



# **PROGRAMMATIC ENVIRONMENTAL ASSESSMENT**

**To Revise U.S. Commercial Fishing Regulations for Rebuilding  
Pacific Bluefin Tuna in the Eastern Pacific Ocean**

**PREPARED BY:**

**DEPARTMENT OF COMMERCE  
NATIONAL MARINE FISHERIES SERVICE  
WEST COAST REGION  
LONG BEACH, CALIFORNIA**



**APRIL 2015**

---

---

**Cover Sheet**

**Programmatic Environmental Assessment to Revise U. S. Commercial Fishing Regulations for Rebuilding Pacific Bluefin Tuna in the Eastern Pacific Ocean**

Proposed Action:	Establish U.S. commercial fishing limits on PBF in the eastern Pacific Ocean.
Type of Statement:	Environmental Assessment
For Further Information:	Amber Rhodes (Amber.Rhodes@noaa.gov) Fishery Policy Analyst  Heidi Taylor (Heidi.Taylor@noaa.gov) Supervisory Fishery Policy Analyst  National Marine Fisheries Service West Coast Region 501 West Ocean Boulevard, Suite 4200 Long Beach, CA 90802 Telephone: (562) 980-4039

---

## Abstract

The National Marine Fisheries Service proposes regulations under authority of the Tuna Conventions Act of 1950, as amended, to implement commercial limits for Pacific bluefin tuna harvest (*Thunnus orientalis*) in the eastern Pacific Ocean that are consistent with resolutions adopted by the Inter-American Tropical Tuna Commission. The Inter-American Tropical Tuna Commission Convention Area includes the waters of the eastern Pacific Ocean bounded by the coast of the Americas, the 50° N. and 50° S. parallels, and the 150° W. meridian. Resolutions on Pacific bluefin tuna measures have been adopted by the Inter American Tropical Tuna Commission since 2012. These resolutions typically include two catch limits: (1) a Commission-wide limit for all commercial fishing vessels of all Inter-American Tropical Tuna Commission Members and Cooperating Non-Members fishing in the Inter-American Tropical Tuna Commission Convention Area of the eastern Pacific Ocean and (2) a catch limit for each Member and Cooperating Non-Member with a historical record of Pacific bluefin tuna catch from the eastern Pacific Ocean—such as the United States—to allow these nations to catch a small share of Pacific bluefin tuna even if the Commission-wide limit is reached. In addition to domestically implementing measures included in Resolutions adopted by the Inter-American Tropical Tuna Commission, the Pacific Fishery Management Council and/or the National Marine Fisheries Service may see a need to include additional specifications (e.g., trip limits, monitoring requirements, and/or forfeiture of overages) in the regulations to ensure effective monitoring and management. The proposed regulations would apply only to U.S. vessels that commercially catch Pacific bluefin tuna in the eastern Pacific Ocean, and ensure that the United States is satisfying its obligations as a member of the Inter-American Tropical Tuna Commission. The National Marine Fisheries Service is obligated to implement and enforce regulations consistent with Inter-American Tropical Tuna Commission resolutions and does not make substantive decisions regarding the measures contained in resolutions when promulgating such actions. Given that the Pacific bluefin tuna stock is overfished and subject to overfishing (80 FR 12621; March 10, 2015), the National Marine Fisheries Service anticipates that the Inter-American Tropical Tuna Commission (with input from the U.S. Department of State and the U.S. Delegation) will resolve to impose catch limits for Pacific bluefin tuna into the foreseeable future. This Programmatic Environmental Assessment includes essential components of environmental impact analyses in accordance with the National Environmental Policy Act to consider a range of Pacific bluefin tuna catch limits for U.S. commercial vessels fishing in the Convention Area and to assess the potential environmental impacts on the human environment that could result from the proposed action. If future Inter-American Tropical Tuna Commission resolutions fall within the scope of alternatives analyzed in this Programmatic Environmental Assessment and the impacts or the affected environment have not significantly changed, this document may be used to analyze the impacts of those actions. The 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.

---

---

**Table of Contents**

**1.0 INTRODUCTION..... 1**

1.1 Proposed Action ..... 2

1.2 Proposed Action Area..... 2

1.3 Purpose and Need..... 3

1.4 Background..... 4

**2.0 ALTERNATIVES PROPOSED FOR THE U.S. COMMERCIAL FISHERY ..... 5**

**3.0 AFFECTED ENVIRONMENT..... 8**

3.1 Climate and Biophysical Factors Contributing to Baseline Effects ..... 8

3.1.1 Pacific Bluefin Tuna in the Pelagic Ecosystem..... 8

3.1.2 Oceanographic Conditions and the Distribution of Pacific Bluefin Tuna..... 9

3.1.3 Climate Variability ..... 10

3.1.3.1 Climate Change ..... 11

3.2 Commercial Fisheries ..... 12

3.2.1 Baseline Description of Commercial Fisheries in the Proposed Action Area..... 13

3.2.2 Baseline Description of U.S. Commercial Fisheries in the Proposed Action Area ..... 13

3.2.2.1 U.S. Coastal Purse Seine Fishery ..... 14

3.2.2.2 California DGN Fishery ..... 14

3.2.3. Pacific Bluefin Tuna Stock Status ..... 15

3.3 Essential Fish Habitat and Protected Species..... 16

3.4 Socioeconomic Environment..... 17

**4.0 ENVIRONMENTAL CONSEQUENCES..... 18**

4.1 Direct and Indirect Impacts of Alternative 1 (Preferred Alternative)..... 19

4.2 Direct and Indirect Impacts of Alternative 2 ..... 21

4.3 Direct and Indirect Impacts of Alternative 3 ..... 21

4.4 Direct and Indirect Impacts of Alternative 4 ..... 22

4.5 Direct and Indirect Impacts of Alternative 5: No Action ..... 23

4.6 Cumulative Impacts..... 23

**5.0 APPLICABLE MANDATES: Federal Laws and Executive Orders ..... 25**

5.1 Coastal Zone Management Act (CZMA) ..... 25

5.2 Endangered Species Act (ESA)..... 25

5.3 High Seas Fishing Compliance Act (HSFCA) ..... 25

5.4 Marine Mammal Protection Act (MMPA) ..... 25

5.5 Migratory Bird Treaty Act (MBTA) ..... 25

5.6 EO 12866 Regulatory Impact Review (RIR) ..... 26

5.7 EO 12898 Environmental Justice ..... 26

5.8 EO 13132 Federalism ..... 26

5.9 EO 13175 Consultation and Coordination with Indian Tribal Governments ..... 27

5.10 EO 13186 Responsibilities of Federal Agencies to Protect Migratory Birds ..... 27

5.11 EO 12114 Environmental Effects Abroad of Major Federal Actions ..... 27

---

<b>6.0</b>	<b>LIST OF PREPARERS AND PERSONS AND AGENCIES CONSULTED .....</b>	<b>28</b>
<b>7.0</b>	<b>REFERENCES CITED .....</b>	<b>29</b>

**List of Figures**

Figure 1. Map of Proposed Action Area.....	3
Figure 3-1. Simplified food-web diagram of the pelagic ecosystem in the tropical EPO. ....	7
Figure 3-2. The dominant ocean current systems in the Pacific Ocean.....	8
Figure 3-3. Major current and water mass systems that influence essential fish habitat of highly migratorymanagement unit species in the U.S. west coast EEZ.....	9
Figure 3-4. West Coast ommercial landings of Pacific Bluefin Tuna (in Metric Tons), 1981–2012.....	11
Figure 3-5. U.S. coastal purse seine and DGN commercial landings of PBF caught in the EPO (in mt)....	17

**List of Tables**

Table 1-1. Potential scenarios for U.S. commercial catch of Pacific bluefin tuna (in metric tons) from the eastern Pacific Ocean for a two-year IATTC resolution.....	2
Table 4-1: Size of landings (in metric tons (mt)) from trips targeting Pacific bluefin tuna in the EPO from 2004 to 201.....	21

---

## List of Acronyms

CCS- California Current System  
CFR- Code of Federal Regulations  
CPC- Cooperating Non-Parties to the 1949 Convention for the establishment of an Inter-American Tropical Tuna Commission  
CPS- Coastal Pelagic Species  
DGN- Drift Gillnet  
EA- Environmental Assessment  
EEZ- Exclusive Economic Zone  
EFH- Essential Fish Habitat  
EO- Executive Order  
EPO- Eastern Pacific Ocean  
ESA- Endangered Species Act  
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  
HSFCA- High Seas Fisheries Compliance Act  
IATTC- Inter-American Tropical Tuna Commission  
IPCC- Intergovernmental Panel on Climate Change  
ISC- International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean  
MBTA- Migratory Bird Treaty Act  
MMPA- Marine Mammal Protection Act  
MOU- Memorandum of Understanding  
MSFMP- Market Squid Fisheries Management Plan  
MT- Metric Ton  
NEPA- National Environmental Policy Act  
NMFS- National Marine Fisheries Service  
NOAA- National Oceanic and Atmospheric Administration  
PacFIN- Pacific Fisheries Information Network  
PBF- Pacific Bluefin Tuna  
PDO- Pacific Decadal Oscillation  
PFMC- Pacific Fishery Management Council  
RIR- Regulatory Impact Review  
SCB- Southern California Bight  
SFD- Sustainable Fisheries Division  
STFZ- Subtropical Frontal Zone  
USFWS- United States Fish and Wildlife Service  
WCPO- Western Central Pacific Ocean

---

## 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.

**Coastal Purse Seine:** A purse seine is an encircling net that is closed by means of a purse line threaded through rings on the bottom of the net. “Coastal” purse seiners are smaller vessels that fish close to the shore. They mainly harvest coastal pelagic species (sardines, anchovies, mackerel), but they also fish for PBF and other tunas when they are available. (<http://www.pcouncil.org/highly-migratory-species/background/>)

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

**Drift Gillnet:** A panel of netting, suspended vertically in the water by floats along the top and weights along the bottom, which is neither stationary nor anchored to the bottom. The HMS Fisheries Management Plan (FMP) final rule defines drift gillnet gear as 14 inch (35.56 cm) stretched mesh or greater.

