0.69
Tuna type N= 20,375	0.00	0.00	0.05	0.25	0.10	0.15	0.88	0.00	0.05	0.00	0.10	0.54

Note: BE = Bryde's whale; DD = short-beaked common dolphin; GG = Risso's dolphin; GM = short-finned pilot whale; MD = Blainsville beaked whale; MN = humpback whale; PC = false killer whale; PM = sperm whale; SA = Pantropical spotted dolphin; SL = spinner dolphin; TT = bottlenose dolphin; UC = unidentified cetacean.
Source: Forney and Kobayashi 2007.

4.3.2.3 Sea Turtle Mortality Impacting Populations

The PIRO staff calculated a three year incidental take statement (ITS) for the Hawaii-based DSLL fishery based upon probability distributions of annual anticipated take of ESA-listed sea turtles (NMFS 2005). Utilizing the anticipated rate of sea turtle takes calculated by PIRO and scaling to the level of the proposed action (i.e., 800,000 hook effort), the following rates of sea turtle incidental take are anticipated over the next three years in the west-coast-based DSLL tuna fishery: three olive ridley sea turtles, one leatherback sea turtle, one green sea turtle, and one loggerhead sea turtle (most of the takes of olive ridley and green sea turtles in the DSLL fishery would result in mortalities, and about 50 percent of the loggerhead and leatherback takes would result in mortality. These rates may over-estimate the actual takes since a conservative approach was taken by PIRO in developing the anticipated annual interactions for each of the four species expected to interact with the DSLL fishery. Also, the distribution of sea turtles at the time and area of the proposed action may not be the same as the distribution of sea turtles in the proposed action area for the west-coast-based DSLL tuna fishery.

Table 4–3. Projected takes of sea turtles in the west-coast-based DSLL fishery over three years.

Species/Stock	Estimated three year take(s) of west-coast-based DSLL fishery
Green	1
Leatherback	1
Olive Ridley	3
Loggerhead	1

The projected take rates that are presented in Table 4–3 and associated mortalities of these turtle species are low in terms of overall impacts to these populations. In Section 3.4.2 the status of sea turtle populations was discussed; it was noted that some are declining while others are increasing. It is important to note that for many sea turtle populations, overall trends in abundance cannot be derived from the limited available information. For all of the sea turtle populations included in this EA, significant declines have been recorded in the last century.

As detailed in Section 3.4.2, some populations of olive ridley and green turtles have been increasing over the last few decades. North Pacific loggerhead sea turtle nesting numbers are low but not declining at most beaches in Japan; over the short term, the last ten years, nesting appears to be increasing. However, these data are not sufficiently long term to conclude a trend in the population. As described in Section 3.4.2, research indicates that western Pacific leatherbacks travel across the north Pacific to forage and some move into the U.S. west coast to forage. By comparison, tracks of eastern Pacific leatherbacks indicate that they remain south of the equator and thus out of the proposed action area. Leatherbacks in the EPO have shown steep declines at nesting beaches and there is concern that this population could go extinct. By comparison, western Pacific leatherbacks have traits (e.g., a wide variety of nesting sites, year round nesting, and a variety of foraging areas) that may make the population more resilient than the eastern Pacific leatherback population. While there has not been long term monitoring of the nesting sites in the western Pacific Ocean, it is clear that the population has declined.

Based upon the current status of the four sea turtle populations considered most likely to be affected by the preferred alternative, the loss of one leatherback, one loggerhead, one green turtle, and/or three olive ridley sea turtles in three years is not likely to significantly affect the population.

4.3.2.4 Indirect Effects of Alternative 2 on Protected Species

The indirect effects of this alternative on marine mammals and sea turtles are likely to be quite minor. Indirect effects of a fishery on protected species could include displacement of animals out of the area (e.g., harbor porpoise moving out of an area with a high concentration of pingered gillnets in the Atlantic (Dawson, *et al*. 1998), loss of forage (e.g., the salmon fishery targeting fish that may be prey for ESA listed killer whales (NMFS 2006), or destruction of habitat. None of these effects are anticipated under the proposed fishery. As described above, there is no anticipated indirect effect from a loss of prey species due to fishing under the preferred alternative, since none of the species targeted are considered primary prey items for protected species.

4.3.2.5 Direct and Indirect Effects of Alternative 2 on Critical Habitat of Protected Species

DSLL fishing would be taking place far from any critical habitat of the endangered species listed in Section 3.4. Critical habitat designations are contained in the Code of Federal Regulations at 50 CFR 226. Critical habitat for two sea turtle species, leatherback and hawksbill, has been designated in the Atlantic, but has not been designated in the Pacific. However, on October 2, 2007, NMFS received a petition from Center for Biological Diversity, Oceana, and Turtle Island Restoration Network (“Petitioners”) to revise the leatherback critical habitat designation to include the area off the U.S. west coast that is seasonally closed to large mesh drift gillnet fishing. On January 5, 2010, NMFS published a proposed rule in the Federal Register to revise the critical habitat designation for leatherback sea turtles (75 FR 320). The proposed critical habitat includes an area off the coast of California and an area off the coasts of Oregon and Washington. The Critical Habitat Review Team determined that the following activities may require special management to protect prey and/or passage: point source pollution, pesticides, oil spills, power plants, desalination plants, tidal/ wave energy projects, liquefied natural gas facilities, and aquaculture. The impacts of commercial fishing were considered; however, the review team did not identify them as activities that would require special management. No other sea turtles found in the proposed action area have designated critical habitat.

Of listed marine mammals, only Steller sea lions and monk seals have critical habitat designated in the Pacific, but these areas do not fall within the proposed action area. Salmon and steelhead critical habitat is limited to inshore waters and very limited nearshore marine/estuary waters; therefore, the proposed action would not result in destruction or adverse modification of any designated critical habitat.

4.3.3 Cumulative Impacts on Protected Species

4.3.3.1 Marine Mammals

Anthropogenic threats to marine mammals in the North Pacific are detailed in Section 3.4.1.2. These include such threats as 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).

4.3.3.2 Sea Turtles

General threats to Pacific sea turtles are detailed in Section 3.4.2. 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. Even taking these other impacts into consideration, the proposed action is not expected to significantly impact the status of leatherback, loggerhead, olive ridley or green sea turtle populations because the estimated take rates are so low for the three year time frame.

4.4 Direct and Indirect Impacts of Alternatives on Seabirds

Alternative 1 would close the current DSLL fishery. This could provide more seabird protection than is currently in place in the fishery; however, the effect on seabirds would be minimal since very few seabirds interact with the fishery already and the fishing effort may be transferred to another fishery, which may have even less stringent seabird mitigation measures.

Seabird impacts of Alternative 2 are calculated using an estimated fishing effort of 800,000 hooks, along with seabird interaction rates from the Hawaii-based DSLL fishery from 2003 to 2006. In this fishery, observers recorded 0.0018 black-footed albatross and 0.0017 laysan albatross captured per 1,000 hooks observed. Zero short-tailed albatross have been observed caught in the Hawaii-based longline fishery. Using these take rates, the proposed action would be expected to take two black-footed, two laysan, and no short-tailed albatross.

