DRAFT ENVIRONMENTAL ASSESSMENT

To Revise the Vessel Capacity Limit in the Purse Seine Fishery in the Eastern Pacific Ocean in Accordance with Inter-American Tropical Tuna Commission (IATTC) Resolution C-02-03; RIN 0648-AY75

PREPARED BY:

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Cover Sheet
Environmental Assessment of Vessel Capacity in the Purse Seine Fishery in the EPO

Proposed Action:	Revise the vessel capacity limit for purse seine vessels which target tuna species in the EPO so that it is consistent with the limit agreed upon by the IATTC in Resolution C-02-03.
Type of Statement:	Environmental Assessment
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Abstract

The National Marine Fisheries Service (NMFS) is proposing regulations under authority of the Tuna Conventions Act of 1950, as amended to revise the current U.S. vessel carrying capacity limit for the purse seine fishery which targets tuna species in the Inter-American Tropical Tuna Commission (IATTC) Convention Area. The proposed revision would make vessel capacity limits consistent with the amount authorized under resolutions adopted by the IATTC, which currently is 31,775 cubic meters (m^3), or about 27,147 metric tons (mt). Currently, the U.S. fleet capacity limit is 8,969 mt, or 10,498 m^3. The IATTC Convention Area includes the waters bounded by the coast of the Americas, the 40° N. and 40° S. parallels, and the 150° W. meridian. In addition, the regulations pertaining to the purse seine fishery operating in the eastern Pacific Ocean (EPO) would be revised so capacity measurements would be in cubic meter measurements, rather than in metric tons. This is consistent with the measurements currently used by the IATTC. The exemption for small purse seine vessels to be on the Vessel Register would also be removed so all U.S. purse seine vessels would need to be listed on the Vessel Register and categorized as active in order to use purse seine gear to fish for tuna in the IATTC Convention Area. However, these vessels (vessels of 400 short tons or 362.8 mt or less carrying capacity for which landings of tuna caught in the Convention Area comprise 50 percent or less of the vessel's total landings, by weight, for a given calendar year) would be exempt from the frivolous request provisions for active status regulations due to the fact that these vessels only opportunistically fish for tuna off the west coast of California in the summer months when tuna schools occasionally come close enough to shore. These revisions would ensure that the United States is satisfying its obligations as a member of the IATTC and not exceeding its allotted capacity in the fishery, while dismantling artificial regulatory constraints preventing capacity building by the U.S. industry. This environmental assessment (EA) assesses the potential environmental impacts on the human environment that could result from implementation of the proposed rule which would increase the vessel capacity limit of the purse seine fishery targeting tuna species in the EPO. Various alternatives are analyzed in this EA. Impacts to the human environment (e.g., effects of the proposed action on the natural environment and the socioeconomic environment) were found to be insignificant.

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List of Acronyms

AIDCP- Agreement on the International Dolphin Conservation Program
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
EJ- Environmental Justice
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- International Union for Conservation of Nature
IWC- International Whaling Commission
LAAL- Laysan Albatross
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 Fisheries Management Organization
SAFE- Stock Assessment and Fishery Evaluation Report
SAFZ- Subarctic Frontal Zone
SAO- Southwestern Atlantic Ocean
SAR- Stock Assessment Report
SCB- Southern California Bight
SFD – Sustainable Fisheries Division
SSLL- Shallow-set Longline
SST- Sea Surface Temperature
STAL- Short-Tailed Albatross
STFZ- Subtropical Frontal Zone
TDR- Time and Depth Recorder
TRP- Take Reduction Plan
TRT- Take Reduction Team
USFWS- United States Fish and Wildlife Service
WPFMC- Western Pacific Fishery Management Council
WCPFC- Western and Central Pacific Fisheries Commission
WCPFCIA – Western and Central Pacific Fisheries Commission Implementation Act
WCPO- Western 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 species (HMS) population. The term biomass means total biomass (age one and above) unless stated otherwise.

Bycatch: Animals 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.

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, dated March 10, 1983, 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 (3 CFR part 22).

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.

Inter-American Tropical Tuna Commission Convention Area: The area of the Pacific Ocean bounded by the coastlines of North, Central, and South America, 50° N. and 50° S. latitudes, and 150° W. longitude.

Incidental take: "Take", as defined under the ESA, means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, or collect, or to attempt to engage in any such conduct", individuals from a species listed under the ESA. Incidental take is the non-deliberate take of ESA-listed species during the course of an otherwise lawful activity (e.g., fishing under an FMP).

Incidental Take Statement: A requirement under the ESA Section 7 consultation regulations and, provided following the conclusion of a biological opinion, it specifies the impact of any incidental taking of endangered or threatened species and provides reasonable and prudent measures that are necessary to minimize impacts.

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.

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.

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

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

Potential Biological Removal Level: A standard used in the MMPA, it is the maximum number of animals, not including natural mortalities, that can be removed from a marine mammal stock while allowing the stock to reach or maintain its optimum sustainable population.

Section 7 consultation: A requirement for 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 or adverse modification of critical habitat designated for such 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, the bigeye tuna stock.

Strategic Stock: As defined under the MMPA, 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 under the ESA within the foreseeable future; or is already listed as a threatened or endangered species under the ESA or is designated as depleted under the MMPA.

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1.0 INTRODUCTION

1.1 Organization of the Document

This EA provides a detailed analysis of the proposed revision to the vessel capacity limit for the purse seine fishery which targets tuna species in the EPO**.**

Environmental impact analyses have four essential components: 1) a description of the purpose and need for the proposed action; 2) alternatives that represent different ways of accomplishing the proposed action; 3) a description of the human environment affected by the proposed action; and 4) an evaluation of the expected direct, indirect, and cumulative impacts of the alternatives. The human environment includes the natural and physical environment and the relationship of people with that environment, as defined at 40 CFR 1508.14. These elements allow the decision maker to look at different approaches to accomplishing a stated goal and understand the likely consequences of each choice or alternative. Based on this structure, the document is organized into six main chapters:

- Chapter 1 describes the purpose and need, the proposed action, the proposed action area and considerations that went into the development of this EA.

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

- Chapter 3 describes the components of the human environment potentially affected by the proposed action (the "affected environment"). The affected environment represents the baseline condition, which would be potentially changed by the proposed action.

- Chapter 4 evaluates the effects of the alternatives on components of the human environment in order to provide the information necessary to determine whether such effects are significant, or potentially significant.

- Chapter 5 provides information on those laws and Executive Orders, in addition to the Tuna Conventions Act and the National Environmental Policy Act (NEPA), that an action must be consistent with, and how this action has satisfied those mandates.

Additional Chapters (6-8) list those who contributed to this EA, information on EA distribution, and the references cited list.

Information from the following EAs are incorporated by reference and cited accordingly in this EA:

- Environmental Assessment for the Implementation of the Decisions of the Fifth Regular Annual Session of the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean: Fishing Restrictions and Observer Requirements in Purse Seine Fisheries for 2009-2011 and Turtle Mitigation Requirements in Purse Seine Fisheries and Bigeye Tuna Catch Limits in Longline Fisheries in 2009, 2010, and 2011;
- Draft Environmental Assessment for the Characterization of the West Coast Deep-set Longline Fishery Operating Outside of the U.S. Exclusive Economic Zone;
- Fishery Management Plan and Environmental Impact Statement for U.S. West Coast Fisheries for Highly Migratory Species; and
- Environmental Assessment To Implement a Program for the Conservation of Tuna in the Eastern

Pacific Ocean in 2009-2011 as Agreed Upon by the Inter-American Tropical Tuna Commission.

1.2 Proposed Action

NMFS is proposing regulations under authority of the Tuna Conventions Act of 1950, as amended, to revise the current U.S. vessel carrying capacity limit for the purse seine fishery which targets tuna species in the IATTC Convention Area so it is consistent with the amount authorized under resolutions adopted by the IATTC. Under IATTC resolutions, the United States is authorized to have a total carrying capacity in the purse seine fleet in the Convention Area of 31,775 m^3, or about 27,147 mt[1]; however, U.S. regulations limit the carrying capacity to 8,969 mt, or 10,498 m^3. NMFS imposed a smaller regulatory limit on the U.S. fleet for diplomatic reasons in a letter to the IATTC in August 2002, which was merely a non-binding commitment and not necessarily intended to apply indefinitely. IATTC resolutions also require all purse seine vessels fishing for tuna in the Convention Area to be listed on an international Vessel Register maintained by the Director of the IATTC; U.S. regulations exempt small purse seine vessels[2] from this requirement. These small purse seine vessels would no longer be exempted from this requirement; however, they would be exempted from the *frivolous requests for active status* provisions of the regulations. The frivolous request provisions essentially penalize vessels that apply to be on the Vessel Register and do not fish for tuna in the EPO by putting them at the bottom of the hierarchy when applying to be on the Vessel Register the following year. These provisions are meant to prevent vessel owners who do not have any intent to fish in the Convention Area from applying to be on the vessel register and take up valuable capacity. The smaller vessels would be exempt from these provisions because it would be difficult, if not impossible, for the vessel owners to anticipate whether unassociated schools of tuna would come within their range off the U.S. west coast during the summer months in a given year. These revisions would ensure that the United States is satisfying its obligations under the Tuna Conventions Act while dismantling artificial regulatory constraints preventing capacity building by the U.S. industry.

1.3 Proposed Action Area

The proposed action area analyzed in this EA is the IATTC Convention Area, which includes the waters bounded by the coast of the Americas, the 40° N. and 40° S. parallels, and the 150° W. meridian. This area includes the U.S. west coast Exclusive Economic Zone (EEZ); however, most of the fishing that would be affected by the proposed action occurs on the high seas in the Convention Area.

[1] NMFS used the conversion factor that is utilized by the IATTC to convert cubic meter and metric ton carrying capacity measurements. The conversion factor used is 1.17051.

[2] The current exemption for small purse seine vessels applies to vessels of 362.8 mt or less carrying capacity for which landings of tuna caught in the IATTC Convention Area comprise 50 percent or less of the vessel's total landings, by weight, for a given calendar year (50 CFR 300.22 (b)(1)(ii)).

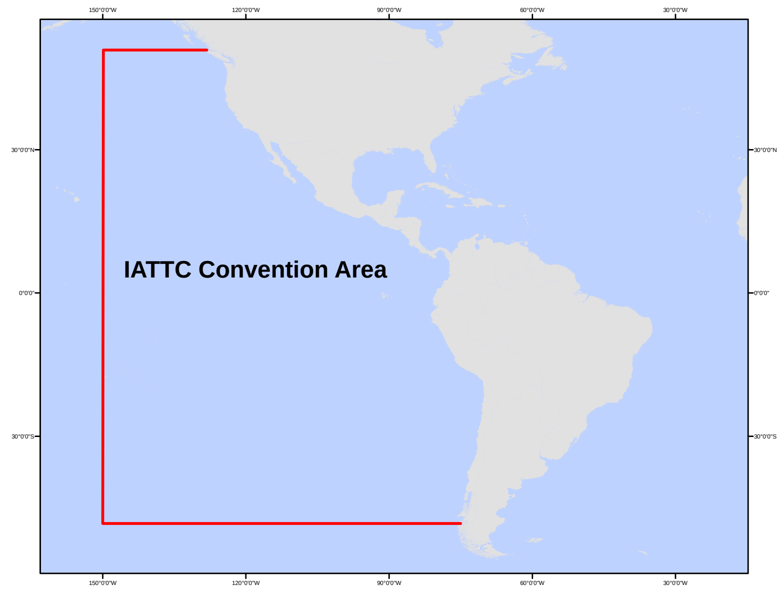


Figure 1. Map of IATTC Convention Area.

1.4 Purpose and Need

The purpose of the proposed action is to amend regulations in order to ensure that the United States is satisfying its obligations as a member of the IATTC and U.S. regulations are as consistent as practicable with active IATTC Resolutions, while dismantling artificial regulatory constraints that may prevent capacity building by the U.S. industry and increasing economic opportunities for the U.S. purse seine fleet.

1.5 Background

The 1949 Convention for the establishment of an Inter-American Tropical Tuna Commission entered into force in May 1949. The full text of the Convention is available at: http://www.iattc.org/PDFFiles/IATTC_convention_1949.pdf. The Convention focuses on the conservation and management of highly migratory species (HMS) and the management of fisheries for HMS, and has provisions related to non-target, associated, and dependent species in such fisheries.