**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 Code of Federal Regulation (CFR) part 22).

**Fishing:** Refer to definition for commercial fishing.

**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 (PFMC 2011b) (Note: this definition is used in the HMS FMP and differs from the definition in the Magnuson-Stevens Act, which defines “high seas” as waters beyond the territorial sea).

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

**Incidental take:** “Take”, 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 that 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.

**Retention/Retaining:** The process of maintaining possession an animal (fish) once the animal is harvested as part of a fishery.

**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 result in 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.

---

## 1.0 INTRODUCTION

This Environmental Assessment (EA) provides an analysis of restrictions on U.S. commercial vessels fishing in the eastern Pacific Ocean (EPO) proposed by the National Marine Fisheries Service (NMFS) in accordance with international resolutions of the Inter-American Tropical Tuna Commission (IATTC). The NMFS is obligated to implement and enforce regulations consistent with IATTC resolutions and does not make substantive decisions in promulgating such actions. Given that the Pacific bluefin tuna stock is overfished and subject to overfishing (80 FR 12621; March 10, 2015), NMFS anticipates that the IATTC, with input from the U.S. Department of State and U.S. Delegation to the IATTC, will resolve to impose catch limits for PBF into the foreseeable future. Therefore, this Programmatic Environmental Assessment includes essential components of environmental impact analyses in accordance with the National Environmental Policy Act (NEPA) to consider a range of PBF catch limits for U.S. commercial vessels fishing in the EPO and assesses the potential environmental impacts on the human environment that could result from the proposed action as well as similar actions in future years. If future IATTC resolutions fall within the scope of alternatives analyzed in this Programmatic Environmental Assessment and the impacts or the affected environment have not significantly changed this document may be used to analyze the impacts of those actions. Environmental impact analyses pursuant to the NEPA 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 purpose and need and the likely consequences of each alternative. Based on this structure, the document is organized into the following 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 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 NEPA, that an action must be consistent with, and how this action will satisfy those mandates.

Additional Chapters (6-7) list those who contributed to this EA, information on EA distribution, and the references cited list.

---

## 1.1 Proposed Action

NMFS is proposing regulations under authority of the Tuna Conventions Act of 1950, as amended (16 U.S.C. 951-962 and 971 et seq.) to implement decisions of the IATTC and satisfy obligations of the United States as a member of the IATTC. IATTC Resolutions on PBF tuna measures have been adopted by the IATTC since 2012. These resolutions typically include two catch limits: (1) a Commission-wide limit for all commercial fishing vessels of all IATTC Members and Cooperating Non-Members (CPCs) fishing in the Convention Area of the eastern Pacific Ocean and (2) a catch limit for CPCs with a historical record of PBF catch from the eastern Pacific Ocean—such as the United States—to allow these nations to catch a small share of PBF even if the Commission-wide limit is reached. NMFS is obligated to implement and enforce regulations consistent with resolutions of the IATTC, and does not make substantive decisions regarding the measures prescribed in the resolutions when domestically promulgating the actions. Given that the PBF stock is overfished and subject to overfishing (80 FR 12621; March 10, 2015), NMFS anticipates that the IATTC (with input from the U.S. Department of State and the U.S. Delegation) will resolve to impose catch limits for PBF into the foreseeable future. In addition to domestically implementing measures included in resolutions adopted by the IATTC, the Pacific Fishery Management Council (PFMC) and/or NMFS may see a need to include additional specifications in the implementing regulations to ensure effective monitoring and management. For example, the PFMC recommended that trip limits be implemented to assist with inseason management of the catch limits.

These proposed regulations will only apply to vessels that commercially catch PBF in the IATTC Convention Area of the EPO. This rule will restrict U.S. commercial fishing in the IATTC Convention Area by implementing catch and trip limits as follows:

- The catch limit is not to exceed 425 metric ton (mt) in a single year. However, if the U.S. commercial PBF catch in the EPO exceeds 300 mt in year one of the recent two-year IATTC resolution, the U.S. catch may not exceed 200 mt in year two. See Table 1-1.
- Therefore, a catch limit of 425 mt will be imposed for year one.
- For the second year, the catch limit will be calculated as the remainder from year one (i.e., how much of 425 mt was not caught) added to 175 mt, except as follows: (1) if 175 mt or less is caught in year one, then the catch limit for year two is 425 mt; or (2) if greater than 300 mt and up to 400 mt are caught in year one, then the catch limit in year two will be 200 mt.
- These catch limits are not contingent upon a Commission-wide limit, but rather represent the maximum levels of PBF that U.S. commercial fishing vessels are permitted to catch in the IATTC Convention Area.
- NMFS is also proposing a trip limit of 25 mt for both years until catch is within 50 mt of the catch limit.
- When NMFS anticipates that catch will be within 50 mt of the catch limit, NMFS will announce that a 2 mt trip limit will be in effect until the catch limit is reached or expires.

Table 1-1. Potential scenarios for U.S. commercial catch of Pacific bluefin tuna (in metric tons) from the eastern Pacific Ocean for a two-year IATTC resolution.

Scenarios	U.S. Commercial Catch (or Limit) in Year 1	U.S. Commercial Limit in Year 2
1	401-425 mt	175-200 mt (remainder of 600mt limit)
2	greater than 300 mt and up to 400 mt	200 mt
3	176-300 mt	300-424 mt (remainder of 600mt limit)
4	0-175 mt	425 mt (max allowed)

---

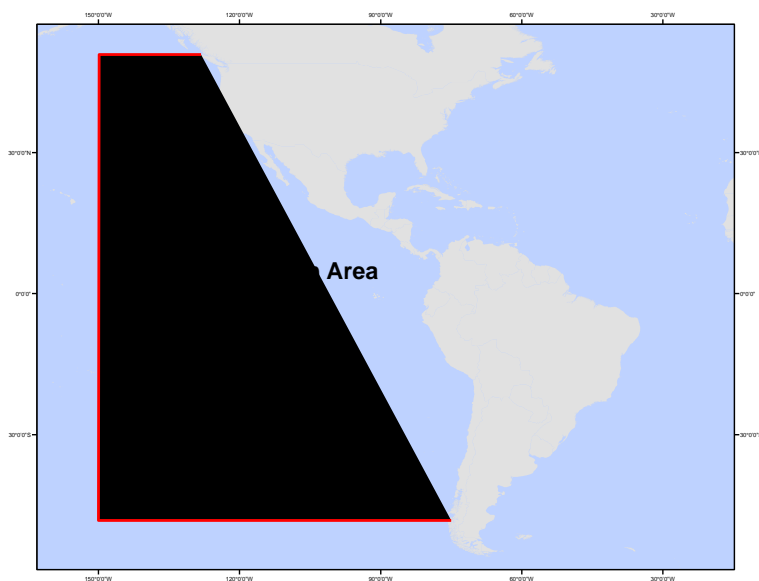
After NMFS determines that the total U.S. catch commercial catch limit for PBF in the EPO is expected to be reached by a specific future date in any given year, NMFS will publish a notice in the Federal Register announcing that the limit has been reached and that further commercial targeting, retaining, transshipping, and landing of PBF in the IATTC Convention Area will be prohibited through the end of the calendar year. As of the effective date in the announcement, a commercial fishing vessel of the United States may not be used to target, retain on board, transship, or land PBF tuna captured in the Convention Area for the remainder of the calendar year, with the exception that any PBF already on board a fishing vessel upon the effective date may be retained on board, transshipped, and/or landed, to the extent authorized by applicable laws and regulations, provided that they are landed within 14 days after the effective date.

To help ensure that total commercial catch of PBF by all IATTC Members and Cooperating Non-Members (CPCs) fishing in the IATTC Convention Area does not exceed Commission-wide catch limits, NMFS will report the U.S. catch to the IATTC Director on a regular basis (i.e., weekly or monthly). The IATTC Director, in turn, will inform the members of the IATTC of the current catch levels on a regular basis and notify members when the Commission-wide catch limit is reached. NMFS will provide updates on Commission-wide and U.S. catches to the public via the highly migratory and coastal pelagic species email distribution lists and the NMFS website:

[http://www.westcoast.fisheries.noaa.gov/fisheries/migratory\\_species/bluefin\\_tuna\\_harvest\\_status.html](http://www.westcoast.fisheries.noaa.gov/fisheries/migratory_species/bluefin_tuna_harvest_status.html).