4.4.1 Cumulative Impacts on Seabirds

Threats to seabirds are detailed in Section 3.5. The summary includes such threats to seabirds as catastrophic events at breeding colonies, climate change and oceanic regime shifts, contaminants, air strikes, disease/parasitism, predation and other natural factors, and invasive species. DSLL fishery impacts to seabird populations are not expected to significantly affect these species.

4.5 Direct and Indirect Impacts of Alternatives 1 and 2 on the Socioeconomic Environment

4.5.1 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); under this definition, the socioeconomic effects of the proposed action are considered. This evaluation also addresses the requirements of two other cross-cutting mandates, the Regulatory Flexibility Act and Executive Order 12866. In examining the socioeconomic effects of the DSLL fishery alternatives, benefits, costs, and economic impacts are evaluated by comparing the estimated impact of the alternatives to the baseline. In this section a qualitative analysis of the socioeconomic impacts of Alternatives 1 and 2 is provided. As the proposed fishery currently has only one participant and did not exist historically, there is limited data on which to base a quantitative assessment. Cost and earnings data from the "Economic and Operational Characteristics of the Hawaii-Based Longline Fleet in 2000" are used to gauge the potential scale of the economic impacts, but should not be interpreted as predictive for what might occur under the proposed alternatives, as many relevant factors would likely differ between west-coast-based and the Hawaii-based fisheries (O'Malley and Pooley 2000).

Benefit-cost analysis (the focus of Regulatory Impact Review, required by Executive Order 12866) concerns the change in net benefits resulting from the 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 estimated increased effort under Alternative 2).

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 fish 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. 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, 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 alternative on the financial well being of small entities. This concerns changes in profitability, i.e., changes in firms' cost and earnings. For small organizations (not-for-profit enterprises), concern is with the potential impact of the action alternative on their economic viability. In the case of small government jurisdictions, the impacts deal with how the action alternative would affect the income and expenditures of public authorities.

4.5.1.1 Evaluation Criteria

The evaluation criteria employed to assess economic consequences of the action alternative and regulatory changes have both quantitative and qualitative components. The former involves the use of an estimate of potential costs and gross revenue per vessel from the Hawaii-based longline fishery to produce a corresponding estimate of producer surplus. The latter involves a number of considerations, addressed below in this section.

4.5.1.2 Direct and Indirect Impacts of Alternatives

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. The producer surplus 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 west-coast-based DSLL fishery, financial producer surplus was estimated. Financial producer surplus is the estimated increase in producer revenues less the estimated increase in pecuniary costs under each alternative.

Estimates of potential financial producer surplus were estimated using data from the "Economic and Operational Characteristics of the Hawaii-Based Longline Fleet in 2000" (O'Malley and Pooley 2000) Annual gross revenue and total cost information was provided for the longline fishery in the year 2000 according to vessels targeting tuna and vessel size. A small vessel is defined as less than 56 feet in length, a medium vessel is between 56.1 and 73.9 feet in length and a large vessel is greater than 74 feet in length. All of the data presented in this document was adjusted for year 2007 inflation using the Bureau of Labor Statistics' inflation calculator. The results are shown in Table 4–4 below. The current west-coast-based DSLL participant would be categorized as a large vessel in this case; therefore could be estimated to have an annual producer surplus of $21,855.

Table 4–4. Annual net revenue estimates for longline tuna vessels according to vessel size in 2007.

Year 2007	Small Vessel < 56 ft	Medium Vessel 56.1ft -73.9 ft.	Large Vessel > 74 ft.	Average
Gross Revenue	$603,422	$596,026	$582,473	$593,974
Total Costs	$482,024	$532,081	$560,618	$524,908
Net Revenue	$121,398	$63,945	$21,855	$69,066

Source: O'Malley and Pooley 2000.

The average revenue and costs from the above table are used below to show possible estimates for producer surplus as additional vessels may enter this fishery. It is important to note that the greater the number of vessels, the smaller the net revenue. Table 4–5 shows a net revenue range from about $70,000 to $415,000 for one to six vessels, respectively.

Table 4–5. Average annual net revenue (2007 $) estimates for longline tuna vessels according to number of vessels.

Number of Boats	1	2	3	4	5	6
Gross Revenue	$593,974	$1,187,948	$1,781,922	$2,375,896	$2,969,870	$3,563,844
Total Costs	$524,908	$1,049,816	$1,574,724	$2,099,632	$2,624,540	$3,149,448
Net Revenue	$69,066	$138,132	$207,198	$276,264	$345,330	$414,396

There would be some indirect economic effects that have not been estimated because of the lack of data and fisheries confidentiality agreements. Indirect effects of the DSLL fishery 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 tuna and other fish species.

It should be understood that the estimates of financial producer surplus are based on experience from the Hawaii-based longline fishery for year 2000, which may not accurately represent what would occur in the west-coast-based fishery for many different reasons:

1. Costs are variable on vessel size, crew size and other factors, such as fuel costs, which would vary between the two geographic locations, Hawaii versus the west coast;
2. Gross Revenue would vary depending on the amount and size of catch, what entity purchases the catch and at what price;

3. 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 experience would have an uncertain and unquantifiable impact on profitability.

It should be noted that the CPUE would provide variability in cost and revenue estimates; however, currently CPUE for the west coast and Hawaii are comparable, but this may change in the future.

Under Alternative 1, no economic benefits would be realized from west-coast-based DSLL fishing. Under Alternative 2 such benefits could be realized, as reflected in the estimates provided in Table 4–5.

4.5.1.3 Fishing Communities Involved in the Longline Fishery (Including Buyers/Processors)

Socioeconomic impacts of the longline fishery on affected communities would be realized by: 1) the commercial fishing sector (harvesters, processors and consumers); 2) non-use sectors (protectionists and preservationists); and, 3) fishing communities. Because there is currently only one participant, and future participation is expected to only minimally increase, any impact on affected communities would be small, under Alternative 1 (no fishing) and Alternative 2 (fishing permitted). In future years, under Alternative 2, the primary affected communities of concern would be west coast ports where participants are based out of and/or landing catches.

4.5.2 Cumulative Impacts on the Socio-Economic Environment

Under Alternative 1, there would be no longline fishery and therefore a loss in economic benefits to society. This loss would be a direct effect on the current fishermen, estimated by the annual net revenue for one large vessel of $21,855, as well as to any intermediate or final purchasers. Longline fishing has been prohibited inside the U.S. west coast EEZ since 2004, which has negatively impacted many longline fishermen, processors, and consumers of locally caught fish, while positively impacting the non-consumptive and non-use values of the ocean (e.g., decrease in mortality to various species that may be caught/taken in a longline fishery in the west coast EEZ, etc.). Alternative 1 would further constrain longline fishermen, and negatively impact west coast processors, and consumers of locally caught fish (tuna in particular); however, it would have a positive impact on the non-use values of the ocean due to a decrease in the mortality of some marine species.

Under Alternative 2, there would be a direct positive economic benefit. The estimated economic surplus is estimated using the average annual net revenue for one to six vessels at a range of $70,000 to $415,000. This is most likely unrepresentative of total economic benefits due to the indirect effects mentioned previously. Alternative 2 would positively impact west-coast-based longline fishermen, processors, and consumers of locally caught fish. It would negatively impact the non-use values of the ocean due to the increase in mortality of various species that may interact with the fishery.