The IATTC, established under the Convention, is comprised of the Members, including High Contracting Parties to the Convention and fishing entities that have agreed to be bound by the regime established by the Convention. Other entities that participate in the IATTC include Cooperating Non-Parties, Cooperating Fishing Entities, and Regional Economic Integration Organizations. Cooperating Fishing Entities participate with the authorization of the High Contracting Parties with responsibility for the conduct of their foreign affairs. Cooperating Non-Parties are identified by the IATTC on a yearly basis. In accepting Cooperating Non-Party status, such States agree to implement the decisions of the IATTC in the same manner as Members.

The current Members of the IATTC are Colombia, Costa Rica, Ecuador, El Salvador, France, Guatemala, Japan, Mexico, Nicaragua, Panama, Peru, Republic of Korea, Spain, United States, Vanuatu, and Venezuela. The current Cooperating Non-Parties, Cooperating Fishing Entities and Regional Economic Integration Organizations are Belize, Canada, China, Cook Islands, Kiribati, Chinese Taipei, and the European Union.

As a Contracting Party to the Convention and a Member of the IATTC, the United States is obligated to implement the decisions of the IATTC in a legally binding manner. The Tuna Conventions Act of 1950 (16 U.S.C. 951 *et seq.*) authorizes the Secretary of Commerce, in consultation with the Secretary of State and the Secretary of the Department in which the United States Coast Guard (USCG) is operating (currently the Department of Homeland Security), to promulgate such regulations as may be necessary to carry out the obligations of the United States under the Convention, including the decisions of the IATTC. The authority to promulgate regulations has been delegated to NMFS.

At its 69th annual meeting in June 2002, the IATTC adopted the Resolution on the Capacity of the Tuna Fleet Operating in the Eastern Pacific Ocean (Resolution C-02-03) to address the problem of excess capacity in the tuna purse-seine fleet operating in the EPO by limiting the capacity to a level which would ensure that tuna fisheries in the region are sustainable. The resolution places certain obligations on the IATTC's members. Resolution C-02-03 replaced the previous Resolution on Fleet Capacity adopted at the 62nd annual meeting of the IATTC in October 1998 (Resolution C-98-11). Resolution C-02-03 established a total vessel capacity limit of 158,000 m^3 for all vessels authorized by the IATTC to fish for tuna species in the EPO. Each Contracting Party to the Convention was then allocated a portion of the vessel capacity limit by the Director based on historical fishing levels in the EPO. The resolution included provisions that, among other things, prohibited the entry of new vessels to the EPO purse seine fleet, except to replace vessels removed from the Vessel Register, and prohibited the increase of the capacity of any existing purse seine vessel unless a purse seine vessel or vessels of equal or greater capacity is removed from the Vessel Register.

For the United States, a vessel capacity limit of 39,228 m^3 was established in 2002 with the adoption of Resolution C-02-03, as well as a provision that allowed 32 U.S. vessels that are regularly based out of the WCPO to make one trip per year in the EPO and not be included on the Vessel Register. However, the United States chose to further limit its fleet capacity by maintaining the U.S. fleet capacity limit established in paragraph 1 of Resolution C-98-11. Thus, on April 12, 2005, a final rule was published in the Federal Register (70 FR 19004) which, among other things, established a fleet capacity limit of 8,969 mt, or 10,498 m^3. Since that time, the United States has been unable to make meaningful use of the 32-trip provision because of restrictions; in particular, the restriction on applicable vessels making only a single trip in the EPO per year even if the total number of trips made by U.S. vessels is less than 32. Some vessel owners have expressed interest in making multiple trips to the EPO since fewer than 32 vessels have ever used this provision in a given year; however, this is not allowed. Thus, the United States has never been able to fully take advantage of the 32-trip per year provision. In addition, due to removals and additions of vessels from the Vessel Register, the United States is currently authorized by the IATTC to have 31,775 m^3 of carrying capacity in the purse seine fleet.

2.0 ALTERNATIVES

Alternative 1 (Preferred Alternative): The preferred alternative is to revise the current U.S. vessel carrying capacity limit for the purse seine fishery operating in the EPO so it is consistent with the amount authorized under resolutions adopted by the IATTC, which currently is 31,775 m^3. Currently, the U.S. fleet capacity limit is 8,969 mt, or about 10,498 m^3. In addition, the regulations pertaining to the purse seine fishery operating in the EPO would be revised so capacity measurements would be in cubic meter measurements, rather than in metric tons. The exemption for small purse seine vessels to be on the Vessel Register at 50 CFR 300.22 (b)(1)(ii) would also be removed, so all U.S. purse seine vessels would need to be listed on the Vessel Register and categorized as active under paragraph (b)(4)(i) of the same section in order to use purse seine gear to fish for tuna in the IATTC Convention Area. However, these vessels (class size 5 and under purse seine vessels that primarily fish for coastal pelagic species off the West Coast) would be exempt from the frivolous request provisions for active status at 50 CFR 300.22(b)(4)(ii) due to the fact that these vessels only opportunistically fish for tuna off the West Coast of California in the summer months when tuna schools occasionally come close enough to shore.

Summary of Alternative 1
- U.S. purse seine fleet capacity limit of 31,775 m^3
- Capacity measurements in m^3
- Small purse seine vessels no longer exempt from being on the IATTC Vessel Register
- Small purse seine vessels exempt from frivolous request provision

Alternative 2: Alternative 2 would be the same as the preferred alternative; however, the Vessel Register list exemption for small purse seine vessels at 50 CFR 300.22 (b)(1)(ii) would not be removed, and the frivolous request provisions would not be amended. Thus, Alternative 2 would increase the U.S. vessel carrying capacity limit for the purse seine fishery operating in the EPO to 31,775 m^3, the capacity measurements would be changed to cubic meter measurements, and small purse seine vessels for which landings of tuna caught in the Convention Area comprise 50 percent or less of the vessel's total landings, by weight, for a given calendar year, would continue to be exempt from the requirement to be on the Vessel Register.

Summary of Alternative 2
- U.S. purse seine fleet capacity limit of 31,775 m^3
- Capacity measurements in m^3

Alternative 3: Alternative 3 would revise the current regulations to give NMFS the discretion to revise the current 8,969 mt (10,498 m^3) vessel capacity limit in the future up to the amount authorized under resolutions adopted by the IATTC (currently 31,775 m^3) based on specific criteria. However, the vessel capacity limit would not be increased at this time because currently there appears to be limited demand for additional vessel capacity. The capacity measurements would be amended so that they are in cubic meter measurements, and small purse seine vessels for which landings of tuna caught in the Convention Area comprise 50 percent or less of the vessel's total landings, by weight, for a given calendar year, would continue to be exempt from the requirement to be on the Vessel Register.

Summary of Alternative 3
- U.S. purse seine fleet capacity limit of 10,498 m^3; criteria would be established that, if met, would give NMFS the discretion to increase the capacity limit to 31,775 m^3
- Capacity measurements in m^3

Alternative 4: No Action. Under this alternative there would be no changes to the current regulations for the purse seine fishery which targets tuna species in the EPO. The purse seine vessel capacity limit would remain at 8,969 mt, the capacity measurements would remain in metric tons, and small purse seine vessels for which landings of tuna caught in the Convention Area comprise 50 percent or less of the vessel's total landings, by weight, for a given calendar year, would continue to be exempt from the requirement to be on the Vessel Register.

Summary of Alternative 4

- U.S. purse seine fleet capacity limit of 8,969 mt
- Capacity measurements in mt
- Small purse seine vessels exempt from being on the IATTC Vessel Register

3.0 AFFECTED ENVIRONMENT

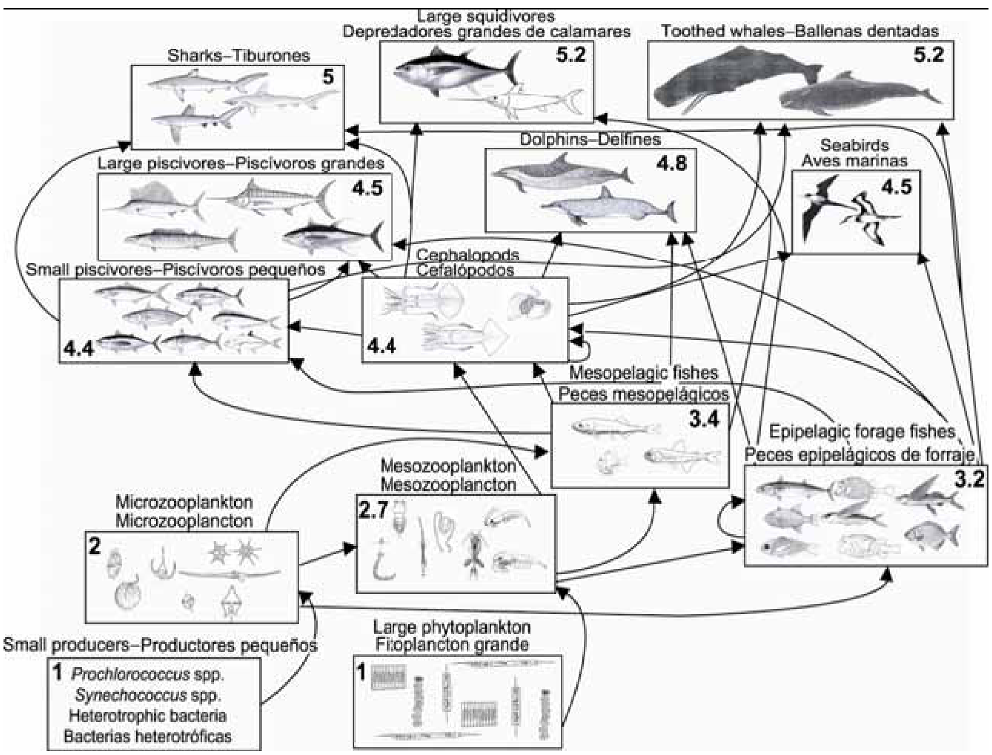
3.1 Introduction

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 chapters: target and non-target finfish, protected species (marine mammal, sea turtle, and seabird species), and the socioeconomic environment (fishermen, processors, consumers, etc.).

3.2 Climate and Biophysical Factors Contributing to Baseline Effects

3.2.1 Pelagic Ecosystem

Figure 3-1 illustrates a simplified food-web diagram of the pelagic ecosystem in the tropical EPO and the approximate trophic levels of each group.



Source: IATTC. 2009. Available on IATTC website: http://www.iattc.org/PDFFiles2/IATTC-80-05-Tunas-and-billfishes-in-the-EPO-2008.pdf

Figure 3-1. Simplified food-web diagram of the pelagic ecosystem in the tropical EPO. The numbers inside the boxes indicate the approximate trophic levels of each group.

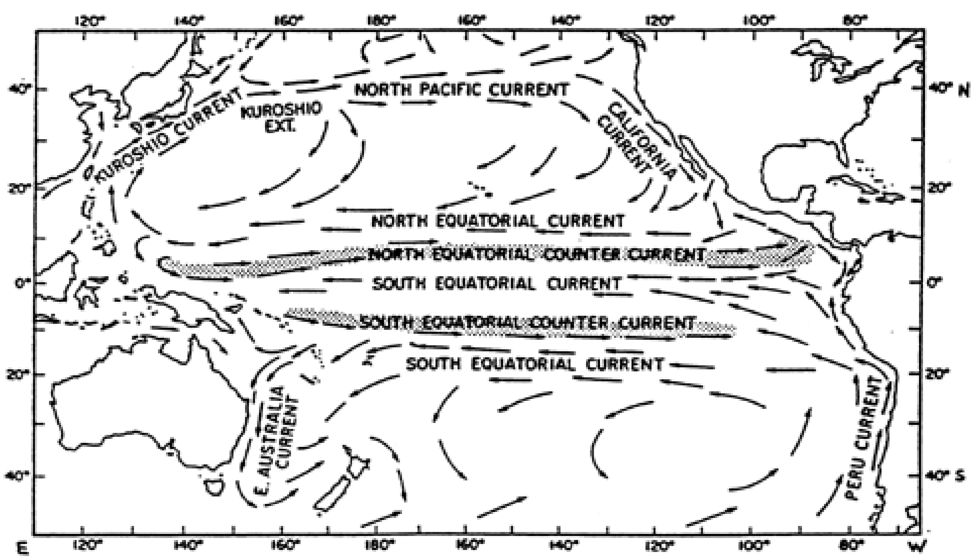
3.2.2 Tuna Movements Correlated to Oceanographic Conditions

The following is a summary of Section 3.1.1 of the EA prepared by NMFS for the implementation of the decisions of the fifth regular session of the WCPFC (NMFS 2009b). Ocean currents transport plankton, fish, heat, momentum, salts, oxygen, and carbon dioxide. Wind is the primary force that drives ocean surface currents; however, Earth's rotation and the wind determine the direction of current flow. Figure 3-

2 illustrates the two main subtropical gyres (the North Pacific subtropical gyre in the northern hemisphere and the South Pacific subtropical gyre in the southern hemisphere) and the other major Pacific Ocean currents.