## 1.2 Proposed Action Area

The IATTC Convention Area is the proposed action area analyzed in this EA. The IATTC Convention Area includes the waters of the EPO bounded by the coast of the Americas, the 50° N. and 50° S. parallels, and the 150° W. meridian. This area includes the U.S. west coast Exclusive Economic Zone (EEZ) where most of the fishing that would be affected by the proposed action occurs.



**Figure 1. Map of Proposed Action Area.**

## 1.3 Purpose and Need

The purpose of the proposed action, is to manage fishing mortality of [PBF] “...to contribute to the rebuilding of the stock,” as stated in IATTC resolutions related to the conservation and management of

---

PBF. Limits on commercial fishing mortality of PBF in the EPO are needed to ensure the recovery of PBF and to fulfill the obligations of the United States as a Contracting Party to the 1949 Convention for the Establishment of an IATTC.

## 1.4 Background

The 1949 Convention for the establishment of an IATTC entered into force in May 1949. The full text of the Convention is available at: [iattc.org/PDFFiles/IATTC\\_convention\\_1949.pdf](http://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 Antigua Convention, which was negotiated to strengthen and replace the 1949 Convention establishing the IATTC, entered into force in 2010.

The IATTC Members include High Contracting Parties to the Convention and fishing entities that have agreed to be bound by the regime established by the Convention, such as 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 Commission 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 Commission are Belize, Canada, China, Chinese Taipei, Colombia, Costa Rica, Ecuador, El Salvador, European Union, France, Guatemala, Japan, Kiribati, Mexico, Nicaragua, Panama, Peru, Korea, United States, Vanuatu, and Venezuela. The current Cooperating Non-Parties, Cooperating Fishing Entities and regional economic integration organizations are Bolivia, Honduras, Indonesia, and Liberia.

As a Contracting Party to the Convention and a member of the Commission, the United States is obligated to implement the decisions of the IATTC in a legally binding manner. The Tuna Conventions Act 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 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. When promulgating PBF conservation and management measures through U.S. regulatory procedures and in accordance with other U.S. laws, NMFS will notify the public of its intent to implement the measures and monitor PBF catch by U.S. vessels fishing in the Convention Area.

IATTC resolutions take into account IATTC staff recommendations, recommendations from the IATTC's Scientific Advisory Committee<sup>1</sup>, the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC). All IATTC resolutions on PBF since 2012 have included a catch limit regime for the commercial catch of PBF in the IATTC Convention Area of the EPO. As a result, all CPCs, including the United States, must ensure that their annual commercial catches of PBF in the Convention Area adhere to these limits. The United States first implemented catch limits on the U.S. commercial catch of PBF from the IATTC Convention Area in 2013 (78 FR 33240, June 4, 2013) in

---

<sup>1</sup> The Scientific Advisory Committee (SAC) is composed of a representative of each member of the Commission ("governmental members") determined to have appropriate scientific expertise, qualifications, or relevant experience in the area of competence of the Committee, and who may be accompanied by up to five experts or advisers. The Commission may invite non-governmental organizations or individuals with recognized scientific expertise in matters related to the work of the Commission to participate in the work of the SAC. For more information, see: [iattc.org/Meetings/Meetings2011/May-SAC-Shark/PDFfiles/SAC-02-03-REV-Rules-of-Procedure.pdf](http://iattc.org/Meetings/Meetings2011/May-SAC-Shark/PDFfiles/SAC-02-03-REV-Rules-of-Procedure.pdf)

---

accordance with Resolution C-12-09, available here: [iattc.org/PDFFiles2/Resolutions/C-12-09-Conservation-of-bluefin-tuna.pdf](http://iattc.org/PDFFiles2/Resolutions/C-12-09-Conservation-of-bluefin-tuna.pdf). The United States also implemented commercial catch limits in 2014 in accordance with Resolution C-13-02, available here: [iattc.org/PDFFiles2/Resolutions/C-13-02-Pacific-bluefin-tuna.pdf](http://iattc.org/PDFFiles2/Resolutions/C-13-02-Pacific-bluefin-tuna.pdf). These catch limits have expired as they were conditioned upon resolutions with management measures specified for particular years. The IATTC will bases its decisions about management and conservation measures on scientific information about the status of the stock, the conservation advice of the ISC, and recommendations of the IATTC scientific staff.

The ISC last published a full stock assessment for PBF in 2012. The ISC made improvements to the catch data and model inputs in preparation for this assessment. The 2008 assessment was the first to make a quantitative estimate of abundance with some degree of confidence. The results of the 2012 assessment indicate that overfishing is occurring and that the stock is overfished. These estimates were based on 2010 data. Of particular concern is the fact that the catch in weight is dominated by juvenile fish (ages 0-3). If fishing mortality is unconstrained and environmental conditions continue to be favorable, the assessment model predicts that biomass will decline. Following the ISC's assessment in 2012, NMFS determined the stock to be in an overfishing and overfished status and notified the respective Fishery Management Councils to consider taking further action under the Magnuson-Stevens Fisheries Conservation and Management Act. In 2014, the ISC updated the 2012 assessment with data through 2012 and found that the average recruitment level (i.e., new fish entering the population) for 2007 to 2011 may have been below the historical average; the 2012 level was estimated to be the eighth lowest in the last 61 years (ISC 2014b).

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. In general, PBF harvests from the WCPO have been greater than those from the EPO. During 2006 through 2013, catches in the EPO have ranged between 18 and 46 percent of the total PBF landings (ISC 2014a). The IATTC recognizes “that the impact of the fishery for bluefin tuna in WCPO the is much greater than in the EPO fisheries, and its rate of increase in recent years has been greater” and put on record, “that that the conservation measures adopted in the WCPO are more important, due to their magnitude and composition of their catch.”

U.S. fisheries generally harvest a small fraction of the total pan-Pacific harvest of HMS and that fraction is smaller when considering only PBF harvests. Between 2006 and 2013, PBF landings by fleets fishing in the EPO and Western and Central Pacific Ocean (WCPO) ranged between 12,124 mt and 26,392 mt. The U.S. commercial landings make up less than .04 percent of the total commercial harvest of PBF in those years. The PBF harvests by U.S. commercial vessels fishing in the EPO have been greater than those from WCPO, with fewer than two metric tons caught by U.S. vessels fishing in the WCPO between 2006 and 2013. Nonetheless, the PBF landings by U.S. commercial vessels fishing in the EPO represent fewer than two percent of the landings by all fleets fishing in the EPO from 2006 through 2013 (ISC 2014a).

## **2.0 ALTERNATIVES PROPOSED FOR THE U.S. COMMERCIAL FISHERY**

Several alternatives are being considered for implementing management measures for commercial fishing for PBF in the IATTC Convention Area. These alternatives may be applicable to future proposed actions by NMFS to implement IATTC resolutions. Therefore, they include different types of limits that may be applicable to actions pertaining to U.S. commercial fisheries that catch PBF in the IATTC Convention Area. Two types of catch limits are common to IATTC resolutions: (1) a Commission-wide limit for all commercial fishing vessels of all IATTC Members and Cooperating Non-members (CPCs) fishing in the IATTC Convention Area of the EPO and (2) a catch limit for each CPC with a historical record of eastern PBF—such as the United States—to allow these nations to catch a small share of PBF, even if the

---

Commission-wide limit is reached. In some years, the IATTC has defined the catch limit for CPCs as contingent upon a Commission-wide catch limit being reached. For example, in Resolutions C-12-09 and C-13-02, U.S. catches were not limited to the catch limit for each CPC (and/or the United States) unless and until the Commission-wide limit had been reached. However, in Resolution C-14-06, this was not the case. In this instance, U.S. commercial catches are limited to the CPC catch limit only. Depending on the level of catch limits adopted by the IATTC, the PFMC and/or NMFS may need to include additional specifications (e.g., trip limits, monitoring requirements, and/or forfeiture of overages) in the implementing regulations so that monitoring and management is effective in providing U.S. commercial vessels access to the full catch limits, and ensuring that they do not exceed them.

Some of the alternatives include limit ranges as opposed to specific limits to provide flexibility for incorporating public input and lessons learned when implementing future actions. The different ranges were selected for the various alternatives based on their level of impact. However, Chapter 4 includes discussion of varying levels of impacts within the ranges of the individual alternatives. Lastly, the IATTC may reserve the option of amending its adoption of the PBF catch limits before domestic regulations are expected to expire. If such a decision occurs, NMFS will take appropriate action.