By any reasonable objective standard, the direct impact of the longline fishery would be limited and fairly small, at least in the next three years, given that there is currently only one participant, and the predicted future participation is estimated to be around six vessels. 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.

5.0 CONSISTENCY WITH MSA NATIONAL STANDARDS

An FMP or supplemental 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 United States fishing industry.

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. 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. Currently conservation management measures are in place in both the IATTC and WCPFC to address the fishing pressure on bigeye and yellowfin tuna in the Pacific Ocean. The United States has already issued the necessary regulations to implement both conservation measures.

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

The analyses and baseline information in this EA are based on the best scientific information available. The references cited in Section 9 lists the sources for 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 proposed action. The HMS FMP recognizes the need for managing these stocks in the international context through the RFMOs, including IATTC and WCPFC.

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 United States 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 currently includes only one fishing vessel and the projected expansion to six vessels is not large enough to warrant an allocation or assignment of fishing rights.

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 would have 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 non-target 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 does not involve the implementation of any new regulations or management measures. The preferred alternative is to keep the DSLL fishery operating as status quo. Additional management measures may be implemented in the future if necessary.

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 to minimize socioeconomic impacts to fishermen while complying with existing regulations.

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. However, the IATTC and WCPFC have established annual catch limits on bigeye tuna caught in the EPO and WCPO, respectively. In the EPO, the U.S. has an annual quota of 500 mt for bigeye tuna, thus there would not be an increase of overall fishing by the U.S. fleet in the EPO. The current Federal regulations for the west-coast-based DSLL fishery limit the fishing area to the high seas and mandate specific gear configurations and sea turtle and seabird mitigation measures in order to minimize the amount of bycatch in the fishery (see Section 2.2 for a list of the current terms and conditions of the fishery). Fishermen are also required to attend a protected species workshop where they learn methods to avoid interactions with turtles and marine mammals, and safe handling techniques for de-hooking animals, if caught.

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 has been operating outside of the EEZ for several years now in a safe manner.

6.0 CROSS-CUTTING MANDATES

6.1 Other Federal Laws

6.1.1 Coastal Zone Management Act (CZMA)

Section 307(c)(1) of the Coastal Zone Management Act (CZMA) as amended in 2006 requires all Federal actions that have reasonably foreseeable effects on any land or water use or natural resource of the coastal zone should be consistent with the enforceable policies of a coastal state's federally approved coastal management program to the maximum extent practicable. The 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 Washington, Oregon, and California. The recommended action is consistent and within the scope of the actions contemplated under the framework of the HMS FMP. The proposed action is not expected to affect any state's coastal management program.

6.1.2 Endangered Species Act (ESA)

NMFS is required under Section 7(a)(2) of the ESA to ensure 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 is conducting a Section 7 consultation to determine if the DSLL fishery would jeopardize the continued existence of endangered or threatened species. Because NMFS would implement the proposed action and must protect protected 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, and it has been determined through informal consultation that the proposed action is not likely to adversely affect ESA-listed seabird species. Section 4 evaluates impacts to ESA-listed species.

6.1.3 High Seas Fishing Compliance Act (HSFCA)

The HSFCA requires the Secretary to license U.S. vessels fishing on the high seas. The "high seas" are defined as the waters beyond the territorial sea, exclusive economic zone or the equivalent of any nation, to the extent that these areas are recognized by the United States. The DSLL fishing vessel which is currently operating outside of the west coast EEZ is compliant with this act and has a HSFCA permit.

6.1.4 Marine Mammal Protection Act (MMPA)

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, seals, sea lions, and fur seals. USFWS is responsible for walrus, sea otters, and the West Indian manatee. Any species listed as endangered or threatened under the ESA is automatically considered depleted under the MMPA. Section 4 evaluates impacts of the alternatives on marine mammal species.

6.1.5 Migratory Bird Treaty Act (MBTA)

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 the directed take of seabirds, but the incidental take of seabirds does occur. The MBTA applies within three nautical miles of the U.S. coastline. The action area is on the high seas (seaward of the U.S. EEZ), thus the fishery would not be subject to the MBTA. Section 4 of this EA evaluates the effect of the alternatives on seabirds.

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

This EA will be posted on the NMFS Southwest Regional Office website[22] and an email will be sent announcing its availability on the Pacific Council and NMFS Southwest Region HMS listserves. NMFS will also distribute copies of this final EA upon request.

[22] http://swr.nmfs.noaa.gov/

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Response to Public Comments

NMFS received two substantive letters in response to a notice published in the Federal Register on September 29, 2008, that requested public comments on the Draft Environmental Assessment for the Characterization of the Deep-set Longline Fishery Operating Outside the U.S. Exclusive Economic Zone. The public comment period closed on October 29, 2008. The substantive comments that were included in the letters and NMFS's responses to those comments are summarized below and incorporated into the final EA.

Letter from the Marine Mammal Commission

1) **Comment:** Measures should be added to limit entry to the fishery to ensure that bycatch levels remain below thresholds set by the Marine Mammal Protection Act. No more than one vessel should be allowed to enter the fishery per year, up to a total of five new vessels, with any such additions contingent upon fishery observer data confirming that take levels do not exceed the potential biological removal (PBR) level for any marine mammal stocks. The need to limit entry to a fishery should not be based on the number of vessels per se but rather on their potential to have an adverse impact. In this case, the addition of even a single vessel could cause a catch in excess of estimated PBR levels for some stocks, including the short-finned pilot whale.

   Response: NMFS and the Pacific Council are aware of the need to ensure that a very conservative and heavily regulated fishery is in place based in part on the need to minimize impacts on protected species. However, at this time NMFS has received no indication that the fishery is going to expand or that fishermen are interested in entering the fishery, so it would be premature to limit entry to the fishery. In addition, the scope of this analysis covers a total of six vessels participating in the fishery for up to three years with no significant impacts on the affected environment. If more than six vessels wanted to participate in the fishery, or the takes in the fishery exceeded the estimated takes in the Incidental Take Statement, additional NEPA and ESA analyses would be required.

2) **Comment:** Expand the draft assessment to include all relevant, available information on the California/Oregon/Washington stock of short-finned pilot whales and the fisheries that might take them.

   2.a. **Comment:** The draft EA provides an incomplete review of information on the status and incidental take of short-finned pilot whales. It does not indicate that the current minimum population level for the CA/OR/WA short-finned pilot whale stock is 123 whales with a calculated PBR of 0.98 whales per year. It also does not mention that short-finned pilot whales are considered a strategic stock under the MMPA, or indicate the distinct morphological differences between pilot whales off the U.S. west coast and those in the eastern Pacific. The EA should also note that Hawaii-based vessels are not prohibited from fishing in the eastern Pacific, and describe the extent to which they do so, whether the estimate of 400 sets accounts for that effort, and the number of sets that could occur if all vessels based in Hawaii and on the west coast fished in the EPO. Also the EA needs to mention that if incidental take rates of short-finned pilot whales are similar to those observed off the Atlantic coast, thresholds could quickly be exceeded and trigger the need for a TRT.