Subtropical gyres rotate clockwise in the northern hemisphere and counter clockwise in the southern hemisphere in response to trade and westerly wind forcing. Due to this, the Central Pacific Ocean (~20°N-20°S) experiences weak mean currents flowing from east to west, while the northern and southern portions of the Pacific Ocean experience a weak mean current flowing from west to east. Imbedded in the mean flow are numerous mesoscale eddies created from wind and current interactions with the ocean's bathymetry. These eddies, which can rotate either clockwise or counter clockwise, have important biological impacts.

Eddies create vertical fluxes, with regions of divergence (upwelling) where the thermocline shoals and deep nutrients are pumped into surface waters enhancing phytoplankton production, and also regions of convergence (downwelling) where the thermocline deepens. The edges of eddies, or oceanic fronts where the mixing is greatest, are often targeted by fishermen as these are areas of high biological productivity.



Source: http://www.fao.org/docrep/005/t1817e/T1817E12.gif

Figure 3-2. The dominant ocean current systems in the Pacific Ocean.

Oceanic fronts are characterized by steep gradients in temperature and salinity. 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 (see Figure 3-3). 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).

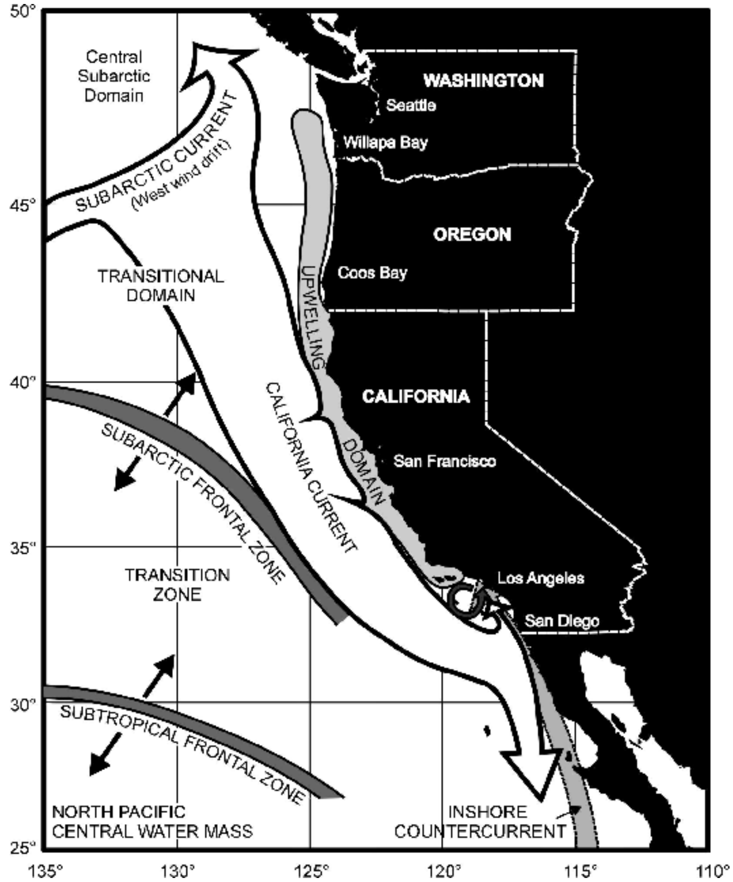


Figure 3-3. Major current and water mass systems that influence essential fish habitat of highly migratory management unit species in the U.S. west coast EEZ.

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).

3.2.3 Climate Variability

The following is a summary of Section 3.2.3 of the draft EA prepared by NMFS to characterize the west coast deep-set longline fishery (NMFS 2008). 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 indicated 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 of El Niños in 1998-99 and 2002-03. The cooling trend was interrupted or may have ended in 2003 (Schwing 2005).

Because the effects are similar, "in-phase" ENSO events (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).

3.2.3.1 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 effects 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 from 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, fishery catches on a stock-wide basis, and a summary of stock status.

3.3.1 Baseline Description of Fisheries in the Proposed Action Area

The target species in the tuna purse seine fishery are bigeye, yellowfin, and skipjack tunas. Baseline descriptions are provided for tuna species, and several major non-target finfish species. The amended HMS FMP provides a detailed description of the baseline environment for most U.S. HMS fisheries operating in the EPO 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, drift gillnet, 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).

A description of the industrial scale purse seine fishery in the IATTC Convention Area is presented followed by a brief description of other fisheries that interact and harvest HMS species.

3.3.1.1 U.S. EPO Purse Seine Fishery

The majority of vessels in the U.S. purse seine fleet operating in the EPO target skipjack and to a lesser extent yellowfin tuna throughout the equatorial regions of the Convention Area.

Fleet Characteristics

There are two components to the U.S. tuna purse seine fishery in the EPO: large vessels (greater than 400 short tons (st)[3] carrying capacity) and smaller vessels (equal to or less than 400 st carrying capacity). The smaller U.S. purse seine vessels that target tuna species in the EPO range from carrying capacity class size 2-5.

The fleet of large vessels fishing in the EPO has been greatly reduced over the past 20 years. At the height of the fishery in the 1970s, the California-based fleet consisted of 140 vessels larger than 100 gross registered tons (Gillet, *et al*. 2002). In the 1960s and 1970s, the vessels of the fleet experienced restrictions on their activities, including: conservation controls resulting in short fishing seasons in the usual EPO fishing grounds, implementation of 200-mile extended jurisdictions of Latin American countries and expansion of fishing fleets in several of those countries, and adoption of U.S. domestic legislation in the early 1970s to protect dolphins. These and other factors motivated many U.S. purse seine vessels to begin fishing in the WCPO (see Figure 3-4; Gillet, *et al*. 2002).

As of June 2010, there are only two U.S. purse seine vessels that are authorized to fish in the IATTC Convention Area and are on the IATTC Vessel Register (one is class size 6 and the other is class size 5).[4] The total U.S. vessel carrying capacity at this time is 1,194 mt; although, this does not include small purse seine vessels. These smaller vessels occasionally land tuna species off the coast of California and are not included on the Vessel Register, but are authorized to fish for tunas in the Convention Area if landings of tuna caught in the Convention Area comprise 50 percent or less of the vessel's total landings, by weight, for a given calendar year. In 2009, there were eight small purse seine vessels that were exempt from being listed on the IATTC Vessel Register and made landings of tuna in the EPO; these vessels amount to an estimated 1,000 mt of capacity, or the equivalent of one large vessel. Large U.S. purse seiners typically target skipjack and yellowfin tuna found in association with drifting logs/flotsam or fish aggregating devices (FADs). In addition, U.S. purse seiners set on unassociated free-swimming schools of tuna ("school sets"). The relative proportion of the different set types has varied considerably over time as oceanographic conditions, regulations, and technology have changed.

Economics

The fish caught by the U.S. EPO purse seine fleet are frozen on board and either delivered directly to canneries or transshipped to carriers that deliver them to canneries. Deliveries are made to canneries in both the United States (American Samoa) and foreign nations (Ecuador, Mexico, Tahiti, Colombia, Costa Rica). The canned product then enters global markets.

Most estimates of ex-vessel revenues in the U.S. purse seine fishery in the EPO 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. Purse seine vessels class size 5 would be considered small business entities (revenues equal to or less than $4 million per year). It is estimated that from 2004-2008, the majority, if not all, class size 5 U.S. purse seine vessels have had revenues of less than $0.5 million

[3] The IATTC uses short tons in its stock status reports. 400 short tons is equal to about 363 metric tons.
[4] For the current list of authorized U.S. purse seine vessels go to the following IATTC website: http://www.iattc.org/VesselRegister/VesselList.aspx?List=AcPS&Lang=ENG

per year[5]. Class size 6 vessels are categorized as large business entities (revenues in excess of $4 million per year). It is estimated that large purse seine vessel typically generate about 4,000 to 5,000 mt of tuna valued at about $4 to $5 million per year[6].

3.3.1.3 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[7] (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, the 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, average annual catch was 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. 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), which is 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).

[5] According to data obtained from PacFIN by NMFS in June 2009.
[6] According to data provided by the IATTC to NMFS in June 2009.
[7] Available on the following IATTC website: http://www.iattc.org/PDFFiles2/IATTC-80-05-Tunas-and-billfishes-in-the-EPO-2008.pdf

Table 3-1. 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.

3.3.2 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).

3.3.2.1 Target Tuna Species

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

Table 3-2 summarizes NMFS' official status of the main fish stocks targeted by U.S. purse seine vessels fishing in the Convention Area. 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 3-2. Stock status summary of select highly migratory fish stocks in the Pacific Ocean for 2008.

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

Source: NMFS 2009.

As shown in Table 3-2 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.

Some of the following summaries (e.g., bigeye, yellowfin, skipjack tunas) are based on RFMO stock assessments that do not reflect Table 3-2; however, these stock assessments are used in international fora and have contributed to the decisions of the IATTC after undergoing stock assessment review panels.

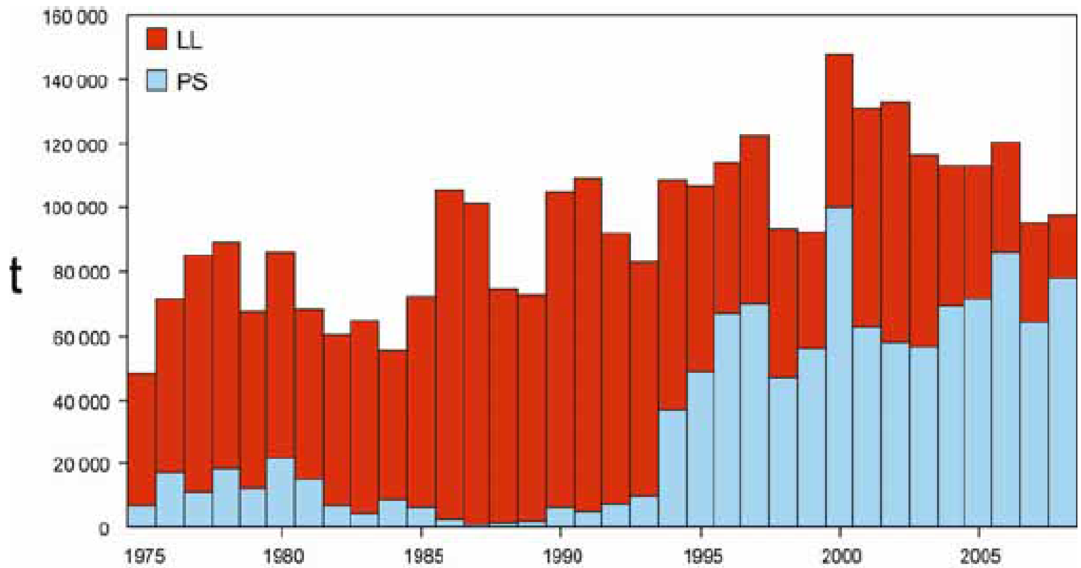
[8] Available on the following NMFS PIRO website: http://www.fpir.noaa.gov/Library/IFD/AX60%20-%20Final%20WCPFC5%20EA%20-%20July%202009.pdf.

Bigeye (*Thunnus obesus*) (Aires-da-Silva and Maunder 2009)

Stock status of bigeye tuna in the EPO is assessed every 1–2 years by the IATTC. The latest assessment was conducted in May 2009 (Aires-Da-Silva and Maunder 2009). The *Stock Synthesis III* assessment model, an integrated statistical age-structured stock assessment model, was used with available data through December 2008. 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 scenarios were examined which differed by the assumption of a stock recruitment relationship, use of a Richards growth curve fit to age at length data derived from otolith data, and extending the assumed western limit of the bigeye stock distribution from 150° W. to 170° E. longitude. The base case assessment assumed no relationship between stock and recruitment and used a von Bertalanffy growth function. 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 at the beginning of January 2009, the spawning biomass of bigeye tuna in the EPO was below the MSY level and near the historic low level. The spawning biomass ratio (the ratio of the spawning biomass at that time to that of the unfished stock; SBR) was about 0.17, which is about 11 percent less than the level corresponding to the MSY, thus the stock is considered overfished. Both recent catches and fishing effort have been above levels corresponding to MSY. Recent catches are estimated to have been 19 percent higher than MSY levels. 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 the MSY is about 81 percent of the current (2006-2008) level of effort, thus the stock is also considered subject to overfishing.