**Alternative 1 (Preferred Alternative):** Implement a commercial catch limit for PBF taken from the IATTC Convention Area by U.S. commercial vessels that is greater than 50 mt and fewer than 600 mt per year, and that is not contingent upon a Commission-wide catch limit being reached. For any given calendar year, NMFS will publish catch limitations in the Federal Register. If the Commission-wide catch limit and the U.S. catch limit are reached, NMFS will announce a closure in the Federal Register prohibiting U.S. commercial vessels from targeting, retaining on board, transshipping, or landing additional PBF catch from the Convention Area, effective on a date following the closure announcement and through the last day of that calendar year. The catch limits would not apply to any U.S. commercial fishery operating outside of the Convention Area.

**Sub Option:** If the U.S. commercial fleet should become constrained to a catch limit of fewer than 500 mt in any given year, then two trip limits will be imposed—a larger trip limit until catch is within 50 mt of the annual limit, and a smaller trip limit thereafter. Trip limit alternatives for this Sub Option to Alternative 1 are listed directly below.

**A (Preferred Alternative):** A trip limit that is equal to or greater than 10 mt and fewer than or equal to 30 mt will be imposed until catch is within 50 mt of the annual catch limit. A trip limit greater than 1mt and fewer than 5 mt will be imposed when catch is within 50 mt of the annual catch limit.

**B:** A trip limit greater than 30 mt and fewer than or equal to 50 mt will be imposed until catch is within 50 mt of the annual catch limit. A trip limit greater than 1mt and fewer than 5 mt will be imposed when catch is within 50 mt of the annual catch.

**Alternative 2:** Implement a commercial catch limit for PBF taken from the IATTC Convention Area by U.S. commercial vessels that is greater than 50 mt and fewer than 600 mt per year, and is contingent upon a Commission-wide catch limit being reached. For any given calendar year, NMFS will publish catch limitations in the Federal Register. If the Commission-wide catch limit and the 500 mt catch limit is reached, NMFS will announce a closure in the Federal Register prohibiting U.S. commercial vessels from targeting, retaining on board, transshipping, or landing additional PBF catch in the Convention Area, effective on a date following the closure announcement and through the last day of that calendar year. The catch limits would not apply to any U.S. commercial fishery operating outside of the Convention Area.

---

**Sub Option:** If the U.S. commercial fleet should become constrained to a catch limit of fewer than 500 mt in any given year, then two trip limits will be imposed—a larger trip limit until catch is within 50 mt of the annual limit, and a smaller trip limit thereafter. Additionally, NMFS may institute a forfeiture policy, such that overages of PBF trip limits may be landed and the sale and/or catch of those fish be forfeited to authorities. Trip limit alternatives for this Sub Option to Alternative 1 are listed directly below.

**A:** A trip limit that is equal to or greater than 10 mt and fewer than or equal to 30 mt will be imposed until catch is within 50 mt of the annual catch limit. A trip limit greater than 1 mt and fewer than 5 mt will be imposed when catch is within 50 mt of the annual catch limit.

**B:** A trip limit greater than 30 mt and fewer than or equal to 50 mt will be imposed until catch is within 50 mt of the annual catch limit. A trip limit greater than 1mt and fewer than 5 mt will be imposed when catch is within 50 mt of the annual catch.

**Alternative 3:** Prohibit U.S. commercial vessels fishing in the IATTC Convention Area from targeting PBF and implement a 50 mt annual catch limit on incidental commercial catch by prohibiting all U.S. commercial fishing vessels from retaining, transshipping, or landing additional PBF from the Convention Area after a full closure is announced in the Federal Register and through the last day of that calendar year. The fishing restrictions and incidental catch limit would not apply to any U.S. commercial fishery operating outside of the Convention Area.

**Alternative 4:** Implement annual commercial catch limits for PBF taken from the IATTC Convention Area by U.S. commercial vessels that are greater than 600 mt and fewer than 10,500 mt, regardless of whether the U.S. commercial fleet is provided access to a Commission-wide catch limit in those years. A trip limit greater than 1 mt and fewer than 5 mt will be imposed when catch is within 50 mt of the annual catch limit. For any given calendar year, NMFS will publish catch limitations in the Federal Register. If the U.S. catch limit is reached, NMFS will announce a closure in the Federal Register prohibiting U.S. commercial vessels from targeting, retaining on board, transshipping, or landing additional PBF catch from the EPO, effective on a date following the closure announcement and through the last day of that calendar year. The catch limits would not apply to any U.S. commercial fishery operating outside of the Convention Area.

**Alternative 5 (No Action):** Under this alternative, NMFS would not implement the IATTC Resolution to implement a PBF commercial catch limit and/or trip limit regime for U.S. commercial vessels fishing in the IATTC Convention Area. There would be no restrictions on the commercial catch of PBF in the Convention Area by U.S. commercial fishing vessels.

NMFS will publish notices in the Federal Register to announce inseason changes in trip limits and/or a closure of U.S. commercial fishing for PBF in the IATTC Convention Area. Should NMFS determine that U.S. commercial catches are within 50 mt of the annual catch limits of Alternatives 1, 2, and 4, the effectiveness of the trip limit (i.e., greater than 1 mt and fewer than 5 mt). Should NMFS determine that the annual catch limits under Alternatives 1 through 4 are expected to be reached by a specific future date, the agency will publish a notice in the Federal Register announcing that the limit has been reached and that restrictions on targeting, retaining on board, transshipping, and landing PBF within the IATTC Convention Area will be in effect through the end of the calendar year. Once such an announcement is made, a commercial fishing vessel of the United States may not be used to target, retain on board, transship, or land PBF captured in the Convention Area during the period specified in the announcement, with the exception that any PBF already on board a fishing vessel upon the effective date published in the notice may be retained on board, transshipped, and/or landed, to the extent authorized by applicable laws and regulations, provided that they are landed within 14 days after the effective date.



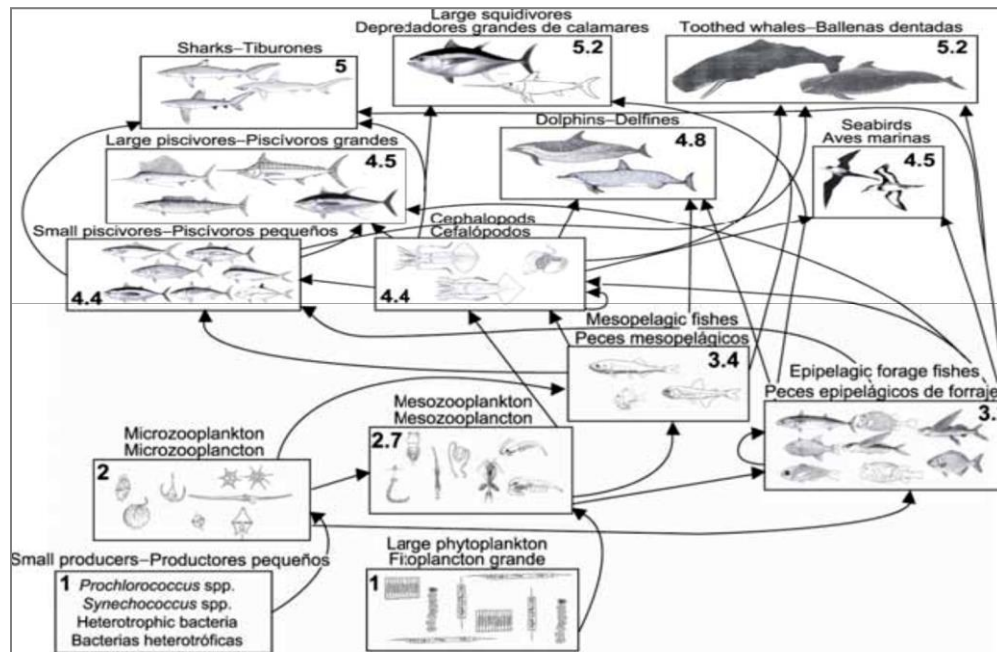
### 3.0 AFFECTED ENVIRONMENT

This EA considers the effects of the alternatives on different parts of the human environment, which are referred to as environmental components. None of the alternatives are expected to have an adverse impact on public health or safety. Three environmental components have been identified for further evaluation and discussion in these chapters: target and non-target finfish, protected species (marine mammals, sea turtles), and the socioeconomic environment (fishermen, processors, etc.).

#### 3.1 Climate and Biophysical Factors Contributing to Baseline Effects

##### 3.1.1 Pacific Bluefin Tuna in the Pelagic Ecosystem

PBF are one of three species of bluefin tuna that inhabit the world's oceans. PBF have the larger of bluefin individual home ranges. They are found throughout the north Pacific and range into the western south Pacific (Boustany *et al.* 2010). PBF are large pelagic piscivores and feed primarily on epipelagic fish. 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.