   Response: There are a number of short-finned pilot whales that may be found on the high seas within the proposed action area. These include the stock of short-finned pilot whales found off the U.S. west coast, the CA/OR/WA stock and the Hawaiian stocks (the Hawaiian Islands EEZ and the Palmyra Island EEZ). The CA/OR/WA stock is considered strategic, with a minimum population estimate of 123 and mean annual take of 1.00, which is over the stock's PBR of 0.98. The strategic status of this stock is based upon one observed take in the U.S. west-coast-based drift gillnet fishery in 2003. There have been no recent observed serious injuries or mortality of short-finned pilot whales in any other U.S. west coast fishery within or outside of the west coast EEZ, so this stock is likely to be considered non-strategic as bycatch of the species does not appear to be an on-going issue.

The Hawaiian stock of short-finned pilot whales is not considered depleted or strategic under the MMPA due to levels of serious injuries and mortalities. The level of serious injury and mortality in the EEZ around Johnston Atoll is below the range of the stock's PBR, so this stock is not considered strategic. There has been no reported serious injury or mortality of short-finned pilot whales with the Palmyra Atoll EEZ, so this stock is not considered strategic.

The analysis in the NEPA document focuses on the proposed alternatives. The cumulative effects of the Hawaii-based DSLL fishery are already described within the EA. NMFS has no information to suggest that all Hawaii-based DSLL vessels will move into the EPO and fish and therefore did not analyze this possibility. Most of the Hawaii-based longline vessels concentrate their fishing effort within close proximity to the Hawaiian Islands given market and shoreside support needs.

NMFS has no information to suggest that short-finned pilot whale distribution will overlap the DSLL effort to the same extent as is observed on the U.S. east coast in the Atlantic. In the Atlantic, there are isobaths that are utilized for foraging by pilot whales (both long-finned and short-finned) and longline fisheries. This has not been observed in the Pacific in the Hawaii based DSLL, so the Atlantic fishery was not considered a reasonable proxy for possible impacts of the proposed action.

3) **Comment:** Prohibit west coast vessels from fishing west of 140° W. longitude to prevent any additional incidental take from the Hawaiian stocks of false killer whales. False killer whales may be taken in areas outside of the U.S. EEZ around Hawaii, including areas where west coast vessels might fish, and the way the preferred alternative is written now, there is nothing to prevent them from doing so. In addition, recent information suggests that there are at least two stocks of false killer whales in Hawaii.

   Response: As noted in the draft EA, it is considered very unlikely that fishing under the preferred alternative would result in serious injury or mortality of a false killer whale. Observer records from the Hawaii based DSLL fishery and the SSLL fishery, along with observer records from the California based SSLL fishery do not contain any records of false killer whale takes east of 140° W. longitude.

4) **Comment:** Expand assessment to include available information on longline vessels that actually fish in the eastern Pacific Ocean, their numbers, where they fish, their incidental catch rates, and the protected species taken (including marine mammals). The assessment indicates that 1,292 large longline vessels from 15 countries, including 17 U.S. vessels, are authorized to target tuna and tuna-like species in the EPO, but there is little information on these vessels and the risks they pose to marine mammal stocks and other protected species.

   Response: This information is not provided by the Inter-American Tropical Tuna Commission (IATTC), the Commission that manages tuna and tuna-like species in the eastern Pacific Ocean (EPO) and collects information on vessel numbers, catch data, etc. that fish for tuna and tuna-like species in the EPO. The IATTC provides a breakdown of the catches by gear type, flag state and species, but not by vessel. In addition, incidental catch rates are largely unknown in foreign fleets because of lack of observer coverage and records.

5) **Comment:** Retain all existing management measures for the fishery, especially including 100 percent observer coverage.

Response: NMFS is retaining all the existing management measures for this fishery, and at least for the time being, 100 percent observer coverage.

Joint letter from the Center for Biological Diversity, the Ocean Conservancy and Turtle Island Restoration Network

6) **Comment:** The draft EA is not consistent with the requirements of NEPA.

6.a. **Comment:** The agency proposes a single "action" alternative, shutting down the current fishery, and a "no action" alternative, which includes a significant increase in capacity from the status quo. NMFS's failure to properly define "no action" alternative renders the draft EA flawed and insufficient to support NMFS's proposal to expand effort in the fishery. According to NMFS's proposed NEPA rule (73 FR 28008) "in a fishery management context, the no action alternative means the presumption that the fishery would continue being prosecuted in the same manner that it is being prosecuted at the time the [environmental review process] is initiated".

Response: Currently there is no limit on the number of vessels that can enter the DSLL fishery on the high seas, it is an open access fishery, thus the status quo assumes the vessel that has been participating since 2005 would continue to participate, and other vessels could enter the fishery at any time (as long as they have a High Seas Fishing Permit) and are in compliance with the measures outlined in the HMS FMP. Thus, the no action alternative represents continuing to manage the fishery as an open access fishery. NMFS chose to evaluate the impacts of a total of six vessels participating in the fishery instead of just the one vessel currently participating because there is a potential for more vessels to enter the fishery since it is open access and NMFS did not want to underestimate the potential impacts to the affected environment.

In addition, it should be noted that the proposed rule referenced in the comment entitled Magnuson-Stevens Act Provisions; Environmental Review Process for Fishery Management Actions (73 FR 28008, May 14, 2008) did not make it to the final rule stage and has not entered into force.

6.b. **Comment:** NMFS improperly eliminated the alternative of limiting the number of vessels that could enter the fishery, purportedly because NMFS does not anticipate that any more than five additional vessels will enter the fishery; this is unreasonable.

Response: NMFS does not think that it is unreasonable to assume that no more than five additional vessels will enter the fishery in the next three years because there are only a few west-coast-based vessels that are large enough and equipped for longline fishing for tuna on the high seas. In addition, acquiring the gear and refitting a vessel, for someone not already participating in longline fishing, would represent a substantial capital investment. There is also a substantial investment required for each high seas trip due to the amount of fuel and ice that is necessary. These are the reasons why NMFS has estimated that there a maximum of five additional vessels capable (i.e., have the experience, capital, and a vessel large enough to make high seas fishing trips) of entering the fishery over the next three years. Thus, NMFS did not put a cap on the number of vessels because there is no indication that a run up of vessels is imminent and other constraints, such as available observer manpower, and limits on takes of protected resources (i.e., the ITS statement) may limit effort. NMFS can exercise the option of a limited entry fishery in the future should circumstances dictate.

6.c. **Comment:** The draft EA fails to undertake an adequate cumulative effects analysis. The baseline status of multiple affected species is already dire and cumulative effects on these species are significant. Because any expansion of this fishery will have significant impacts on public resources, NMFS must prepare an EIS for the proposal. Expansion of the fishery is likely to contribute to overfishing and compromise the long-term productivity and resiliency of bigeye, yellowfin, and albacore tuna populations. It is also likely to impair the prospects of survival and recovery of Pacific leatherback and North Pacific loggerhead sea turtles. The action is also likely to impact protected marine mammals.

Response: NMFS did address the cumulative effects of this action as required under NEPA. The negligible catch totals for non-target species given the estimated effort levels in the next three years do not constitute a significant impact as the commenter stated. In addition, the commercially-important tuna species that are noted by the commenter are being managed internationally by the appropriate RFMOs for which the United States is a member. As mentioned, should the fishery expand beyond six vessels, additional NEPA and ESA analyses would be undertaken.