Analyses show that before the expansion of the floating-object fishery in 1993, the MSY was greater than the current MSY and the fishing mortality was below the fishing mortality at MSY (F_{MSY}). If bigeye were only caught in the purse-seine fishery, the MSY would be about 22 percent less than what is currently estimated for all gears combined. However, if bigeye were caught only by the longline fishery the MSY would about 111 percent greater than that estimated for all gears combined. Simulations demonstrated that without the conservation measures put in place through 2007 under IATTC resolutions C-04-09 and C-06-02, the spawning biomass ratio would have decreased to below current levels. Furthermore, continuation of those conservation measures would be insufficient to allow the population to maintain above levels corresponding to the MSY in the long term. The IATTC reached consensus on IATTC Resolution C-09-01 in June 2009 which included time/area closures in the purse seine fishery, a catch limit for bigeye tuna caught in the longline fishery, and a catch retention requirement for tropical tunas caught in the purse seine fishery.

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 the previous IATTC bigeye tuna stock assessment, NMFS determined that the bigeye tuna stocks are experiencing overfishing.



Source: IATTC 2009.

Figure 3-4. 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, 1975-2008. The purse-seine catches are adjusted to the species composition estimate. The 2008 catch data are provisional.

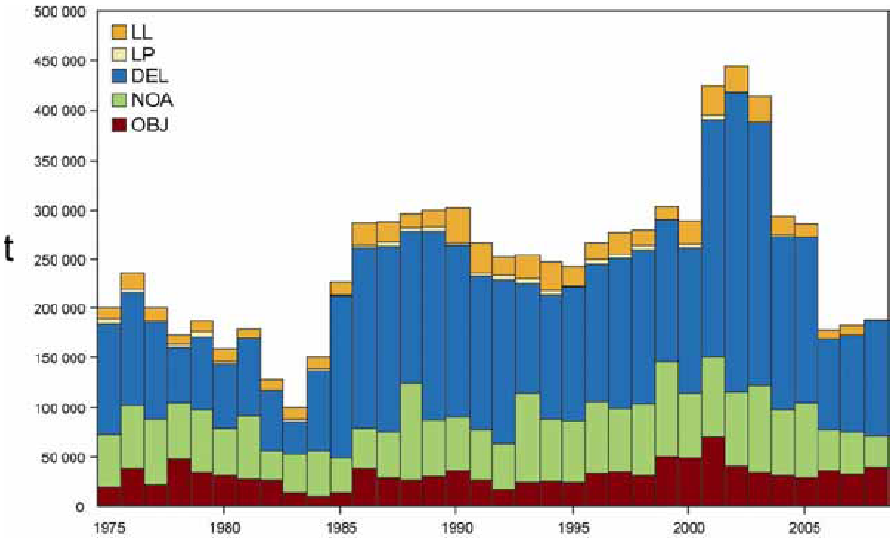
Yellowfin (*Thunnus albacares*) (Maunder and Aires-Da-Silva 2009)

Stock status of yellowfin tuna in the EPO is assessed every 1–2 years by IATTC. The IATTC conducted the latest stock assessment of eastern Pacific yellowfin tuna in May 2009 (Maunder and Aires-Da-Silva 2009). The *Stock Synthesis III* assessment model was used with available data through December 2008. 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 differs substantially from that of 2008 because it uses the Stock Synthesis program; previous assessments have used the A-SCALA program. The estimated biomass is significantly lower than estimated in the previous assessment indicating that the results are sensitive to the changes in assessment methodology. Seven sensitivity analyses were conducted to investigate other sources of uncertainty.

The 2008 base case assessment, which does not include a stock-recruitment relationship, indicates that at the beginning of 2009 the spawning biomass ratio of yellowfin in the EPO was above the level corresponding to MSY, thus the stock is not overfished, and effort levels are estimated to be less than those that would support the MSY, but recent catches are substantially 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 current levels of fishing mortality (2006-2008), the spawning biomass is predicted to slightly decrease, but remain above the level corresponding to MSY. Fishing at F_{msy} is predicted to reduce the spawning biomass slightly from that under current effort and produces slightly higher catches. However, if a stock-recruitment relationship is assumed, the outlook is more pessimistic, and current biomass is estimated to be below the level corresponding to the MSY.

A simulation was done in the 2008 IATTC Stock Assessment of yellowfin tuna (Maunder and Aires-Da-Silva 2008) which indicated that without the conservation measures put in place through 2007 under

IATTC resolutions C-04-09 and C-06-02, including a six week purse seine closure and longline catch limits, biomass and spawning biomass ratio would have decreased to near MSY levels. The IATTC reached consensus on IATTC Resolution C-09-01 in June 2009 which included time/area closures in the purse seine fishery, a catch limit for bigeye tuna caught in the longline fishery, and a catch retention requirement for tropical tunas caught in the purse seine fishery.



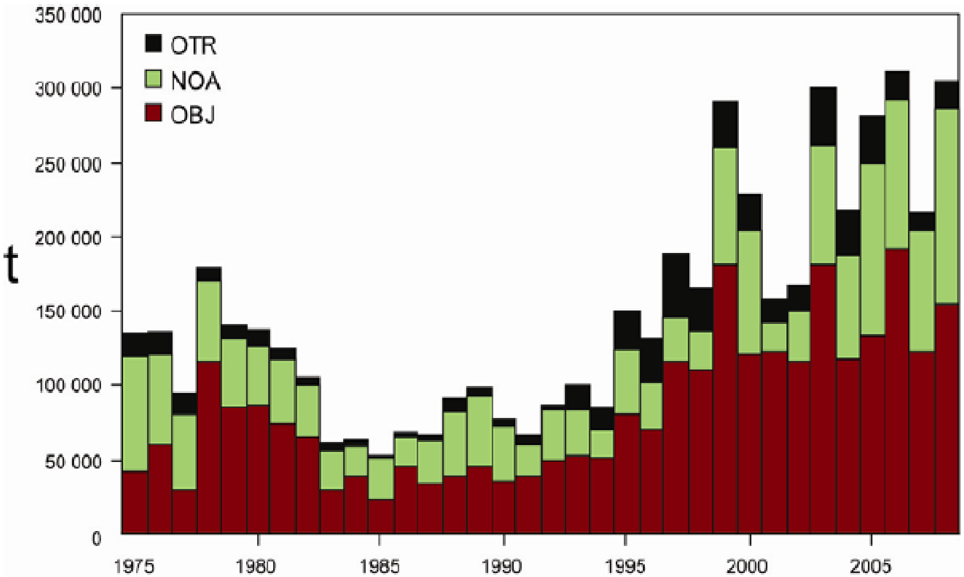
Source: IATTC 2009.

Figure 3-5. 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 2009)

Stock status of skipjack tuna in the eastern Pacific is assessed every 1–2 years if deemed necessary by 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). 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.

Beginning 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). The latest analyses show some inconsistencies (Maunder 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 2009.

Figure 3-6. 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, 1975-2008. The purse-seine catches for 1975-2006 are adjusted to the species composition estimate.

3.3.2.2 Non-target Finfish Species

Overview

The purpose of this section is to discuss the stock status of non-target finfish species that make up a portion of the overall finfish catch in purse seine fisheries in the EPO. Although tuna species are the target species in these fisheries, there are also catches of non-target finfishes. The review of species below includes commercially important finfish species, as well as bycatch species.

Status of Major Non-target Sharks

The focus of the analysis will be on the major non-target shark species, namely silky, oceanic whitetip, scalloped hammerhead, and shortfin mako sharks. Silky sharks are the most commonly-caught species of shark in the purse-seine fishery, followed by oceanic whitetip sharks. 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).

Family Carcharhinidae (NMFS 2009b; IATTC 2009)

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. Preliminary estimates of indices of relative abundance of silky sharks, based on data for purse-seine sets on floating objects in the EPO, show a decreasing trend during 1994-2006; the trends in unstandardized bycatch per set are similar for the other two types of purse-seine sets (standardized trends are not yet available) (IATTC 2009). The unstandardized average bycatches per set of oceanic whitetip sharks also show decreasing trends for all three set types during the same period (IATTC 2009). It is not known whether these decreasing trends are due to incidental capture by the fisheries, changes in the environment (perhaps associated with the 1997-1998 El Niño event), or other factors; the decreasing trends do not appear to be due to changes in the density of floating objects (IATTC 2009).

Family Sphymidae

Scalloped Hammerhead (Sphyrna lewinin) (IUCN 2007)

There has not been a formal stock assessment of the scalloped hammerhead shark stock in the EPO; however there is some available information on biology and catch, and the IUCN has conducted a general assessment of the population. According to an IUCN analysis[9], this species is heavily exploited through its range in the EPO. The species occurs in southern California and the Gulf of California to Panama, Ecuador, and possibly to northern Peru. Of particular concern is increasing fishing pressure at adult aggregating sites such as Cocos Island (Costa Rica) and the Galapagos Islands (Ecuador), and along the slopes of the continental shelf where high catch rates of juveniles can be obtained. The number of adult individuals at a well-known *S. lewini* aggregation site in the Gulf of California (Espiritu Santo seamount) has declined sharply since 1980. Large hammerheads were also formerly abundant in coastal waters off Central America, but were reportedly depleted in the 1970s. A comparison of standardized catch rates of pelagic sharks (species-specific information was not available) in the EEZ of Costa Rica from 1991-2000 showed a decrease of 60 percent. In Ecuador, landings (grouped for the family Sphyrnidae) peaked in 1996 and declined until 2001. Illegal fishing for shark fins is occurring around the Galapagos. There are no species specific data for these fisheries, but *S. lewini* is one of the most common species around the Galapagos and given the high value of its fins, it is very likely being targeted. Divers and dive guides in the Galapagos have noted a severe decrease in shark numbers and schools of hammerhead sharks. Given continued high fishing pressure, observed and inferred declines, the species is assessed as Endangered by the IUCN in this region.

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. Shortfin makos are widely distributed in pelagic waters. Although makos are most frequently found above the mixed layer, they have

[9] The IUCN analysis is available at: http://www.iucnredlist.org/apps/redlist/details/165291/0.

been recorded down to depths of 740 m. Tagging and fishery catch data demonstrate that 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.

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). 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 Finfish

The focus of the analysis will be on the major non-target finfish species caught in the EPO purse seine fishery, namely bluefin tuna, bonitos, black skipjack, dorado, and wahoo. These species were included because there were more than 250 mt of catch (retained and/or discarded) made by the entire purse seine fleet operating in the IATTC Convention Area in 2008 according to a recent IATTC report (IATTC 2009). Bluefin tuna is generally retained and highly marketable; however, it is not the target for the majority of the EPO purse seine fleet. Some countries, such as Mexico, target bluefin tuna with purse seine gear specifically to transfer them to aquaculture farms before selling them as sashimi grade tuna, and some small U.S. purse seiners target bluefin tuna when it comes close to shore; however, the majority of purse seine vessels are targeting tropical tunas in the EPO.

Pacific Bluefin Tuna (*Thunnus orientalis*) (IATTC 2009; ISC 2009)

It is considered that there is a single stock of Pacific bluefin tuna in the Pacific Ocean, given that spawning apparently occurs only in the WCPO. However, tagging studies have shown that there is exchange of bluefin between the eastern and western Pacific Ocean. A stock assessment was carried out by the ISC in 2009. It indicated that recruitment has fluctuated without trend over the assessment period (1952-2006), and does not appear to have been adversely affected by the relatively high rate of exploitation (ISC 2009). Recent recruitment (2005-present) is highly uncertain, making short-term forecasting difficult; in particular, the 2005 year class strength may have been underestimated in this assessment (ISC 2009). If the future fishing mortality rate continues at the current *F* level, the short-term projections (2009-2010) indicate SSB will decline; in the longer term, SSB is expected to attain levels comparable to median SSB levels over the assessment period (ISC 2009). Current *F* (2002-2004) is greater than commonly used BRP that may serve, in principle, as potential target reference points and *F* on recruits (age 0) and on juveniles (ages 1-3) has been generally increasing for more than a decade (1990-2005) (ISC 2009). The catch (in weight) is dominated by recruits and juveniles (ages 0-3). Total catch has fluctuated widely in the range of 9,000-40,000 mt during the assessment period (1952-2006). Recent catch in the Pacific Ocean is near the average for the assessment period (~22,000 mt) (ISC 2009).