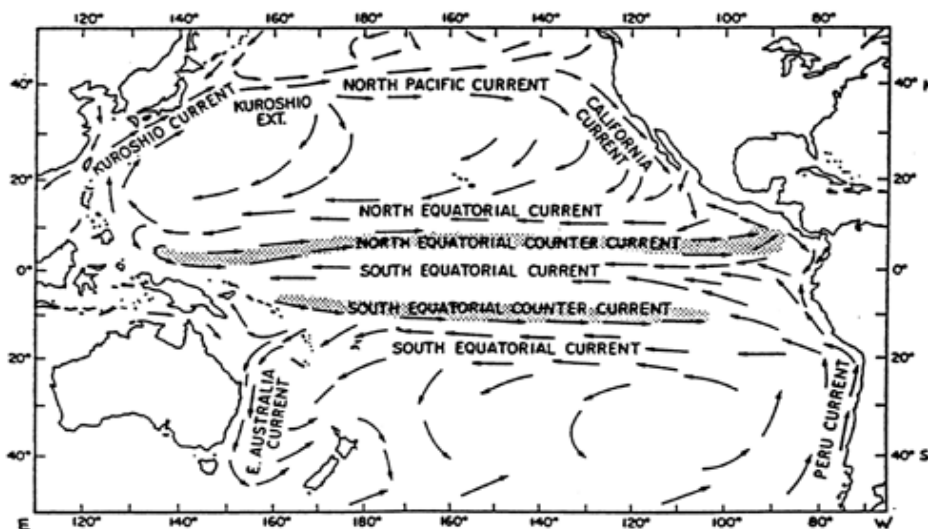
**Figure 3-1. Simplified food-web diagram of the pelagic ecosystem in the tropical EPO. The numbers inside the boxes indicate the approximate trophic levels of each group.** Source: IATTC. 2009. Available on IATTC website: <http://www.iattc.org/PDFFiles2/IATTC-80-05-Tunas-and-billfishes-in-the-EPO-2008.pdf>

PBF spawn in the region between the northern Philippines and central Japan during the months of April through August and are thought to comprise a single stock (Boustany *et al.* 2010). While most remain in the western Pacific, tagging studies of PBF have shown that there is exchange between the eastern and western Pacific Ocean (IATTC 2011a). These migrations occur during the first and second years of life (IATTC 2011a) and are hypothesized to be linked to local sardine abundances off Japan (Polovina 1996) and food availability (i.e., high density areas of primary productivity and forage fish and swimming crabs spawning aggregations) (Boustany 2010). Once in the EPO, PBF remain in North American coastal waters for up to four years before making the return migration to the western Pacific to spawn (Bayliff 1993). Diet studies conducted in the late 1960s included an investigation of PBF stomach samples for fish

caught in the EPO (i.e., offshore waters of the Southern California Bight, Baja California, and Guadalupe Island) and found the dominant prey feature to be small epipelagic forage fish (anchovy, sardine, mackerel, saury, etc.) and squid, with more squid in the diets of fish caught off Guadalupe than fish caught in the other areas (Pinkas *et al.* 1971). Diet studies of PBF that were conducted in the western Pacific reported similar findings (Yokota *et al.* 1961 and Yamanaka *et al.* 1963) indicating that PBF feeding patterns are the same whether they are in the eastern or western portions of the North Pacific. However, their feeding preferences during their migrations are unknown.

### 3.1.2 Oceanographic Conditions and Distribution of Pacific Bluefin Tuna

Ocean currents transport plankton, fish, heat, 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. The edges of eddies, or oceanic fronts associated with ocean currents, are often targeted by fishermen as these areas where the mixing is greatest tend to have high biological productivity. Much of information in this section is incorporated by reference from Section 3.1.1 of the EA prepared by NMFS for the implementation of the decisions of the fifth regular session of the WCPFC, and remains unchanged (NMFS 2009).

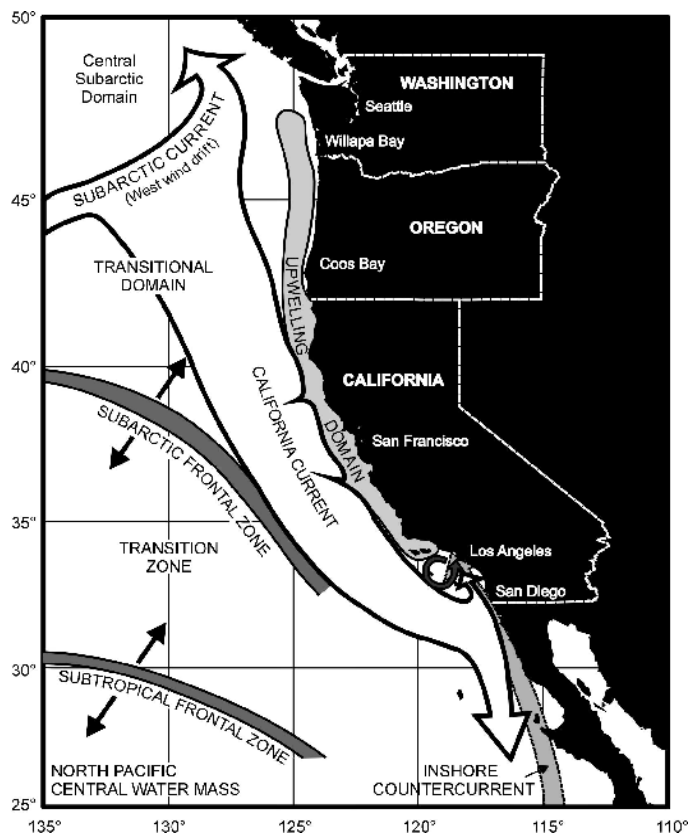


**Figure 3-2. The dominant ocean current systems in the Pacific Ocean.**

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

Subtropical gyres rotate clockwise in the northern hemisphere and counter clockwise in the southern hemisphere in response to trade and westerly wind forcing (Figure 3-2 illustrates 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). 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. Tagging studies have shown that PBF will occasionally dive through the surface mixed layer, or thermocline. It is presumed that this is done to forage (Kitagawa *et al.* 2007). Juvenile PBF in the EPO spend the majority of the time in the surface mixed layer at depths shallower than 50 meters.

Oceanic fronts are characterized by steep gradients in temperature and salinity and 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 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). The temperature preference of PBF hovers between 14 and 20° C. Although there seems to be some tolerance to extended time in cooler waters of 12 – 14° C (Boustany *et al.*, 2010), which is just a few degrees warmer than the isotherm temperatures commonly associated with these fronts.



**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.**

Tuna species are also attracted to upwelling zones along ocean current boundaries such as the transition zone west of the California Current System (CCS). Seasonal movements of PBF show that fish were located farthest south, off the coast of southern Baja California, in the spring months. PBF will move north into the Southern California Bight (SCB) in the summer months, and will extend their range farthest north along the North American coast in the fall, with the highest density in the area near Point Conception, California. Their locality and density in these months appear to be correlated with peaks in coastal upwelling induced primary productivity (Boustany *et al.* 2010). PBF over four years old travel significantly farther north than fish in younger age classes. In the winter they tend to follow one of two patterns: movement offshore or movement south to the water off the coast of Baja California. Tagging studies indicate that, during the spring through fall, PBF were located in areas of high productivity and more dispersed in regions of low productivity. However, during the winter, tagged bluefin were found in areas of the EPO with comparatively lower productivity in those months. This suggests that they are feeding on spawning aggregations of fish (e.g., sardines and anchovies) and pelagic crabs that prefer areas

---

of reduced upwelling (Boustany *et al.* 2010). These assertions comport with a known correlation between shifts in sardine catch distribution along the California coast with variations in the seasonal migrations of PBF (Kitagawa *et al.* 2007).

### **3.1.3 Climate Variability**

Much of information in this section is incorporated by reference from Section 3.2.3 of the draft EA prepared by NMFS to characterize the west coast deep-set longline fishery (NMFS 2011), and remains unchanged.

Two mesoscale climate phenomena likely affect frontal activity and the distribution of tuna, other target and non-target finfish, and protected species found in the proposed action area. The first is El Niño-Southern Oscillation (El Niño), 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, an El Niño event brings warm waters and a weakening of coastal upwelling off the west coast. Tunas and billfish are found farther north during El Niño years (Field and Ralston 2005). La Niña, a related condition, results in inverse conditions, including cooler water in the eastern tropical Pacific and CCS.

The second mesoscale climate phenomenon likely to affect the distribution of species in the proposed action area is the Pacific Decadal Oscillation (PDO). It has 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.