7) **Comment:** Analysis of likely impacts on species must include analysis of available observer data for the existing west coast DSLL fishery. None of the provisions NMFS cites in support of its assertion indicate that data collected by a NMFS observer in order to comply with ESA, MMPA, MSA, and other statutory requirements are considered "proprietary" or confidential, and none of the provisions excuses NMFS from its core obligations under the ESA.

Response: This data is not available to the public due to confidentiality laws statutorily required under MSA. NMFS has reviewed the data to ensure that it is not substantially different from the estimates used from the Hawaii-based DSLL fishery on the high seas.

8) **Comment:** Expansion of the west coast DSLL fishery is inconsistent with the ESA. Increasing the take of threatened and endangered species, even in seemingly small numbers, is inconsistent with the ESA's conservation mandate.

Response: NMFS's Sustainable Fisheries Division has initiated a Section 7 consultation with NMFS's Protected Resources Division for threatened and endangered species, including sea turtles and marine mammals. The biological opinion prepared by NMFS PRD will determine if the action is likely to jeopardize the species. In addition, reinitiation of a Section 7 consultation with the U.S. Fish and Wildlife Service for endangered seabirds is not required because this action was considered under the 2004 biological opinion issued for the HMS FMP. The biological opinion issued for the HMS FMP considered the effects of the DSLL fishery on the endangered short-tailed albatross (*Phoebastria albatrus*) and the endangered brown pelican (*Pelecanus occidentalis*). Based primarily on concerns with potential short-tailed albatross interactions, the terms and conditions of the BO stipulate that NOAA Fisheries must require the U.S. west coast-based longline fishers to employ mandatory seabird mitigation measures when setting and hauling the longline gear north of 18° N latitude (north of 23° N in the HMS FMP final rule). These measures are required as a part of the preferred alternative. Similarly, any measures stipulated by NMFS PRD's BO will be required of the fishery.

8.a. **Comment:** According to current estimates, approximately 1,500 females remain in the North Pacific loggerhead population and nesting populations have declined by 50-90 percent in the last 50 years. Alarmingly, current trends indicate a high probability that North Pacific loggerheads will be quasi-extinct within about 50 years.

Response: Balazs and Wetherall (1991) speculated that 2,000 to 3,000 female loggerheads nested annually in all of Japan. Considering multiple nesting estimates, Kamezaki, *et al*. (2003) estimated that approximately less than 1,000 female loggerheads return to Japanese beaches per nesting season. Matsuzawa (2005) has updated nesting numbers from 2001-2004 to 3,122; 4,035; 4,519; and 4,854. So over the short term, the last seven years, nesting appears to be increasing; however, these data are not sufficiently long-term to conclude a trend in the population. Genetic analysis of loggerheads that may be exposed to the west-coast-based DSLL fishery indicate that they are likely to be those from nesting beaches in Japan (95 percent), and those foraging off Baja California and the central North Pacific (Bowen, *et al.* 1995).

8.b. **Comment:** NMFS found that it may be warranted to change the status of the North Pacific loggerhead from threatened to endangered.

Response: Loggerheads are currently listed as threatened as a global species. On July 16, 2007, NMFS and USFWS received a petition from the Center for Biological Diversity and Turtle Island Restoration Network requesting that loggerhead turtles in the North Pacific Ocean be reclassified as a distinct population segment (DPS) with endangered status and that critical habitat be designated. On November 16, 2007, NMFS and USFWS received a petition from the Center for Biological Diversity and Oceana requesting that loggerhead turtles in the Northwest Atlantic Ocean be reclassified as a DPS with endangered status and that critical habitat be designated. NMFS and USFWS published a 90 day finding that the petitions presented substantial information and that the petitioned actions may be warranted. A biological review team (BRT) was convened in February 2008 and tasked with determining whether DPS's exist and assessing the extinction risk of each DPS. In August 2009, the BRT published the results of their analysis. They concluded that the nine identified population segments meet the standard for being considered a DPS; they are both discrete from other conspecific population segments and significant to the species to which they belong, *Caretta caretta* (Conant *et al.* 2009).

The BRT has identified the following nine loggerhead DPS's distributed globally and their status:
(1) North Pacific Ocean DPS – currently at risk of extinction
(2) South Pacific Ocean DPS - currently at risk of extinction
(3) North Indian Ocean DPS - currently at risk of extinction
(4) Southeast Indo-Pacific Ocean DPS - currently at risk of extinction
(5) Southwest Indian Ocean DPS - not currently at immediate risk of extinction
(6) Northwest Atlantic Ocean DPS - currently at risk of extinction
(7) Northeast Atlantic Ocean DPS - immediate risk of extinction
(8) Mediterranean Sea DPS - immediate risk of extinction
(9) South Atlantic Ocean DPS - not currently at immediate risk of extinction

8.c. **Comment:** In 2000, an article published in the preeminent scientific journal, *Nature*, predicted extinction of leatherbacks in the Pacific within decades (Spotila, *et al.* 2000). The primary cause of the leatherback decline, and the greatest threat to its continued existence, is entanglement and drowning in longline fishing gear. The ESA requires not only that the fishery managers prevent the extinction of these species, but that they facilitate the species' recovery.

Response: NMFS is required to use the best available and most recent information in evaluating impacts of a proposed action on protected species. 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. Since 2000, NMFS has issued four no jeopardy opinions for actions that would likely take leatherback sea turtles in the North Pacific. These takes and the current environmental baseline are considered as part of the Section 7 consultation on this proposed action.

9) **Comment:** Both the existing fishery and any expanded fishery are likely inconsistent with the MMPA.

9.a. **Comment:** The draft EA fails to disclose whether the current west coast DSLL fishery has resulted in the serious injury or death of marine mammals.

Response: The observer data is confidential due to the fact that there has been only one participant in the fishery; however, the current participant made a public comment at the Pacific Fishery Management Council in April 2009 and disclosed that he has never had any takes or mortalities of marine mammals while participating in the DSLL fishery.

9.b. **Comment:** The west-coast-based DSLL fishery may result in serious injury or death of marine mammal stocks that are already subject to serious injury or death or in excess of PBR, such as false killer whales and short-finned pilot whales. Yet NMFS has failed to convene a take reduction team as required by the MMPA to address marine mammal interactions in this or any of the Pacific longline fisheries.

Response: As described in the draft EA, NMFS has reviewed the available information on longline fishery interactions with marine mammals and the distribution of marine mammals within the proposed action area and determined that very few, if any, marine mammals are likely to be taken during fishing operations under the preferred alternative. The commenter appears to misunderstand the MMPA. 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 or shut-down 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. If the DSLL fishery does cause the serious injury or mortality of marine mammals at a level that exceeds the stock's PBR or 50 percent of PBR, NMFS can consider management actions to reduce this.

9.c. **Comment:** The west coast DSLL fishery is operating without any take authorization for ESA-listed marine mammals. Take must be authorized via an ITS issued pursuant to ESA only if such take is also authorized pursuant to Section 101 of the MMPA. Because this fishery may result in the take of humpback and sperm whales, the effects of the fishery on these species must be analyzed in a BO and any take must be permitted under both the ESA and MMPA.