Most of the catches of bluefin in the EPO are taken by purse seiners. Nearly all of the purse-seine catch have been made west of Baja California and California, within about 100 nautical miles of the coast, between about 23°N and 35°N (IATTC 2009). The total retained catches of bluefin tuna in the Pacific Ocean from 1952-2007 are available in Figure 3-7. Ninety percent of the catch is estimated to have been between about 60 and 100 cm in length, representing mostly fish 1 to 3 years of age (IATTC 2009). Aquaculture facilities for bluefin were established in Mexico in 1999, and some Mexican purse seiners began to direct their effort toward bluefin during that year. During recent years, most of the catches have been transported to holding pens, where the fish are held for fattening and later sale to sashimi markets. In 2008, 4,406 mt of Pacific bluefin tuna were caught in the purse seine fishery in the IATTC Convention Area and all but 14 mt were retained. Lesser amounts of bluefin are caught by recreational, gillnet, and longline gear. Bluefin have been caught during every month of the year, but most of the fish are taken during May through October (IATTC 2009).

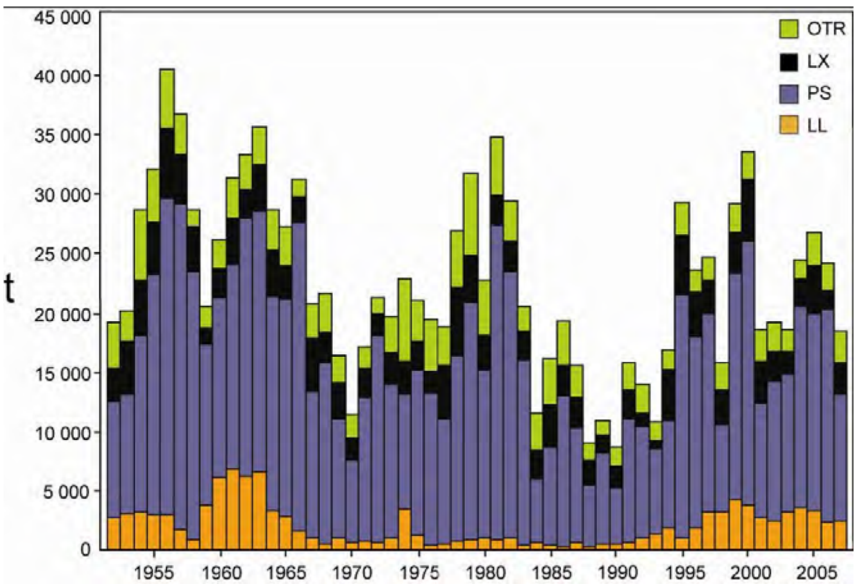


Figure 3-7. Retained catches of Pacific bluefin in the Pacific Ocean, 1952-2007 (IATTC 2009).

Bonitos (genus *Sarda*)

Bonito refers to various species of finfish of the genus *Sarda*, in the mackerel family. Bonitos are fast-swimming pelagic fishes related to tunas. Bonitos are fast-growing and mature at around one year, and females at two years of age. There is no conservation concern for bonitos in the Pacific; although, a formal stock assessment has not been conducted. In 2008, 7,128 mt of bonitos were caught in the purse seine fishery operating in the IATTC Convention Area; all but 65 mt were retained.

Black Skipjack (*Euthynnus lineatus*) (IATTC 2009)

Black skipjack are caught incidentally by fishermen who direct their effort toward yellowfin, skipjack, and bigeye tuna. The demand for this species is low, so some of the catches are discarded at sea; however, it is often mixed with the more desirable species and retained. Twenty-nine samples of black skipjack were taken in 2008. The estimated size compositions for each year of the 2003-2008 period are shown in Figure 3-8. The majority of the purse seine catch of black skipjack in the EPO is caught in sets of floating objects (e.g., FADs and flotsam). In 2008, 6,145 mt of black skipjack were caught in the purse seine fishery; of this 2,561 mt were discarded and 2,283 mt were caught in the floating object fishery.

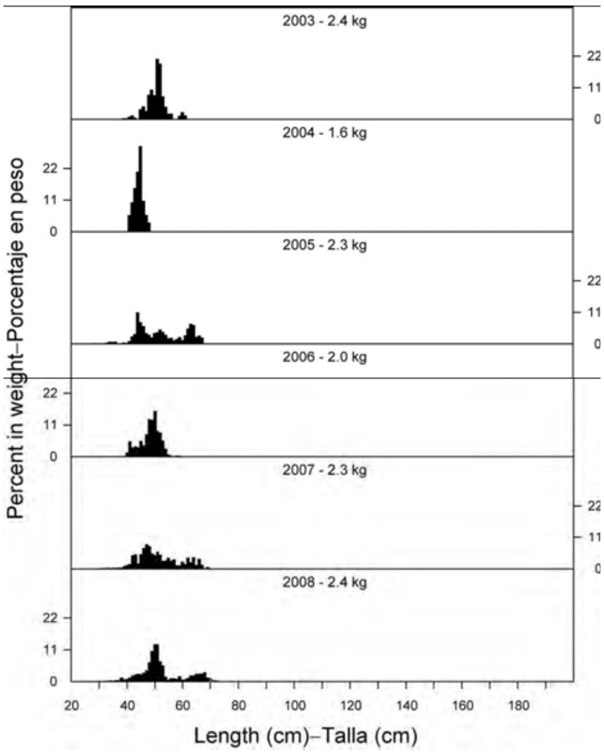


Figure 3-8. Estimated size compositions of the catches of black skipjack by purse-seine vessels in the EPO during 2003-2008 (the values at the tops of the panels are the average weights) (IATTC 2009).

Dorado (*Coryphaena hippurus*) (NMFS 2008)

Dorado are predominantly a warm water tropical species. 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). 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. This species is also important in the recreational private sport fishery. In 2008, the total catch of dorado made by the purse seine fishery was 1,274 mt; of this, 1,166 mt were discarded and 1,274 mt were caught in the purse seine fishery which sets on floating objects.

Wahoo (*Acanthocybium solandri*) (IATTC 2009)

Wahoo are caught incidentally in the purse seine fishery in the EPO and are generally discarded. Wahoo are found worldwide in tropical and subtropical seas; In the Pacific, wahoo are found between 46° N.-35° S. latitude. Wahoo is a fast growing species and can therefore handle relatively high levels of fishing pressure. No formal stock assessment has been conducted for wahoo in the EPO. In 2008, 243 mt of wahoo were discarded in the purse seine fishery; of this, 242 mt were landed in the purse seine fishery setting on floating objects (e.g., FADs and flotsam).

3.4 Protected Species

This section provides information on protected species that may interact with the U.S. purse seine fishery operating in the EPO. 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 are covered under the Marine Mammal Protection Act (MMPA).

3.4.1 Marine Mammals

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. 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

Harbor porpoise (*Phocoena phocoena*) – Morro Bay stock
Harbor porpoise (*Phocoena phocoena*) – Monterey Bay stock
Harbor porpoise (*Phocoena phocoena*) – San Francisco-Russian River stock
Harbor porpoise (*Phocoena phocoena*) – Northern California/Southern Oregon stock
Harbor porpoise (*Phocoena phocoena*) – Oregon/Washington coast stock
Harbor porpoise (*Phocoena phocoena*) – Washington inland waters stock
Dall's porpoise (*Phocoenoides dalli*) – CA/OR/WA stock
Pacific white-sided dolphin (*Lagenorhynchus obliquidens*) – North Pacific stock; CA/OR/WA stock
Risso's dolphin (*Grampus griseus*) – CA/OR/WA stock
Bottlenose dolphin (*Tursiops truncatus*) – California coastal stock
Bottlenose dolphin (*Tursiops truncatus*) – CA/OR/WA offshore stock
Short-beaked common dolphin(*Delphinus delphis)* – CA/OR/WA stock
Long-beaked common dolphin(*Delphinus capensis)* – California stock
Northern right whale dolphin (*Lissodelphis borealis*) – CA/OR/WA stock
Striped dolphin (*Stenella coeruleoalba*) – CA/OR/WA stock
Short-finned pilot whale (*Globicephala macrorhynchus*) – CA/OR/WA
Sperm whale (*Physeter macrocephalus*) – CA/OR/WA stock
Dwarf sperm whale (*Kogia sima*) - CA/OR/WA stock
Pygmy sperm whale (*Kogia breviceps*) - CA/OR/WA stock
Killer whale (*Orcinus orca*) – eastern North Pacific northern resident stock
Killer whale (*Orcinus orca*) – west coast transient stock
Mesoplodont beaked whales (*Mesoplodon* spp.) - CA/OR/WA stocks
Hubbs' beaked whales
Gingko-toothed whale
Stejneger's beaked whales
Blainville's beaked whales
Pygmy beaked whale or Lesser beaked whale
Perrin's beaked whale
Due to the difficulties involved with identifying different species, as well as the rarity of these species, the SAR for these species designated all Mesoplodont beaked whales as one stock in the EEZ waters off the coasts of CA/OR/WA
Cuvier's beaked whale (*Ziphius cavirostris*) - CA/OR/WA stock
Baird's beaked whale (*Berardius bairdii*) – CA/OR/WA stock
Blue whale (*Balaenoptera musculus)* – eastern North Pacific stock
Fin whale (*Balaenoptera physalus*) - CA/OR/WA stock
Humpback whale (*Megaptera novaeangliae*) – central North Pacific stock

North Pacific right whale (*Eubalaena glacialis*) – eastern North Pacific stock
Sei whale (*Balaenoptera borealis)* - eastern North Pacific stock
Minke whale (*Balaenoptera acutorostrata*) – CA/OR/WA stock

Pinnipeds

California sea lion (*Zalophus californianus californianus*) – U.S. stock
Harbor seal (*Phoca vitulina richardsi*) – California stock
Harbor seal (*Phoca vitulina richardsi*) – Oregon and Washington stock
Northern elephant seal (*Mirounga angustirostris*) – California Breeding Stock
Guadalupe fur seal (*Arctocephalus townsendi*)
Northern fur seal (*Callorhinus ursinus*): San Miguel Island stock
Steller sea lion (*Eumetopias jubatus*) – eastern U.S. stock

The ESA-listed marine mammals under NMFS's jurisdiction are listed below (Table 3-3). 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.

Table 3-3. Threatened or endangered species listed under the ESA of NMFS's jurisdiction and occurring in the EPO.

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
Steller sea lion (*Eumetopias jubatus)*	Threatened
Guadalupe fur seal (*Arctocephalus townsendi)*	Threstened

Fishery Effects

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 Part 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 purse seine fishery in the EPO is currently listed as a Category II fishery; however, NMFS is proposing to reclassify the fishery from Category II to Category III in the 2011 proposed list of fisheries (75 FR 36318, June 25, 2010). In the purse seine fishery, interactions with marine mammals are uncommon throughout the Pacific Ocean. The U.S. purse seine fishery in the EPO is listed in the 2009 List of Fisheries with no documented marine mammal species and stocks incidentally killed or injured (73 FR 73032, December 1, 2008). In the U.S. WCPO purse seine fishery, the most recent available data indicates that during 2005 there were two marine mammals (unidentified) encountered on U.S. purse seine vessels in 293 observed sets, and both were listed as dead when returned to the sea (NMFS 2009b).

3.4.2 Sea Turtles

Five species of sea turtles may be found in the proposed action area (section 1.2) and are listed along with their status in Table 3-4.

Table 3-4. 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
Hawksbill (*Eretmochelys imbricata*)	Endangered

3.4.2.1 Species of sea turtles found in the action area

The following sections provide brief status descriptions of the sea turtle species that are found in the action area. More detailed descriptions of these species can be found in the 2004 Biological Opinion (BO) prepared for the HMS FMP. Updates of that data are provided as available for sea turtles.

Green Turtles (NMFS 2008)

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[10].

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 3-5. 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

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

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 3-5. 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).

Central Pacific - Hawaii

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 (personal communication with Balazs, G., NMFS, 2000).

Loggerhead Turtles (NMFS 2008)

The loggerhead turtle is listed as threatened under the ESA throughout its range, primarily due to direct take, incidental capture in various fisheries, and the alteration and destruction of its habitat. Loggerheads are circumglobal, inhabiting continental shelves, bays, estuaries, and lagoons in temperate, subtropical, and tropical waters. Major nesting grounds are generally located in temperate and subtropical regions, with scattered nesting in the tropics (NMFS and USFWS 1998). In the Pacific Ocean, loggerhead turtles are represented by a northwestern Pacific nesting aggregation (located in Japan) which is comprised of separate nesting groups (Hatase, *et al.* 2002) and a smaller southwestern nesting aggregation that occurs in Australia (Great Barrier Reef and Queensland) and New Caledonia (Limpus and Limpus 2003). 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 can be found by reviewing the 5-Year Status Review document published in 2007 by NMFS and the USFWS[11].