#### **3.1.3.1 Climate Change**

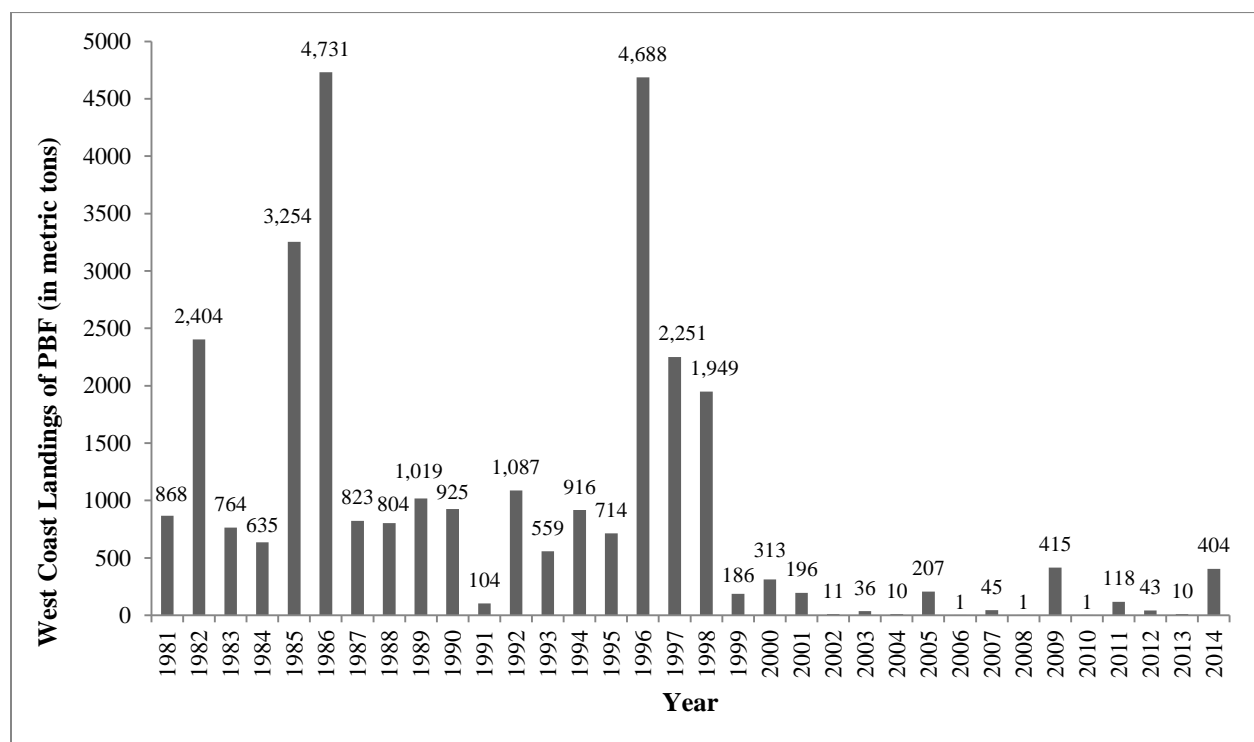
Recent reports by the Intergovernmental Panel on Climate Change (IPCC) have made it clear that the earth's climate is changing, and with it the environmental conditions in the ocean are also changing (IPCC 2007a). Climate change can affect the marine environment by impacting the established hydrologic cycle (a change in precipitation and evaporation rates) and by increasing the incidence of disease in aquatic organisms (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 2007b). 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). Plankton studies demonstrate that climate change is affecting phytoplankton, copepod herbivores, and zooplankton carnivores, which effect ecosystem services, such as oxygen production, carbon sequestration, and biogeochemical cycling and conclude 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).

The California Current is known have large natural fluctuations in its oceanography and coastal pelagic species abundance, which could have a direct impact on the abundance and location of PBF in the EPO. Baumgartner *et al.* (1992) and Field *et al.* (2009) looked at deposits of coastal pelagic fish scales and were able to identify historic periods or regimes of anchovy and sardine abundance that they suggest are linked to large scale climate phenomena. For example, during the 1930's through the 1950's when the California Current was undergoing a "warm" period as reflected in the PDO (Mantua *et al.* 1997) sardines were highly abundant; however, these populations experienced steep declines as the California Current and the North Pacific entered a cool period.

Studies conducted by Perry *et al.* (2005) indicate that climate change is affecting marine fish distributions in ways that may have important ecological impacts on fish as well as important impacts on commercial fisheries. Impacts to 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) shifts in mixing areas of water zones leading to decreases in spawning habitat and decreased stock sizes; and (3) changes in currents that may lead to changes in larval dispersals and retention among certain habitats, which could lead to decreases in stock sizes or availability of resources to certain fisheries (Roessig *et al.* 2004).

### 3.2 Commercial Fisheries

This section gives a description of baseline conditions for the PBF stock and commercial fisheries operating in the proposed action area. The U.S. commercial fleet has not landed 500 mt of PBF in more than a decade (refer to Figure 3-4). However, management actions in place in 2014 may have prevented landings meeting or exceeding 500mt. Nonetheless, for many years, U.S. commercial landings did not exceed 300 mt, even without management measures in place. Thus, it is unlikely that the proposed action will significantly impact U.S. fishing operations and therefore, other species of U.S. commercial interest. For this reason, species other than PBF are not discussed in great detail. In recent years, the vast majority of the U.S. commercial landings of PBF were caught by the U.S. coastal purse seine fishery and California drift gillnet (>14in. mesh) (DGN) fishery. These fisheries are discussed in greater detail as they could be impacted by the proposed action.



**Figure 3-4. West Coast Commercial Landings of Pacific Bluefin Tuna (in Metric Tons), 1981–2012**  
 Source: PFMC 2015. \*Preliminary estimate of 2014 U.S. commercial landings of PBF based on Communications with California Department of Fish and Wildlife on December 11, 2014.

---

### **3.2.1 Baseline Description of Commercial Fisheries in the Proposed Action Area**

In the eastern Pacific waters of the IATTC Convention Area, PBF have been caught during every month of the year, but most of the fish are taken during May through October (Bayliff 2000). A majority of the commercial catches of PBF in the Convention Area are taken by smaller purse seine vessels (class size 5 and under with a well volume carrying capacity fewer than 363 mt). Ninety percent of the catch is estimated to have been between about 60 and 100 cm in length, representing mostly fish that are one to three years of age. The larger class size six purse seine vessels target tropical tunas which prefer warmer water temperatures than PBF. Therefore, their catches of PBF are rare. For example, of the 228,339 sets recorded for all class size six vessels fishing in the Convention Area (regardless of flag) from 2000-2009, only .03 percent included any PBF (IATTC 2013). Aquaculture facilities for PBF were established in Mexico in 1999, and some Mexican purse seiners began to direct their effort toward PBF during that year (IATTC 2011b). During recent years, most of the catches by Mexico's commercial fleet have been transported to holding pens, where the fish are held for fattening and later sale to sashimi markets. PBF are also caught by U.S. recreational vessels. However, since management measures for recreational or sportfishing activities are typically implemented under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), those fisheries will not be discussed in detail as part of this EA, which analyzes PBF measures to be implemented under the TCA.

### **3.2.2 Baseline Description of U.S. Commercial Fishing for Bluefin Tuna in the Proposed Action Area**

Availability and access to PBF in the IATTC Convention Area has fluctuated, impacting the fishing effort of U.S. commercial fleets for this resource. While the availability of PBF to the U.S. fleets naturally fluctuates with ocean conditions, two management actions by Mexico have had major effects on the United States' commercial access to the resource and to market opportunities. First, beginning in the early 1980s, increasingly effective measures by the Mexican government to enforce its EEZ resulted in a gradual exodus of U.S. boats from those fishing grounds. Second, beginning in 1996, PBF farming trials had been initiated in northern Baja California, and since 2002, many Mexican vessels began to direct their efforts toward PBF off Baja California during the summer and early fall, to provide for farming needs. The fish are transported to holding pens, where they are fattened for several months before being sold for the production of sashimi (ISC 2012b).

The U.S. commercial catch of PBF represents a relatively minor component of the overall tuna catch in the eastern Pacific waters of the IATTC Convention Area. As stated in the background section, the average annual PBF landings by U.S. commercial vessels fishing in the EPO from 2006 through 2013 represent fewer than two percent of the average annual landings from all fleets fishing in the EPO (ISC 2014a). In 1986, U.S. commercial landings of PBF were the highest recorded between 1981 and 2013 at just under 4,675 mt, but have declined precipitously in more recent years (PFMC 2014). The majority of PBF landed by the U.S. commercial fleets is caught in the U.S. EEZ portion of the IATTC Convention Area. Most of the U.S. commercial landings of PBF from the Convention Area are those of the coastal purse seine vessels operating in the SCB, which opportunistically target PBF when they are available. Small amounts of PBF are caught in the DGN fishery (typically fewer than 5mt per year). PBF have also been caught in the Convention Area by the U.S. West Coast fleets fishing with longline gear, albacore surface hook-and-line gear, and larger purse seine gear used to target tropical tunas (typically fewer than 1mt per year). The last recorded PBF catch by any U.S. class size six purse seine vessel was in 2003 and was under 25 mt. PBF are also caught with recreational gear.

NMFS first implemented a PBF catch limit regime of a 500 mt limit for U.S. commercial vessels fishing in the Convention Area, which was contingent upon a Commission-wide catch limit being met, in 2013. While the Commission-wide limit was met in 2013 (i.e., by all CPCs fishing in the Convention Area), the

---

U.S. catch of PBF did not reach 20 percent of the limit for the United States. The recreational fishery in California is not restricted by size or slot regulations for PBF, but is managed with daily bag limits and possession limits. Additionally, there are regulatory mechanisms in place under the Fishery Management Plan (FMP) for U.S. West Coast Fisheries for Highly Migratory Species (HMS) as well as under the coastal pelagic species (CPS) FMP to ensure the sustainability of the target species of the above mentioned U.S. fisheries, including PBF. These FMPs also include reporting and regulatory mechanisms to contribute to the monitoring and sustainability of non-target species in these fisheries.