Response: As described by the current participant in this fishery, there have been no takes of ESA-listed marine mammal species observed in the fishery. NMFS reviewed the available information on the distribution of the ESA-listed marine mammals and the action area of the preferred alternative and does not anticipate takes of ESA-listed marine mammals, so there is no need for an ITS or an authorization under section 101(a)(5) (E) of the MMPA.

10) **Comment:** Both the existing fishery and any expanded fishery are inconsistent with the Migratory Bird Treaty Act. Section 2 of the MBTA provides that “it shall be unlawful at any time, by any means or in any manner,” to, among other prohibited action, “pursue, hunt, take, capture, [or] kill” any migratory bird included in the terms of the treaties (16 U.S.C. § 703). NMFS reports that two species included in the list of migratory birds protected by the MBTA may be taken in the west coast DSLL fishery: Laysan’s albatross and black-footed albatross. USFWS may issue a permit allowing the take of migratory birds if consistent with applicable treaties, the statute, and USFWS regulations; however, NMFS has neither applied for nor obtained a permit authorizing any take by this fishery.

    Response: The Migratory Bird Treaty Act (MBTA) does not apply beyond the Territorial Sea of the United States. The proposed action would occur on the high seas, thus the MBTA does not apply to this proposed action.

11) **Comment:** Increasing fishing effort on pelagic fish populations is inconsistent with scientific recommendations, international resolutions and the requirements of the MSA. We are concerned about the impact of increased fishing effort on pelagic fish populations. Of the four target tuna species identified in the draft EA, three are experiencing overfishing, including North Pacific albacore, and Pacific yellowfin and bigeye tunas. The MSA requires that management measures prevent overfishing. This alternative allows for up to a 600 percent increase in target species catch.

    Response: NMFS is not increasing fishing effort with this action; it is analyzing effort that is already permitted using an estimated maximum level of effort in this fishery over the next three years. To the best of our knowledge, there are no new vessels being built or refitted to enter this fishery. Any effort shifts, should they occur, will come at the cost of effort in the fishery that the vessel previously fished in. The EA and the proposed action does meet the requirements of the MSRA and as previously stated the tuna species noted by the commenter are being managed under the legally-recognized framework of the appropriate RFMOs. In addition, the fishery would be operating within the current constraints established by the RFMO.

12) **Comment:** Establishment of annual catch limits and accountability measures for managed stocks in the fishery must be a precondition to continued operation and/or expansion of the DSLL fishery. There are no limits on catch or accountability measures to manage capacity and ensure sustainable catch levels. Fishery managers are obligated to set annual catch limits (ACLs) and accountability measures (AMs) for managed fish species; Pacific fishery managers appear to be working under the flawed assumption that the MSA supports an exemption from the ACL/AM requirements for pelagic fisheries managed under international agreements. The ACL requirement of the MSA shall take effect in 2010 or 2011, unless an international agreement to which the United States is a party provides for another effective date.

    Response: The final National Standard (NS) 1 Guideline revisions were published in the Federal Register on January 16, 2009, (Vol. 74, No. 11, 1/16/2009) and included an extensive explanation of NMFS’s interpretation of the international exception language set forth in an uncodified note to MSA section 303 (see MSRA, P.L. 109-479, sec 104(b)(1)). NMFS’s response to comment 78 (page 3198) explained that several interpretations of this exception were considered, including one possible interpretation that stocks under international management are only exempt from timing requirements, as the commenter above states. However, the NMFS response explains in great detail that NMFS believes a reasonable interpretation of the exception is that it should apply to the ACL requirement, not just the effective date. Several reasons for this interpretation are explained in the response, including the practical problem of ensuring that the United States could negotiate such mechanisms, and Congress's clear recognition of U.S. fishing impact versus international fishing effort. Therefore, NMFS believes that establishment of annual catch limits and accountability measures for fish stocks managed under an international agreement are not a precondition to continued operation of the DSLL fishery.

13) **Comment:** Conservation and management measures for the DSLL fishery must minimize bycatch and bycatch mortality to the extent practicable. To ensure consistency and compliance with National Standard 9, the Council and NMFS should evaluate additional measures to reduce bycatch and bycatch mortality in the DSLL fishery, including the bycatch mitigation measures being considered for the American Samoa longline fishery: 1) requiring hooks to be set at least 100m deep; 2) requiring the use of a 45g or heavier weight on branch lines within one meter from each hook; 3) requiring the use of longer float lines; 4) restricting hook deployment to an appropriate distance away from either side of floats; and 5) requiring the use of the largest practical whole fish bait with the hook point. In addition, we recommend that NMFS include the mandatory use of circle hooks (of varying sizes and offsets) among the range of alternatives for further analysis in the draft EA. The west coast DSLL fishery should also incorporate interaction hard caps for any and all endangered and threatened marine species; this must include 100 percent observer coverage, an annual hard cap, and real time reporting that will close the fishery immediately upon hitting the cap. Also, recommend the use of effort controls.

Response: NMFS has included as part of its preferred alternative measures which would require that the longline gear be deployed such that the deepest point of the mainline between any two floats (i.e., the deepest point in each sag of the main line is at a depth greater than 100m below the sea surface); a weight of at least 45g is attached to each branch line within 1m of the hook; the length of each float line possessed and used to suspend the main longline beneath a float must be longer than 20m; and there would be 100 percent observer coverage, paid for by NMFS, for at least the immediate future. The current participant in the west-coast-based DSLL fishery uses predominantly circle hooks in his sets; however, it is not mandatory in the west coast, Hawaii or American Samoa deep-set longline fisheries.

14) **Comment:** Improved data collection and monitoring and a greater scientific understanding about the relationship between protected species, longlining and oceanographic conditions are necessary prerequisites to expansion of the high seas DSLL fishery. Efforts to authorize an increase in fishing effort in this fishery are premature, misguided, and not based on the best scientific information available.

Response: NMFS is not expanding the DSLL fishery with this action .NMFS agrees with the commenter on the need for data collection and monitoring to properly manage any fishery. That is why this fishery is subject to 100 percent observer coverage at the present time. Longline fishery techniques and operational characteristics have been adapted over the years to minimize impacts to protected species and non-target bycatch species. The innovations developed under well managed and regulated U.S. fisheries can and in some cases are being exported to foreign fisheries thereby achieving a positive net benefit to the regional populations in question.

14.a. **Comment**: Studies have shown that pelagic longline fisheries negatively influence sea turtle population growth due to the disproportionate impact on older, reproductively valuable age classes.

Response: NMFS analyzes all relevant information during the Section 7 Consultation and determines whether the action would result in jeopardy.