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-

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

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.

Distribution and Abundance of loggerheads in the Pacific Ocean

Loggerhead populations can be divided in two nesting aggregations in the Pacific, a northwestern Pacific population located in Japan and a smaller southwestern population occurring in Australia and New Caledonia. The nesting populations in Japan have declined by 50-90 percent in the last 50 years (Kamezaki, *et al.* 2003).

Japan

In the western Pacific, 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; and 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 (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.

In Japan, loggerheads nest on beaches across 13° of latitude (24° N. to 37° N.), from the mainland island of Honshu south to the Yaeyama Islands, which appear to be the southernmost extent of loggerhead nesting in the western North Pacific. Researchers have separated 42 beaches into five geographic areas: (1) the Nansei Shoto Archipelago (Satsunan Islands and Ryukyu Islands); (2) Kyushu; (3) Shikoku; (4) the Kii Peninsula (Honshu); and (5) east-central Honshu and nearby islands. There are nine "major nesting beaches" (defined as beaches having at least 100 nests in one season within the last decade) and six "submajor nesting beaches" (defined as beaches having 10-100 nests in at least one season within the last decade), which contain approximately 75 percent of the total clutches deposited by loggerheads in Japan (Kamezaki, *et al*. 2003).

Australia

In eastern Australia, Limpus and Reimer (1994) reported an estimated 3,500 loggerheads nesting annually during the late 1970s. Since that time, there has been a substantial decline in nesting populations at all sites. Currently, less than 500 female loggerheads nest annually in eastern Australia, representing an 86 percent reduction within less than one generation (Limpus and Limpus 2003).

New Caledonia

Loggerheads are the most common nesting sea turtle in the Île de Pins area of southern New Caledonia. Historically, there was little quantitative information available, and surveys in the late 1990s failed to locate regular nesting. However, anecdotal information from locals indicates that there may be more substantial loggerhead nesting occurring on peripheral small coral cays offshore of the main island. Limpus and Limpus (2003) estimate that the annual nesting population in the Île de Pins area may be in the "tens or the low hundreds". A recent study did identify 60-70 nests on four beaches during the 2004-2005 nesting season (Limpus, *et al*. 2006).

Recently, satellite tracking of loggerheads has provided insight into their behavior and distribution in the Pacific. Loggerheads exhibit shallow dive patterns with more than 90 percent of their dives within the top 40 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). 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). Satellite tracking of loggerheads indicates that they occupy a wide range of SSTs from 15–25° Celsius while in the central North Pacific, 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 subtropical 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 feeding. As adults, loggerheads head back across the Pacific to nesting beaches in Japan. Limited satellite tracking of loggerheads tagged in Baja indicate a due east movement which suggests they may be utilizing the subtropical front at 25–30° N. latitude (Nichols, *et al*. 2000).

Leatherback Turtles (NMFS 2008)

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, 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 is 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[12].

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 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,

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

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 Viet Nam, 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 extent nesting populations are in northern Indonesia at Jamursba-Medi and Wermon.

All leatherbacks in the Pacific face similar threats to their populations including poaching of eggs, killing of nesting females, human encroachment on nesting beaches, incidental capture in fishing gear, beach erosion, and egg predation by wild and domestic animals. Little is known about the status of the western Pacific leatherback nesting populations, but once major leatherback nesting assemblages have declined, some to the point of extirpation. Dutton, *et al*. (2007) report that there may be between 1,100 and 1,800 females nesting annually at 28 nesting sites in the western Pacific. Calculations using the same methods used by Spotila, *et al*. (1996) yield a minimum total estimate of nesting females in this area of approximately 2,700 to 4,500 animals taking into account an estimated re-nesting interval of 2.5 years (Spotila, *et al*. 1996). The actual re-nesting interval for western Pacific leatherbacks may vary from this estimate.

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.

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).

<u>Costa Rica</u>
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[13] 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 3-6.

Table 3-6. 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 (NMFS 2008)

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

[13] 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" (Pritchard 1996).

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[14].

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 3-9) show different levels of fishing effort with darker shading 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)).

<u>Mexico</u>
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).

<u>Costa Rica</u>
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

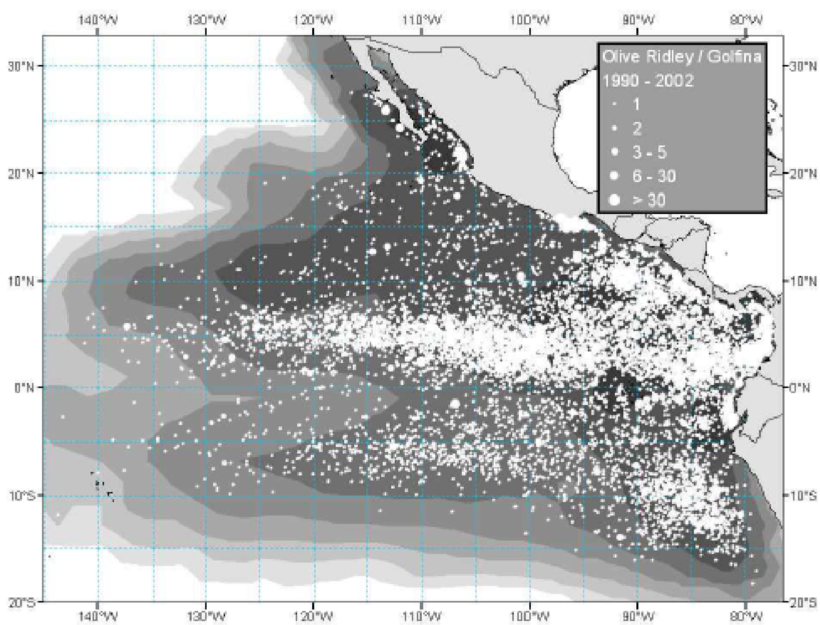
In the western Pacific, olive ridleys are not as well documented as in the eastern Pacific, nor do they appear to be recovering as well. There are small documented nesting sites in Indonesia, Thailand, and Malaysia. In Indonesia, extensive hunting and egg collection, in addition to rapid rural and urban

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

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).



Source: IATTC 2004.

Figure 3-9. Distribution of sightings of olive ridley turtles reported by observers aboard tuna purse-seine vessels, 1990-2002.

Hawksbill Turtle (NMFS 2009b)

Hawksbill turtles are circumtropical in distribution, generally occurring from 30° N. to 30° S. latitude within the Atlantic, Pacific, and Indian Oceans, and associated bodies of water (NMFS 2009b). Anecdotal reports from throughout the Pacific Ocean indicate that the current population is well below historical levels. In the Pacific Ocean, this species is rapidly approaching extinction primarily due to the harvesting of the species for its meat, eggs, and shell, as well as the destruction of nesting habitat by human occupation, disruption, and increased tourism (NMFS 2009b). There is limited information on the biology of hawksbills, probably because they are sparsely distributed throughout their range and they nest in very isolated locations (Eckert 1993). Hawksbills have a relatively unique diet of sponges (Meylan 1985). As a hawksbill turtle grows from a juvenile to an adult, data suggest that the turtle switches foraging behaviors from pelagic surface feeding to benthic reef feeding (Limpus 1992). As with other sea turtles, hawksbills will make long reproductive migrations between foraging and nesting areas but otherwise they remain within coastal reef habitats (Meylan and Donnelly 1999).

3.4.2.2 Other Actions Contributing to the Baseline Condition of Sea Turtles

This section discusses all of the fishery and non-fishery (anthropogenic and natural) impacts on the sea turtles that may interact with the U.S. purse seine fishery. It is important to consider all of the other effects on sea turtle populations to determine the cumulative impacts on the species.

Fishery Effects

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 or are in the process of being conducted. 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 U.S. fisheries that are known to take, or may take, leatherback sea turtles is provided in the NMFS 2004 BO on the HMS FMP (NMFS 2004).

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 WCPO. Observer levels are very low, less than one percent, and there are no observers on Japanese, Korean, or Australian distant water fisheries (NMFS 2004). 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 2004). The species taken, in order of highest to lowest occurrence: olive ridley, green, leatherback, loggerhead, and hawksbill (NMFS 2004). The Japanese tuna longline fleets reported taking 166 leatherbacks in 2000 (IATTC 2004); it is unknown where in the EPO these takes occurred.

In the purse seine fishery, bycatch rates vary according to set type (i.e., unassociated free-swimming tuna schools, tuna schools associated with dolphins, and tuna schools associated with floating objects – including sets on flotsam, logs, and fish aggregating devices (FADs). The U.S. purse seine fleet that operates on the high seas primarily sets on FADs. Sets on FADs are estimated to generate the largest amount of bycatch. One of the least sustainable bycatch species in FAD sets is believed to be sea turtles. In addition to bycatch in sets, on-board observers have reported sea turtles entangled in webbing hanging into the water column underneath some common FAD designs. According to the IATTC, olive ridley sea turtles have the highest rates of interaction and mortality in the purse seine fishery, and the mortality of other sea turtle species is very low. The tuna purse seine tuna fishery in the EPO has a requirement of 100 percent observer coverage on large vessels (vessels greater than 362.8 mt carrying capacity). There is no observer requirement for small purse seine vessels in the EPO; however, NMFS has observed four trips made by small purse seine vessels in the Exclusive Economic Zone off the coast of southern California between September 2004 and September 2005 and no sea turtles were observed interacting with gear. On one trip there was an olive ridley sea turtle sighted when no gear was in the water. Most of these vessels fish on unassociated tuna schools, thus, NMFS believes that the capture of sea turtles is rare or nonexistent.

In the biological opinion prepared for the U.S. tuna purse seine fishery in the EPO in 1999, it was determined that the levels of anticipated take were not likely to result in jeopardy to green, hawksbill, leatherback, loggerhead, or olive ridley turtles or result in any adverse modification of critical habitat. The ITS prepared in 2004 for this fishery amended the take levels and are available in Table 3-7. These estimates were based on effort levels of seven large purse seine vessels operating in the fleet based on the average number of U.S. tuna purse seine vessels operating in the EPO between 1992 and 1999. According to the 2004 ITS, NMFS recognized that the observed takes of listed sea turtles in the tuna purse seine fishery are in some cases orders of magnitude lower than the levels allowed in the amended ITS, and expected sea turtle take levels to remain at low levels in the future relative to the takes allowed by the ITS. Table 3-8 was created from data provided by the IATTC for the 2004 ITS amendment; it provides the actual number of sea turtle interactions by the U.S. tuna purse seine fleet in the EPO from 1993-2008 (the data was only collected from class size 6 vessels, or vessels with a carrying capacity greater than 363 mt, using 100 percent observer coverage). The last two columns in Table 3-7 summarize this information and confirm that the actual capture and mortality of sea turtles has been considerably lower than the estimated capture and mortality for all species.

Table 3-7. Estimated take/mortality levels of U.S. tuna purse seine vessels operating in the EPO (large vessels only) based on the 2004 Incidental Take Statement and actual take/mortality levels based on 100 percent observer coverage of large purse seine vessels.

Species[1]	Estimated Harassment/Capture (every 10 years)	Estimated Mortality (a subset of capture)	Actual Capture (1999-2008)	Actual Mortality[1] (1999-2008); (2002-2008 for loggerheads)
Loggerhead	30	1 every 7 years	6	0
Leatherback	20	1 every 10 years	0	0
Green	350	20 every 10 years	21	0
Hawksbill	20	1 every 10 years	2	0
Olive ridley	1,330	70 every 10 years	165	5

[1] There were 32 unidentified turtles that were also recorded as takes in the observer records; 1 of these was recorded as a mortality.

Table 3-8. Sea turtle interactions by the U.S. tuna purse seine fleet in the EPO (1993-2008), class size 6 purse seine vessels only (100 percent observer coverage by the IATTC Observer Program).