### **3.2.2.1 U.S. Coastal Purse Seine Fishery**

The coastal purse seine fleet off the coast of California uses encircling nets that are closed by means of a purse line threaded through rings in the bottom of the net. This gear is effective in catching schooling fish. Coastal purse seiners are smaller vessels that fish close to the shore. The commercial fishing vessels in the U.S. coastal purse seine fleet operating in the EPO target small pelagic species, especially Pacific mackerel, Pacific sardine, northern anchovy, and market squid. However, they will target the tropical yellowfin and skipjack tunas when intrusions of warm water from the south bring these species within range of the U.S. coastal purse seine fleet. Similarly, these vessels will target the higher-valued PBF when they enter the coastal waters of the SCB (PFMC 2010). Refer to Figure 3-5 for purse seine commercial catch of PBF in the EPO. Nearly all of the purse seine catches occur west of Baja California and California, within about 100 nautical miles of the coast, between about 23°N and 35°N.

The coastal purse seine fleet typically lands PBF May through October (PFMC 2011c). Between 2004 and 2014, U.S. purse seine landings of PBF average fewer than 110 mt per year. However, in 2009 and in 2014, coastal purse seine vessels landed over 400 mt of PBF.

### **3.2.2.2 California DGN Fishery**

Currently, the DGN fishery is one of six West Coast HMS fisheries managed by the Pacific Fishery Management Council (PFMC) through the HMS fishery management plan (FMP), with many of the existing State regulations and laws pertaining to the fishery adopted into the FMP (PFMC 2011b). The DGN fishery initially developed in southern California in 1977. Fishing activity is dependent on seasonal oceanographic conditions that create temperature fronts, which concentrate feed for swordfish (the target species for this fishery). Because of the seasonal migratory pattern of swordfish and seasonal fishing restrictions, over 90 percent of the fishing effort occurs from August 15 through January 31. Landings of swordfish soared to a historical high of over 3,000 mt by 1985, but annual landings average only about 175 mt for recent years (2008-2013) with annual PBF landings during those years averaging fewer than 5 mt (PFMC 2014).

An ESA-required Section 7 Consultation resulted in a Biological Opinion (signed and effective in 2000) concluding that the DGN fishery would likely jeopardize the continued existence of leatherback and loggerhead sea turtles, and that protective measures were needed to protect these animals. As a result, NMFS implemented two Pacific sea turtle conservation areas on the West Coast with seasonal DGN restrictions to protect endangered leatherback and loggerhead turtles in 2001. These conservation areas exist within the proposed action area of this EA. To reduce the likelihood of interactions with leatherback turtles, an area is closed annually from August 15 through November 15 from Point Conception to the north extending over 213,000 square miles of ocean (66 FR 44549, August 24, 2001). Because the area closure corresponds with the peak season for swordfish fishing off California, this conservation area has greatly restricted DGN fishing effort off the central California coast (NMFS 2012). Depending on ocean conditions, the second conservation area could occur in the SCB during June, July, and/or August for the protection of loggerhead sea turtles, as was the case in 2014 (79 FR 43268; July 25, 2014).

---

After these restrictions were enacted, the number of active participants in the DGN fishery declined by nearly half, from 78 vessels in 2000 to 18 in 2010. In 2010, there were 27 active vessels and 73 permits issued for the DGN fishery. In 2013, only 18 vessels made HMS landings. These vessels landed 95 mt of swordfish and 48 mt of common thresher shark (the target species) in 2013. PBF landings by the DGN fishery have always been limited with landings generally averaging fewer than 3 mt per year for even the peak years of swordfish landings. The highest recorded landings of PBF by the DGN fleet occurred in the late 1990s with a peak of over 100 mt. However, annual landings for the past decade (2005 to 2014) average fewer than 5 mt. Refer to Figure 3-5 for the DGN landings of PBF from 1998 to 2014.

### 3.2.3 Pacific Bluefin Tuna Stock Status

As mentioned in the introduction to Section 3.2, it is highly unlikely that the proposed action will precipitate changes in U.S. commercial fishing activities that will impact other species of commercial interest in the proposed action area. Therefore, the discussion of the affected environment focuses primarily on the status of the PBF stock. However, more detailed information is provided for other species of commercial interest to the U.S. fleets that catch PBF in the CPS and HMS FMPs (PFMC 2011a; PFMC 2011b respectively), which include regulatory mechanisms to ensure the sustainability of these other species.

PBF is considered a single stock. While tagging studies have shown that there is exchange of PBF between the eastern and western Pacific Ocean, the only recognized spawning grounds occur in the western and central Pacific Ocean (Boustany *et al.* 2010). Prior to 2012, there were no catch limits for this stock in either of the Convention Areas of the EPO or the WCPO. Based on the ISC Pacific Bluefin Tuna Working Group's full assessment for PBF in 2008 and material reanalyzed in 2009 and updated in 2010, the IATTC first resolved (Resolution C-12-09) to establish catch limits in the IATTC Convention Area at their meeting in June 2012.

Key results and conservation advice based on the 2008 ISC PBF Stock Assessment and 2010 updates:

- (1) Important that the level of catch of PBF is decreased below the 2002 to 2004 levels, particularly on juvenile age classes.
- (2) The estimate of spawning biomass in 2008 (at the end of the 2007 fishing year) declined from 2006 and is estimated to be in the range of the 40 to 60 percentile of the historically observed spawning biomasses.
- (3) Fishing mortality levels in 2004-2006 increased from levels in 2002-2004 by approximately six percent for age zero, 30 percent for ages one through four, and six percent for ages five and older.
- (4) Long-term average yield is expected to be lower than recent levels.
- (5) Results of sensitivity analyses in 2010 indicate that the assumption of adult mortality is particularly influential to the estimate of absolute spawning biomass and fishing mortality. Although absolute estimates from the stock assessment model were sensitive to different assumptions of mortality, relative measures were less sensitive (ISC 2008; ISC 2010).

Later in 2012, following the IATTC meeting in June where Resolution C-12-09 was adopted, the ISC published the results of a more recent stock assessment for PBF. For the assessment, stock dynamics were assessed by constructing 20 different models and structural assumptions and no single model scenario was a good fit for all data sources. However, there was general agreement on key results across all model scenarios. The results of the ICS's 2012 stock assessment and scientific advice as well as consideration of conservation and management measures for PBF, including effort restrictions, adopted by the WCPFC in 2012 served as the basis for the IATTC adopting Resolution C-13-02 to extend catch limits for PBF in the EPO waters of the Convention Area beyond 2013.



---

Key results and conservation advice based on the 2012 ISC PBF Stock Assessment:

- (1) Current PBF biomass level is near historically low levels, overfishing is occurring, and the stock is overfished.
- (2) Exploitation rates are above all biological reference points that fishery managers commonly use.
- (3) Long-term fluctuations in spawning stock biomass (SSB) occurred throughout the assessment period (1952-2011); however, over a decade of declining SSB is evident in recent years.
- (4) Age-specific fishing mortality increased eight to 41 percent between 2007 and 2009 relative to 2002 through 2006 levels.
- (5) There is no evidence of reduced recruitment.
- (6) When strong recruitment occurs, implementation of catch limits is effective in increasing future SSB (ISC 2012a).

In early 2013, NMFS affirmed that the ISC stock assessment was the best available science for the PBF and made the determination that the stock is experiencing overfishing and is overfished<sup>2</sup>. In April of 2013, NMFS informed the Pacific and the Western Pacific Fishery Management Councils of this determination and their obligations under section 304(i) MSA which requires the Council, or the Secretary, to develop domestic regulations to address the relative impact on the domestic fishing fleet; and to develop recommendations for the Secretary of State, and to Congress, to address international actions to end overfishing and rebuild PBF. In July of 2013, NMFS published a notice of the PBF overfishing and overfished determination in the Federal Register pursuant to Section 304(e)(2) of the MSA (78 FR 41033, July 9, 2013).

In 2014, the ISC produced an updated stock assessment, which showed that PBF biomass continues to remain at historically low levels and the stock is still experiencing high exploitation rates above all biological reference points. Based on this assessment, the ISC and the IATTC scientific staff provided conservation advice to further reduce fishing mortality. The IATTC took this advice into account in adopting Resolution C-14-06. Additionally, the PFMC considered the conservation advice in making their recommendation to NMFS to write regulations to reduce the recreational bag and possession limits for PBF from 10 to 2-fish and 30 to 6-fish, respectively, to address the relative impact of this domestic fleet. NMFS published the proposed rule to reduce PBF bag and possession limits on April 21, 2015 (80 FR 22156).