14.b. **Comment:** Agency resources should be allocated towards projects that investigate additional sea turtle avoidance strategies. Enhancing fleet communication and coordination and establishing protocols to guide individual vessel behavior following interactions with sea turtles would be effective sea turtle avoidance strategies. We recommend that Pacific fishery managers work with mangers in the western Pacific and prioritize the evaluation and development such a system over attempts to increase effort in Pacific longline fisheries. In addition, we recommend that fishery managers evaluate the impact of seabird bycatch mitigation measures (e.g., blue-dyed bait, line shooters, and weighted branch lines) on sea turtle capture rates. [Author also mentioned that there is evidence that some Hawaii-based fishing vessels actively conceal turtle interactions from onboard observers by jettisoning them on branch lines; if this is the case, fishery managers must incorporate that information into their assessments and management evaluations. In addition, if observers are failing to report turtle interactions, willfully withholding data, and/or undermining data collection and monitoring efforts, immediate steps must be taken to restore the integrity and effectiveness of the observer program in Hawaii]

Response: NMFS has received no indication that some Hawaii-based vessels are concealing turtle interactions from onboard observers, or the observers are withholding information. A collaborative effort is underway with representatives from the environmental community, fisheries managers and researchers, and fishing industry leaders to develop effective avoidance strategies as suggested by the commenter. To this end, a workshop was held in May 2008 to begin the process, and a second workshop will be held in 2010.

15) **Comment:** A coordinated management framework for pelagic fisheries with the Western Pacific Fishery Management Council must be a precondition of expanding fishing effort. At the same time that Pacific fishery managers are seeking to authorize the expansion of the high seas DSLL fishery and establish SSLL fisheries within the U.S. EEZ and on the high seas off the U.S. west coast, fishery managers in the western Pacific are considering weakening conservation measures in the Hawaii-based SSLL fishery. Should these efforts to weaken conservation measures and expand fishing efforts be successful, the likely result would be a net increase in longline fishing effort Pacific-wide and jeopardy determinations for many species of sea turtles. Any increase in current effort levels in the high seas DSLL fishery should be well vetted by NMFS, the public and both Councils before additional time and resources are expended.

Response: Although a coordinated framework for pelagic fisheries with the relevant Councils and management bodies might be one of several future options, it is not a precondition for effectively managing U.S. west coast-based HMS fisheries at this time. All of the relevant environmental documentation being prepared to address the proposed HMS fishery actions both in Hawaii and on the U.S. west coast takes into account the cumulative impacts for the universe of actions under consideration.

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Finding of No Significant Impact for the Characterization of the West Coast Deep-set Longline Fishery Operating Outside of the U.S. Exclusive Economic Zone

National Oceanic and Atmospheric Administration Administrative Order 216-6 (NAO 216-6) (May 20, 1999) contains criteria for determining the significance of the impacts of a proposed action. In addition, the Council on Environmental Quality regulations at 40 C.F.R. '1508.27 state that the significance of an action should be analyzed both in terms of "context" and "intensity." Each criterion listed below is relevant in making a finding of no significant impact and has been considered individually, as well as in combination with the others. The significance of this action is analyzed based on the NAO 216-6 criteria and CEQ's context and intensity criteria. These include:

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

Response: No. The fishing mortality of target species associated with the preferred alternative represents a very minor proportion of total fishing mortality of the target tuna species (i.e., bigeye (*Thunnus obesus*), yellowfin (*Thunnus albacares*), skipjack (*Katsuwonus pelamis*) and albacore tuna (*Thunnus alalunga*) in the Pacific basin. In addition, the west-coast-based deep-set longline (DSLL) fishery is not expected to significantly expand in the future due to the economic and technical constraints involved in fishing far offshore. There are numerous foreign fisheries that operate throughout the Pacific Ocean using, among other gears, pelagic longline, pole-and-line, purse seine, and troll gears. By comparison, U.S. fisheries generally harvest a small fraction of the total Pan-Pacific harvest of highly migratory species (HMS). The U.S. catch of tuna in the eastern Pacific Ocean (EPO) (with all gear types combined) has averaged about 2.6 percent of the total catch of tuna in the EPO from 2002 to 2006; in 2006 the U.S. catch of tuna in the EPO was only about 0.2 percent of the total tuna catch in the EPO. The U.S. tuna longline fishery contributes less than one percent (on average 0.03 percent from 2002 to 2006) of the total tuna landings in the EPO. Summary impacts of effects of the preferred alternative on the target species are presented in Section 4 of the environmental assessment (EA).

The bigeye tuna stock in the Pacific and the EPO yellowfin tuna stock are shared international resources that are both currently subject to overfishing according to National Marine Fisheries Service (NMFS). 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 are implemented through the regional fishery management organization (RFMO) framework. Currently conservation management measures are in place in both the Inter-American Tropical Tuna Commission (IATTC) and the Western and Central Pacific Fisheries Commission (WCPFC) to address the fishing pressure on bigeye and yellowfin tuna in the

Pacific Ocean. These measures include bigeye tuna catch limits in the longline fisheries, which the current participant in the DSLL fishery would be subject to, and time-area closures and effort limits in the purse seine fishery. The United States has already issued the necessary regulations to implement these conservation measures.

2) Can the proposed action reasonably be expected to jeopardize the sustainability of any non-target species?

Response: No. The fishing mortality of non-target species associated with the preferred alternative does not present any overfishing concerns, exceed any recommended harvest guideline in the U.S. West Coast Highly Migratory Species Fishery Management Plan (HMS FMP), and would continue to be monitored with observer coverage of fishing trips.

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

Response: No. Pelagic longline gear is generally not associated with adverse physical impacts to the environment or biological impacts to prey species because it is deployed in the open water column targeting megafauna species and does not interact with the benthic environment at any time during fishing operations, and the fishery takes place far offshore (beyond 200 nm from the nearest mainland point). In addition, it was determined that the final rule to implement the HMS FMP would not result in fishing activities that would have an adverse impact on EFH identified for any U.S. fisheries. This proposed action allows for the continuation of a fishery that is operating in accordance with the management measures established in the HMS FMP.

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

Response: No. The proposed action is not expected to have an adverse impact on public health or safety. The proposed action allows for the continuation of the DSLL fishery operating on the high seas in accordance with current regulations. Currently there are no public health or safety concerns in this fishery. Fishing takes place on the high seas, beyond 200 nm from shore.

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

Response: No. Longline gear is known to incidentally catch and entangle threatened and endangered marine mammals, sea turtles, and seabirds. The EA evaluates impacts to Endangered Species Act (ESA)-listed species and their designated critical habitat, and marine mammals, which are protected under the Marine Mammal Protection Act (MMPA). Impacts of current and projected takes for protected species from DSLL fishing were analyzed in Section 4.2 of the EA.

A Section 7 consultation was conducted on the proposed action to ensure that the action was consistent with the ESA. There is no designated critical habitat within the proposed action area, so an analysis of adverse modification or destruction of critical habitat was not required. A formal Section 7 consultation and a biological opinion were completed on April 8, 2011, by the NMFS Protected Resources Division as part of NMFS's intra-agency consultation on ESA-listed species under the agency's jurisdiction. It was determined that olive ridley (*Lepidochelys olivacea*), green (*Chelonia mydas*), leatherback (*Dermochelys coriacea*), and loggerhead (*Caretta caretta*) sea turtles may be taken in the proposed action; however, the estimated level of takes is very low. No other ESA-listed species were considered likely to be taken, so the consultation was limited to endangered sea turtles. After reviewing the available scientific and commercial fisheries data, current status of the affected species, environmental baseline for the action area, effects of the proposed action and cumulative effects, NMFS determined that the level of sea turtle takes anticipated through the proposed action is not likely to jeopardize the continued existence of any species. Thus, while individual sea turtles may be entangled or hooked on gear during fishing operations and the level of interactions may result in the mortality, this level of impact is not likely to adversely affect the population or the species.