Species/Condition	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Green/Black																
Released unharmed	9	10	16	14	10	3	5	2	2	1	5	0	1	3	2	0
Light injuries	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0
Grave injuries	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Other/Unknown	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Hawksbill																
Released unharmed	0	0	1	0	2	0	0	0	1	1	0	0	0	0	0	0
Leatherback																
Released unharmed	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Loggerhead																
Released unharmed	0	2	0	0	2	0	1	5	0	0	0	0	0	0	0	0
Olive Ridley																
Released unharmed	62	27	48	40	96	38	27	3	16	10	34	23	7	15	8	0
Light injuries	1	0	4	2	2	4	6	2	0	0	7	1	0	0	0	0
Grave injuries	1	0	1	0	0	1	0	0	3	0	0	0	0	1	0	0
Killed	1	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0
Escaped/evaded net	0	0	0	3	2	0	0	1	0	0	0	0	0	0	0	0
Other/Unknown	6	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0
Unidentified																
Entangled alive in flotsam	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Released unharmed	6	9	3	17	7	2	0	3	6	1	10	5	1	1	0	0
Light injuries	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Killed	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Escaped/evaded net	4	2	2	6	1	2	1	1	0	0	0	0	0	0	0	0
Other/Unknown	7	0	0	0	3	1	0	0	0	0	1	0	0	0	0	0
Total:	**98**	**52**	**81**	**86**	**127**	**51**	**40**	**17**	**29**	**13**	**58**	**29**	**10**	**20**	**10**	**0**

* Light injuries are considered to be those that would not be lethal to the turtle.
** Grave injuries are considered to be those that would eventually cause death.
*** "Other" refers to an unknown condition.
Source: IATTC observer data in 2009.

Non-Fishery Effects (NMFS 2008)

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, oil spills, 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 tuna purse seine operations in the EPO, it is estimated that there will be no impacts to seabirds as a result of the proposed action. There are no records or observer data documenting small or large U.S. purse seine vessels' interactions with any species of seabird in the EPO (NMFS 2003). Some species may dive into fish concentrated within or in the vicinity of purse seine nets in pursuit of bait fish, but there are no documented entanglements leading to injury or death (NMFS 2003).

3.6 Socioeconomic Environment

3.6.1 U.S. Commercial Fisheries for Tuna in the EPO

The target species of U.S. purse seine fishing are bigeye, yellowfin, and skipjack tuna. A variety of other commercially viable fish species are sometimes landed as well, including bluefin tuna, bonitos, black skipjack, and dorado. 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).

Purse Seine Fishery

As of March 2010, there are two U.S. purse seine vessels listed on the IATTC Vessel Register; one is class size 5 (273 to 363 mt carrying capacity) and one is class size 6 (greater than 363 mt carrying capacity). From 2000-2008, there was an average of three U.S. purse seine vessels class sizes 4-6 that made catches of yellowfin, bigeye, and skipjack tunas in the EPO. The United States also has a small purse seine fleet that opportunistically targets tunas within the U.S. west coast EEZ. These vessels are class size 2-3. In 2008, eight small purse seine vessels made landing of tuna on the U.S. coast coast.

The larger vessels (class size 6) usually fish outside U.S. waters and deliver their catch to U.S. (e.g., American Samoa, California) or foreign (e.g., Ecuador, Mexico, Panama) ports. Class size 6 vessels are categorized as large business entities (revenues in excess of $4 million per year). The majority of large purse seine vessels typically generate 4,000 to 5,000 mt of tuna valued at about $4 to $5 million per year and fish in both the EPO and WCPO.

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 catch and fishing effort that would occur under each of the alternatives. The baseline is the current level of catch and fishing effort in the purse seine fisheries in the EPO.

Since 1971, the number of large (class size 6) U.S. purse seine vessels fishing for tuna in the EPO has been reduced from over 155 to an average of two over the past seven years. Most of the U.S. vessels that used to fish in the EPO have either re-flagged or are now active in the WCPO, where a treaty between the United States and certain Pacific Island States (i.e., the South Pacific Regional Tuna Treaty which entered into force in 1988) provides the fleet with access to richer fishing grounds. The number of vessels in the U.S. WCPO purse seine fishery gradually decreased from the late 1990s until 2006, and has fluctuated since. Since 2003, there has been an average of two large purse seine vessels and four small purse seine vessels that have landed tuna on the U.S. west coast. Table 4 provides an annual total well volume in m^3 of U.S. purse seine vessels that were listed on the IATTC Vessel Register as of December of each respective year, except for the year 2002, in which data was for July.

Table 4. Total annual well volume (in m^3) of U.S. purse seine vessels that were listed on the IATTC Vessel Register as of December of each respective year.

Year	Well volume (m3)[1]
2002	10,204
2003	11,842
2004	6,008
2005	3,436
2006	3,288
2007	170
2008	781
2009	1,738

Since the end of 2008, the U.S. WCPO purse seine fleet has included 37 vessels. These 37 vessels amount to roughly 55,000 m^3 of carrying capacity. Unless there is a change in the economics of the fisheries, such that fishing in the EPO would be more advantageous for the U.S. fleet, it is unlikely that U.S. vessels will significantly expand their activity in the EPO. In addition, NMFS does not expect any other large vessels to be configured for purse seine fishing and enter into the fishery because of the high start-up costs associated with purchasing a large vessel and the necessary gear and/or retrofitting a vessel to enter the fishery.

NMFS also does not expect a significant influx of smaller vessels into the EPO tuna purse seine fishery. The purse seine fisheries targeting coastal pelagic species (CPS) are limited entry fisheries. Any additional small purse seine vessels that could potentially enter the EPO tuna fishery would either be a new purse seine vessel that would primarily target tuna, or one of the limited entry CPS vessels. It is unlikely that there would be a significant influx of new vessels in the fishery due to the high start-up costs associated with entering the fishery, and it is unlikely that there would be a significant increase in the number of small CPS purse seine vessels that opportunistically target tunas in the summer months as shown by recent fishing practices.

In the purse seine fishery, bycatch rates vary according to set type (i.e., unassociated free-swimming tuna schools, tuna schools associated with dolphins, and tuna schools associated with floating objects – including sets on flotsam, logs, and fish aggregating devices (FADs)). The U.S. purse seine fleet that operates on the high seas primarily sets on FADs. Sets on FADs are estimated to generate the largest amount of bycatch. The tuna purse seine tuna fishery in the EPO has a requirement of 100 percent observer coverage on large vessels (vessels greater than 362.8 mt carrying capacity). Tables 3-7 and 3-8 list mortalities and other takes of sea turtles by such large vessels. There is no observer requirement for small purse seine vessels in the EPO; however, NMFS has observed four trips made by small purse seine vessels in the Exclusive Economic Zone off the coast of southern California between September 2004 and September 2005 and no sea turtles were observed interacting with gear. On one trip there was an olive ridley sea turtle sighted when no gear was in the water. Most of these vessels fish on unassociated tuna schools, thus, NMFS believes that the capture of sea turtles by small purse seine vessels in the EPO is rare or nonexistent.

4.2 Direct and Indirect Impacts of Alternative 1 (Preferred Alternative)

It is estimated that if Alternative 1 were adopted, there would not be a significant change in the catch and fishing effort currently taking place in the purse seine fishery in the EPO for the reasons specified in Section 4.1 and thus it is unlikely that there would be a significant change in the impacts to the human environment. The total carrying capacity in the IATTC Convention Area is limited to 158,000 m^3 and Alternative 1 would ensure that the U.S. portion of this capacity would not be exceeded. In addition, there are other management measures currently in place to limit fishing mortality and effort in fisheries managed by the IATTC. Of particular relevance, in 2009 the IATTC adopted Resolution C-09-01 which established catch limits on bigeye tuna caught in the longline fishery, time/area closures for the purse seine fishery, and catch retention requirements in the purse seine fishery. These measures were put in place primarily to limit the fishing mortality of bigeye and yellowfin tuna. The United States implemented these measures in November 2009 (74 FR 61046, November 23, 2009).

As of July 2010, there are only two large U.S. purse seine vessels listed on the Vessel Register and authorized to fish in the IATTC Convention Area. The total U.S. vessel carrying capacity at this time is 1,194 mt. In 2009, there were eight small purse seine vessels that were exempt from being listed on the IATTC Vessel Register and made landings of tuna in the EPO; these vessels amount to an estimated 1,000 mt of capacity, or the equivalent of about one or two large vessels. If the proposed rule were adopted, it is possible, although unlikely, that the effort in the purse seine fishery operating in the EPO could increase substantially. The carrying capacity limit being proposed is about three times larger than the carrying capacity limit currently in place. This would allow for about half of the large purse seine vessels that are currently registered to fish in the WCPO to be on the IATTC Vessel Register and be eligible to fish in the EPO. However, the current capacity limit of 8,969 mt has never been fully utilized since it was established in 2005 and when excess U.S. capacity has been available in the past, there has not been a surge to use this capacity. Thus, it is apparent that there has not been a high demand for additional vessels to enter the fishery.

In 2008, the Western and Central Pacific Fisheries Commission (WCPFC) adopted a conservation and management measure (CMM-2008-01) that established a three month closure in the WCPO to fishing on fish aggregating devices with purse seine gear. This closure could result in an increase in the number of WCPO vessels interested in operating in the IATTC Convention Area. This did not occur during the 2009 closure; however, NMFS/SWR staff has heard that some vessel managers are considering shifting effort to the IATTC Convention Area in the future.

In April 2010, the Deepwater Horizon drilling rig explosion led to a massive ongoing oil spill in the Gulf of Mexico. This oil spill is now considered the largest offshore oil spill in U.S. history and has led to the closures of most fisheries in the region. There is a potential for the U.S. purse seine fishermen in this area to shift their operations to the EPO to target tunas; however, NMFS SWR staff has not received any indication that this will occur or is even being considered at this time.

In the unlikely event that the increase in capacity led to an increase in total effort in the fishery, of particular importance would be the potential increase in impacts to the bigeye tuna stock, which NMFS considers subject to overfishing, and to endangered sea turtles. NMFS SFD initiated an informal Section 7 consultation with NMFS PRD in regards to the potential impacts to sea turtles on July 23, 2010. NMFS SFD estimates that the proposed action would be within the scope of the 1999 BO that analyzed the purse seine fishery for tunas and the amended 2004 ITS due to the fact that the actual observed take and mortality rates have been substantially lower than the estimated take and mortality rates in the 1999 BO and 2004 ITS. In addition, if the take of sea turtles ever exceeded the ITS, re-initiation of consultation would be required and if necessary, emergency rules would be implemented to close the fishery to protect ESA-listed species. Regarding the potential impacts to bigeye tuna, bigeye tuna is a highly migratory species and subject to impacts from numerous international fisheries, particularly the longline fisheries. Thus, the species needs to be managed through RFMOs like the IATTC. As mentioned previously, the IATTC has other measures in place to minimize impacts to bigeye tuna in the EPO and to ensure that it is being harvested sustainably. In addition, the CPCs to the IATTC adopted IATTC Resolution C-02-03 which authorized 31,775 m^3 of carrying capacity in the U.S. purse seine fishery, and this limit would not be exceeded under Alternative 1. There is also the potential for an increase in the socioeconomic benefits to fishermen and stakeholders in the purse seine fishery if increased capacity led to an increase in effort and resultant tuna harvest.

Changing the capacity measurements from metric tons to m^3 is an administrative change that would not impact the human environment. Since 2000, the IATTC has used well volume, in m^3, instead of weight, in metric tons, to measure the carrying capacities of vessels. Because a well can be loaded with different densities of fish, measuring carrying capacity in weight is subjective, as a load of fish packed into a well at a higher density weighs more than a load of fish packed at a lower density. Using volume as a measure of capacity eliminates this problem. The IATTC staff began collecting capacity data by volume in 1999, but has not yet obtained this information for all vessels. For vessels for which reliable information on well volume is not available, the estimated capacity in metric tons is converted to m^3 using a conversion factor of 1.17051 m^3 which is used by the IATTC. Thus, if the United States switches to cubic meter measurements it would benefit the IATTC and make measurements less subjective.

Removing the current exemption that allows small purse seine vessels to fish for tuna opportunistically without being on the IATTC Vessel Register is also administrative in nature and would not result in significant impacts to the human environment. Removing the exemption would make U.S. regulations more consistent with the active IATTC Resolutions which require that all vessels fishing for tuna in the Convention Area be listed on the IATTC Vessel Register. These vessels would have to apply to be on the Vessel Register every year if they anticipate fishing for tunas; however, there would be no associated cost for registering to be on the IATTC Vessel Register because there are no IATTC observer requirements for vessels under class size 6. Although these smaller vessels would be required to be listed on the IATTC Vessel Register, these vessels would be exempted from the frivolous request provisions for active status at 50 CFR 300.22(b)(4)(ii). The frivolous request provisions essentially penalize vessels that apply to be on the Vessel Register during a calendar year and do not fish for tuna in the EPO in that same calendar year, by putting them at the bottom of the hierarchy when applying to be on the Vessel Register the following year. These provisions are meant to prevent vessel owners who do not have any intent to fish in the Convention Area from applying to be on the Vessel Register and take up valuable capacity. The smaller vessels would be exempt from these provisions because it would be difficult, if not impossible, for the vessel owners to anticipate whether unassociated schools of tuna would come within fishing range off the U.S. west coast during the summer months in a given year.

4.2.1 Cumulative Impacts of Alternative 1

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 (40 CFR 1508.7).

As mentioned above, the target and non-target species in the purse seine 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, artisanal and industrial international fishing fleets). 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.

Resolution C-02-03 was adopted by all of the High Contracting Parties to the IATTC and establishes a total vessel capacity limit of 158,000 m^3 and a vessel capacity limit for each of the High Contracting Parties in the IATTC Convention Area. In addition, IATTC Resolution C-09-01 was adopted in 2009 and establishes time-area closures, catch retention requirements, and a quota on the amount of bigeye that can be retained in the longline fishery. Thus, there are other measures in place to manage the fleets and limit the pressure on tuna stocks in the EPO. In addition, the WCPFC recently adopted a Conservation and Management Measure (CMM-2008-01) in the WCPO which, among other things, establishes bigeye tuna catch limits in longline fisheries, purse seine effort limits, and fish aggregating device (FAD) prohibition periods in order to decrease the fishing mortality of bigeye and yellowfin tuna in the WCPO.

4.3 Direct and Indirect Impacts of Alternative 2

The impacts of Alternative 2 would be very similar to those described under Alternative 1 in Section 4.2. The difference between the two alternatives is that Alternative 2 would not remove the exemption that allows small purse seine vessels to fish for tuna opportunistically without being on the IATTC Vessel Register. Because this change is administrative in nature, it is not likely to change the impacts described in Alternative 1. However, retaining the exemption would keep U.S. regulations less consistent with the active IATTC Vessel Register Resolution (IATTC Resolution C-00-06), which requires that all vessels fishing for tuna in the Convention Area be listed on the IATTC Vessel Register, compared to the preferred alternative.

4.3.1 Cumulative Impacts of Alternative 2

The cumulative impacts of Alternative 2 would be similar to those described under Alternative 1 in Section 4.2.1 because the only difference between the two alternatives is administrative.

4.4 Direct and Indirect Impacts of Alternative 3

Alternative 3 would give NMFS the discretion to increase the carrying capacity in the purse seine fishery operating in the EPO from 8,969 metric tons (or about 10,498 m^3) to 31,775 m^3 based on specific criteria. However, the vessel capacity limit would not be automatically increased if this alternative were adopted because there appears to be limited demand for additional vessel capacity at this time. This would decrease the likelihood that capacity and fishing effort in the purse seine fishery would increase. Thus, the potential for increased impacts to the human environment would also be decreased. Alternative 3 would result in less potential positive socioeconomic impacts to participants and stakeholders in the purse seine fishery. However, if in the future certain criteria were met and NMFS used its discretion to increase the total capacity for the fleet to 31,775 m^3, impacts to the human environment would be similar to those described under Alternatives 1 and 2 in Section 4.3.

The criteria that NMFS would use to determine whether to use its discretion to increase the total capacity in the fishery would be the following:

1) The target stocks of the purse seine fishery (i.e., skipjack, bigeye, and yellowfin tunas) are not subject to overfishing or in an overfished state according to the most recent NMFS Status of the Stocks Report;

2) Effective tuna conservation and management measures have been adopted by the IATTC and implemented by the Parties to the IATTC and include measures that limit the effort and/or fishing mortality of the purse seine fishery in the EPO;

3) There is demand for capacity in excess of the 8,969 metric tons (or about 10,598 m^3) limit in the purse seine fishery in a given calendar year;

These criteria would limit the uncertainty associated with the potential impacts that could result from increasing the carrying capacity in the purse seine fishery.

Under this alternative, the capacity measurements would be amended so that they would be in cubic meter measurements, however, this administrative change would not result in a change in impacts to the human environment. Alternative 3 would also give precedence to vessels applying to be on the Vessel Register that are qualified to land in U.S. ports; however, there would be no change in impacts from this administrative change. In addition, Alternative 3 would continue to allow small purse seine vessels for which landings of tuna caught in the Convention Area comprise 50 percent or less of the vessel's total landings, by weight, for a given calendar year, to be exempt from the requirement to be on the Vessel Register, so no changes to the baseline would result. However, retaining the exemption would make U.S. regulations less consistent with the active IATTC Vessel Register Resolution (IATTC Resolution C-00-06) which requires that all vessels fishing for tuna in the Convention Area be listed on the IATTC Vessel Register.

4.4.1 Cumulative Impacts of Alternative 3

The cumulative impacts of Alternative 3 would be similar to those described under Alternative 1 in Section 4.2.1; however, under Alternative 3 there would be less uncertainty about the cumulative impacts due to the criteria established that would give NMFS the discretion to increase the capacity in the purse seine fishery. In particular, the first criterion would ensure that capacity would not be increased if the target species in the purse seine fishery were subject to overfishing or in an overfished state.

4.5 Direct and Indirect Impacts of Alternative 4: No Action

Under this alternative there would be no revisions to the current vessel capacity limit or other regulations pertaining to the purse seine fishery that targets tuna species in the EPO. Thus, there would be no change in the impacts to the human environment from the purse seine fishery. The U.S. regulations in place would not be as consistent as they could be with the proposed changes; however, the United States current interpretation of the IATTC Vessel Capacity Resolution (Resolution C-02-03) would still satisfy our obligations as a member of the IATTC.

4.5.1 Cumulative Impacts of Alternative 4

Since there would be no change from the status quo under Alternative 4, there would be no change in the impacts to the human environment.

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5.0 CROSS-CUTTING MANDATES

5.1 Other Federal Laws

5.1.1 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.

5.1.2 Endangered Species Act (ESA)

A Section 7 consultation was conducted for the tuna purse seine fishery in the EPO in 1999[15] and the ITS was amended in 2004. The 1999 consultation concluded that the purse seine fishery would not be likely to jeopardize the continued existence of endangered or threatened species. NMFS SFD estimates that the proposed action would be within the scope of the 1999 BO that analyzed the purse seine fishery for tunas and the amended 2004 ITS due to the fact that the actual observed take and mortality rates have been substantially lower than the estimated take and mortality rates in the 1999 BO and 2004 ITS. NMFS SFD has initiated an informal consultation with NMFS PRD to ensure that the action is within the scope of the initial consultation.

5.1.3 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, EEZ, or the equivalent of any nation, to the extent that these areas are recognized by the United States. Each of the vessels that would be affected by the proposed action are in compliance with this act and have an HSFCA permit.

5.1.4 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. The purse seine fishery in the EPO is currently listed as a Category II fishery under Section 118 of the MMPA. However, NMFS is proposing to reclassify the fishery from Category II to Category III in the 2011 proposed list of fisheries (75 FR 36318, June 25, 2010). In the U.S. purse seine fishery, interactions with the marine mammals are uncommon throughout the Pacific Ocean. The purse seine fishery in the EPO is listed in the 2009 List of Fisheries with no documented marine mammal species and stocks incidentally killed or injured (73 FR 73032, December 1, 2008).

[15] The BO for the interim final rule for the continued authorization of the United States tuna purse seine fishery in the eastern tropical Pacific Ocean under the Marine Mammal Protection Act and the Tuna Conventions Act as revised by the International Dolphin Conservation Program Act was finalized in December 1999 and conducted by the NMFS Office of Protected Resources in the Southwest Regional Office. It was amended in January 2001 and July 2004.

5.1.5 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. All of the fishing that would be affected by the proposed action occurs in Federal waters (seaward of three nautical miles), or on the high seas, so the fishery would not be subject to the MBTA. In addition, no impacts to seabirds are anticipated.

5.2 Executive Orders (EO)

5.2.1 EO 12866 Regulatory Impact Review (RIR)

EO 12866, Regulatory Planning and Review, was signed on September 30, 1993. EO 12866 requires that the economic impacts of proposed government regulations on the national economy be assessed before implementation. In most instances, the measurement of changes to gross domestic product is an accurate measure of impact. "In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory measures, including the alternative of not regulating" (EO 12866, Section 1). The emphasis of the analysis is on expected changes in net benefits that occur as a result of the proposed management measures. The government should choose only those sets of regulations that produce positive benefits while considering social and distributional effects. NMFS requires that this analysis be done through a regulatory impact review (RIR) for all regulatory actions that are of public interest. The RIR also includes analysis of distributive impacts and the costs of government administration and private compliance with the proposed measures. See the proposed rule for this action for further analysis of the expected economic effects on businesses, particularly small business entities. The proposed rule has been determined to be not significant for purposes of Executive Order 12866. The RIR is contained within the sections of this document and key elements of the RIR are cited below:

- Description of the management objections: Section 1.4, Purpose and Need and Section 1.5, Background.
- Description of the fishery: Section 3.3.1, Baseline Description of Fisheries in the Proposed Action Area.
- Statement of the problem: Section 1.4, Purpose and Need and Section 1.5, Background.
- Description of each alternative: Section 2, Alternatives.
- Economic Analysis: Section 3.3.1, Baseline Description of Fisheries in the Proposed Action Area, Section 3.6, Socioeconomic Environment and Section 4, Environmental Consequences.

5.2.2 EO 12898 (Environmental Justice)

EO 12898 obligates Federal agencies to identify and address "disproportionately high adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations in the United States" as part of any overall environmental impact analysis associated with an action. NOAA guidance, NOAA Administrative Order 216-6, Environmental Review Procedures for Implementing the National Environmental Policy Act, at Section 7.02, states that "consideration of EO

12898 should be specifically included in the NEPA documentation for decision-making purposes." Agencies should also encourage public participation especially by affected communities during scoping, as part of a broader strategy to address environmental justice issues.

There would not be any significant adverse human health or environmental effects on any population in the United States, including minority and low-income groups. The proposed action would occur at sea and would not likely affect any population. Thus, there will not be any disproportionately high and adverse human health or environmental effects on minority and low income populations in the United States. There will be a notice in the Federal Register announcing when NMFS will be accepting public comments; substantive public comments will be considered in the review and in the Final EA. NMFS encourages public participation in these decisions, especially by communities that could experience disproportionately high and adverse impacts.

5.2.3 EO 13132 Federalism

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

The proposed rule being analyzed includes no conflicts with State law and imposes no mandates on States; the longline fishery and purse seine fisheries in the EPO are not managed by the States. This action does not contain policies with federalism implications under E.O. 13132.

5.2.4 EO 13175 Consultation and Coordination with Indian Tribal Governments

EO 13175 is intended to ensure regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen the United States government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes. The Secretary recognizes the sovereign status and co-manager role of Indian tribes over shared Federal and tribal fishery resources. At section 302(b)(5), the Magnuson-Stevens Act reserves a seat on the Council for a representative of an Indian tribe with federally-recognized fishing rights from California, Oregon, Washington, or Idaho. The U.S. government formally recognizes the four Washington coastal tribes (Makah, Quileute, Hoh, and Quinault) have treaty rights to marine fish. In general terms, the quantification of those rights is 50 percent of the harvestable surplus of groundfish available in the tribes' usual and accustomed fishing areas (described at 50 CFR 660.324). Each of the treaty tribes has the discretion to administer their fisheries and to establish their own policies to achieve program objectives.

The proposed action in the EPO will not have tribal implications as defined in E.O. 13175.

5.2.5 EO 13186 Responsibilities of Federal Agencies to Protect Migratory Birds

EO 13186 supplements the MBTA by requiring Federal agencies to work with USFWS to develop memoranda of agreement to conserve migratory birds. NMFS is in the process of implementing a memorandum of understanding. The protocols developed by this consultation will guide agency regulatory actions and policy decisions in order to address this conservation goal. The EO also directs agencies to evaluate the effects of their actions on migratory birds in environmental documents prepared pursuant to the NEPA. Impacts to seabirds are not anticipated by this action.

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6.0 LIST OF PREPARERS

Name and Affiliation	Responsibility
Heidi Hermsmeyer, IATTC Coordinator, NMFS SWR	Project management

7.0 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[16] and an email will be sent announcing its availability on the NMFS Southwest Region HMS list-servers. NMFS is also requesting public comments on this EA when the proposed rule for this action is published in the Federal Register. NMFS will also distribute copies of this final EA upon request.

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

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