On April 20, 2004, the United States Fish and Wildlife Service (USFWS) completed a biological opinion on the Fishery Management Plan for U.S. West Coast Fisheries for Highly Migratory Species (HMS FMP). The opinion considered the effects of the proposed action on the endangered short-tailed albatross (*Phoebastria albatrus*) and the endangered brown pelican (*Pelecanus occidentalis*). The opinion used the Hawaii-based longline observer records to estimate likely effects in the HMS FMP fisheries and acknowledged the potential for HMS FMP fisheries to interact with short-tailed albatross. Based primarily on concerns with potential short-tailed albatross interactions, the terms and conditions of the opinion stipulate that NOAA Fisheries must require the U.S. West Coast-based longline fishers to employ mandatory seabird mitigation measures when setting and hauling the longline gear north of 18° N latitude (north of 23° N in the HMS FMP final rule). These seabird mitigation measures, required of all owners and operators of vessels registered for use of longline gear, are codified at 660.712(c). Based on the best available information, it is NMFS's determination that re-initiation of consultation on the deep-set tuna longline fishery is not triggered at this time

A number of marine mammal species that are not listed under the ESA may be incidentally taken in the fishing operations authorized by the EFP. These species include bottlenose, Risso's, and striped dolphins, false killer whales, and short-finned pilot whales. Very low levels of takes of these marine mammal stocks are possible under the proposed action. Each marine mammal stock's current potential biological removal (PBR) level was used for determining whether anticipated takes were likely to be significant. If the level of serious injury or mortality of individual marine mammals anticipated under the proposed action resulted in a mean annual mortality, based upon the last five years, that exceeded the stock's PBR, then the action would be considered to have a significant impact on the stock. Based upon the PBRs in the 2009 U.S. Pacific Marine Mammal Stock Assessment reports and the anticipated levels of marine mammals taken, the proposed action is not likely to significantly impact any marine mammal stocks in the proposed area. Short-finned pilot whales currently have a low PBR, 0.98, and an estimated mean annual serious injury/mortality rate of 1.0. An interaction between the proposed fishing activity and a short-finned pilot whale is considered very unlikely.

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

Response: No. The proposed action would have a minor adverse effect on biodiversity and ecosystem function through the removal of target, non-target, and protected species, but this impact is not considered significant. Fish removals under the proposed action would represent a very minor proportion of the total biomass of these species and are highly unlikely to affect biodiversity and ecosystem function. Potential removals of protected species are addressed under question five and impacts evaluated in detail in the EA.

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

Response: The proposed action would likely have a long-term beneficial socioeconomic impact if participation in the west coast DSLL fishery were to continue and potentially expand and the demand for fresh-caught tuna on the U.S. West Coast remains the same or increases. These impacts are estimated to be minimal since participation in the DSLL fishery will most likely be limited. In the short term, DSLL fishing could generate revenue for fishermen, some of which could have community income impacts. Depending on the port of offloading, the proposed action could provide some limited economic gains to the port communities located within the action area. These gains may include, among other things, increases in landings and fuel, bait, ice, and equipment transactions.

8) Are the effects on the quality of the human environment likely to be highly controversial?

Response: No. A notice was published in the Federal Register on September 29, 2008, requesting public comments on the draft environmental assessment. NMFS only received two substantive letters during the public comment period. There was a letter from the Marine Mammal Commission and a joint letter from the Center for Biological Diversity and the Turtle Island Restoration Network. NMFS responded to the comments in Appendix 1 of the EA.

9) Can the proposed action reasonably be 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?

Response: No. All of the DSLL fishing operations take place on the high seas beyond 200 nm from the U.S. West Coast. There would be no direct effect on the biophysical component of the terrestrial environment. No unique areas would be affected. Nothing has been identified in association with the proposed action that would result in adverse effects to historical, archaeological, paleontological, or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers, essential fish habitat, or ecologically critical areas. The impacts of the proposed action on EFH were examined by NMFS and a determination of no significant adverse effect was made. The proposed action does not take place in any National Marine Sanctuary waters.

10) Are the effects on the human environment likely to be highly uncertain or involve unique or unknown risks?

Response: No. The risks are neither unique nor unknown based on the fact that a DSLL fishery has occurred since 2005 in the proposed action area. Information on possible catch and bycatch of finfish and take of protected species from this fishery has been collected through the observer program and 100 percent observer coverage of the fishery to date. The Hawaii-based DSLL fishery observer records also provide a good comparison in terms of catch rates of finfish and protected species takes. The risks of a somewhat expanded fishery are to some extent uncertain in terms of their intensity due to the fact that only one vessel has been observed in this fishery. If the fishery grows beyond what is predicted in this EA then additional NEPA analysis would be required, and additional mitigation measures (such as limits on fishing effort and caps on protected species takes) would be considered.

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

Response: No. The EA describes past and present activities in Sections 3.3-3.6 that contribute to the kinds of impacts identified in the proposed action (e.g., fishing mortality and protected species takes). The proposed action will interact with target and non-target species that are taken in several other commercial and recreational fisheries. These fisheries are regulated by State and/or Federal management actions, including Fishery Management Plans (FMPs). The fisheries have been examined as part of the EA for this action to determine their impacts on target and non-target species interactions, and no cumulatively significant impacts have been identified. Reasonably foreseeable future actions and their impacts are discussed in Sections 4.2-4.5.

For highly migratory species, such as tuna species that are targeted in the west-coast-based DSLL fishery, there are international conservation measures that have been agreed upon and implemented by the United States and other nations to address fishing concerns. The IATTC and WCPFC have established bigeye tuna catch limits in the longline fishery, and time-area closures and effort limits in the purse seine fishery in the EPO and western and central Pacific Ocean (WPO), respectively.

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?

Response: No. Items eligible for listing, or listed in the National Register of Historic Places, or significant scientific, cultural or historical resources are not located in the affected environment, thus they would not be affected by the proposed action.

13) Can the proposed action reasonably be expected to result in the introduction or spread of a nonindigenous species?

Response: No. The proposed action does not involve the transport of non-indigenous species. The fishing vessels would be west-coast-based and 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?

Response: No. 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 since this fishery is already operating.

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

Response: No. Federal, State, and local laws and requirements imposed for the protection of the environment are consistent with the proposed action.

16) Can the proposed action reasonably be expected to result in cumulative adverse effects that could have a substantial effect on the target species or non-target species?

Response: No. See the response to criterion 11 above for a discussion of cumulative effects.

DETERMINATION

In view of the information presented in this document and the analysis contained in the supporting "Environmental Assessment for the Characterization of the West Coast Deep-set Longline Fishery Operating Outside of the U.S. Exclusive Economic Zone", it is hereby determined that the rule "Fishing Restrictions in the Longline and Purse Seine Fisheries in the Eastern Pacific Ocean in 2009, 2010, and 2011" will not significantly impact the quality of the human environment as described above and in the supporting Environmental Assessment. In addition, all beneficial and adverse impacts of the proposed action have been addressed to reach the conclusion of no significant impacts. Accordingly, preparation of an EIS for this action is not necessary.

Rodney R. McInnis

Rodney R. McInnis
Regional Administrator
Southwest Regional Office

4-13-11
Date