### **3.3 Essential Fish Habitat and Protected Species**

Because the proposed action is unlikely to affect U.S. fishing activities in the proposed action area, it is also unlikely to affect the baseline conditions for essential fish habitat (EFH) or any protected species, including marine mammals, sea turtles, and seabirds. Therefore, information on protected species is incorporated by reference in this section. Some areas within the proposed action area have been identified as EFH for several FMPs, including the CPS and HMS FMPs. Commercial fisheries that catch PBF in the EPO are prosecuted in pelagic habitats, which are not affected by these fishing gears. Purse seine and DGN gear are generally not associated with adverse impacts to ocean and coastal habitats or forage fish biomass. In 2003, NMFS completed a Biological Opinion of U.S. West Coast fisheries for HMS, including an analysis of the DGN fishery. In 2004 and 2013, NMFS amended the corresponding incidental take statements for the DGN fishery. Interactions between the U.S. purse seine fishery and marine mammals are uncommon throughout the Pacific Ocean. The tuna purse seine fisheries operating in the EPO are currently listed as a Category III under Section 118 of the MMPA, i.e., remote likelihood of/no known incidental mortality or serious injury of marine mammals. More information on protected species can be found in Sections 5.2, 5.4, and 5.5 of this EA and in the HMS FMP (PFMC 2011b).

---

<sup>2</sup> NMFS posts the status of stocks online according to the Fish Stock Sustainability Index, see: [nmfs.noaa.gov/sfa/statusoffisheries/](http://nmfs.noaa.gov/sfa/statusoffisheries/).

---

## 3.4 Socioeconomic Environment

### *Purse Seine Fishery*

Currently, there are 20 U.S. coastal purse seine vessels (that fall between vessel class sizes 2 and 3; well volume carrying capacity 46 and 181 mt) listed on the IATTC Active Vessel Register and 13 purse seine vessels in class size 6 (>363 mt well volume carrying capacity) (April. 21, 2015). However, vessel participation ranges from year to year. For example, on August 1, 2013, six U.S. coastal purse seine vessels (between class sizes 2 and 3) and four purse seine vessels in class size 6 were listed on the IATTC Active Vessel Register. As stated earlier, most of the U.S. commercial landings of PBF from the IATTC Convention Area are those of the coastal purse seine vessels operating in the SCB, which opportunistically target PBF when they are available in the EPO. Otherwise, these vessels pursue their primary target species, small pelagics especially Pacific mackerel, Pacific sardine, anchovy, and market squid (Landings of these species can be found in reference PFMC 2010). As stated in Section 3.2.1 and 3.2.2, the larger purse seine vessels on the IATTC Active Vessel Register target tropical tunas in the EPO. These vessels rarely make catches of PBF as the fishing grounds differ for tropical tunas since these species prefer warmer water temperatures than PBF.

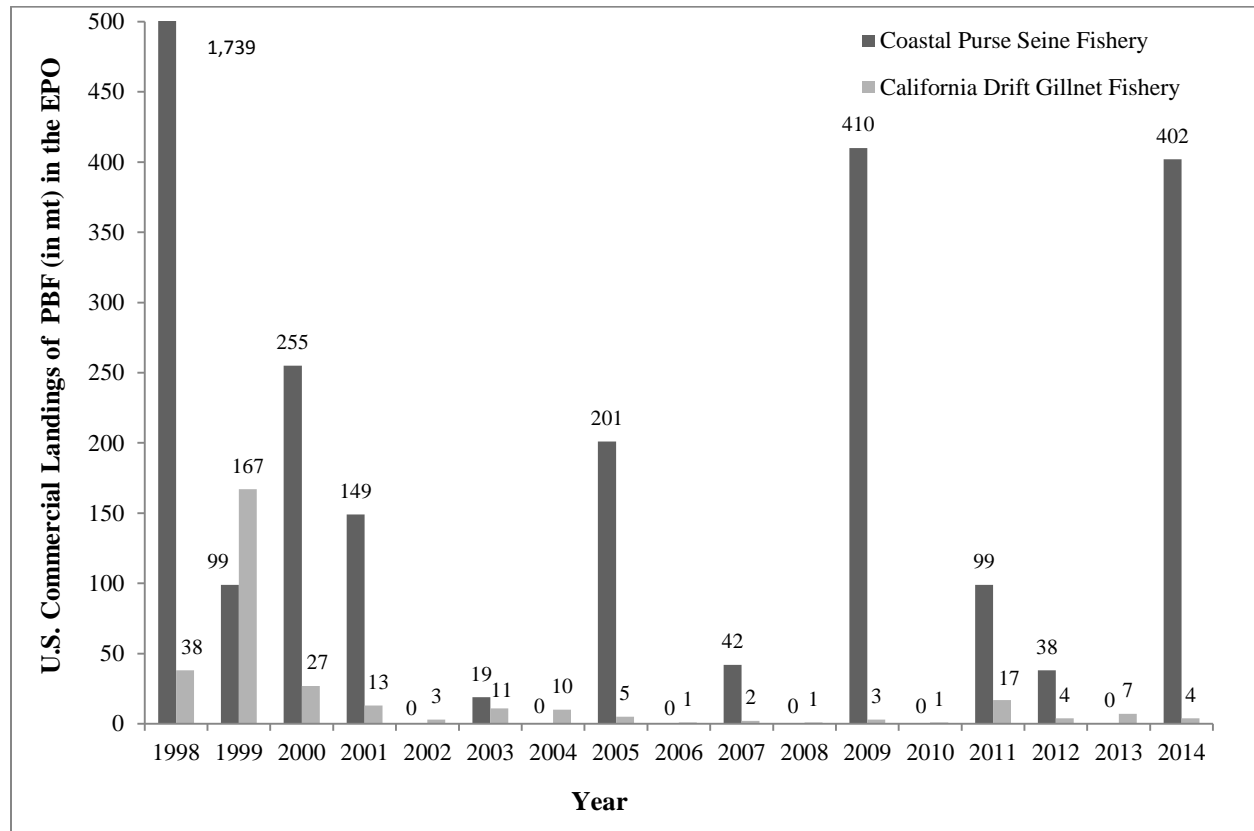
The U.S. coastal purse seine fleet landings of PBF (in mt) from 1998 (the last time there was a PBF catch of over 500 mt) through 2014 can be found in Figure 3-5. U.S. PBF catch was particularly high in 2009 and was unconstrained by management measures at that time. In 2009, the purse seine fleet landed 410.2 mt of PBF for ex-vessel revenue of \$441,102, in 2011 dollars, and five mt of skipjack tuna for ex-vessel revenue of \$3,776 (PFMC 2011c). They also landed small amounts of albacore tuna and yellowfin tuna. The fleet's 2009 ex-vessel revenue, in 2011 dollars, was \$366,664 for 474 mt of coastal pelagic species. Purse seine vessels class size five and under (<363 mt well volume carrying capacity) are considered small business entities according to the Small Business Administration's revised small business size standards (revenues equal to or fewer than \$19 million per year for finfish fishing) (78 FR 37398 June 20, 2013). It is estimated that from 2004-2008, the majority, if not all, class size five U.S. purse seine vessels had revenues of fewer than \$0.5 million per year. Class size six vessels are also considered small business entities. It is estimated that large purse seine vessels typically generate about 4,000 to 5,000 mt of tuna valued at about \$4 to \$5 million per year.

### *California DGN Fishery*

While the primary target species of the California DGN fishery is swordfish, this fleet also retains catch of thresher shark (a secondary target species) and small quantities of incidentally caught PBF. Refer to Figure 3-5 for U.S. DGN commercial landings of PBF in mt from 1998 through 2014. There has been a precipitous decline in participation in the fishery since 1985, when there were 297 active vessels. Since 2004, there have been fewer than 65 active vessels participating in the fishery (NMFS 2012). Participation in the DGN fishery has dwindled from a maximum number of about 250 vessels in the mid-1980s to a recent level of about 26 vessels on average over the 2008-2013 timeframe (NMFS 2014).

California DGN fishing operations are considered small business entities (revenues equal to or fewer than \$19 million per year for finfish fishing). According to the most recently published HMS stock assessment and fishery evaluation document (2014), ex-vessel revenues (all expressed in 2011 dollars) for the DGN fishery have ranged from about \$775,000 to almost \$11 million from 1990 to 2013. Between 2001 and 2011, the highest ex-vessel revenue for the DGN fishery was approximately \$3 million in 2007. In recent years (2009-2013), annual ex-vessel revenues have averaged approximately \$881,500. Ex-vessel revenues for DGN swordfish landings in 2011 totaled \$773,895 for 119 mt. This is a decrease from 2009 when revenues were \$1,111,452 and landings totaled 253mt. Ex-vessel revenues for DGN thresher shark

landings in 2011 totaled \$65,612 (55 mt); a decrease from 2009 when revenues were \$74,441 (38mt). Between 2001 and 2014, landings of PBF by the DGN fleet ranged from 1-17 mt per year, and the ex-vessel revenues ranged from \$2,625 to \$77,110 per year (PFMC 2012; data extracted from PacFIN April 17, 2015).



**Figure 3-5. U.S. Coastal Purse Seine and DGN Commercial Landings of PBF caught in the EPO (in mt).**  
 Source: PFMC 2012. \*PacFIN estimates of 2013 and 2014 U.S. PBF landings, extracted April 17, 2015.

#### 4.0 ENVIRONMENTAL CONSEQUENCES

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 recent level of catch and fishing effort in the coastal purse seine and DGN commercial fisheries in the EPO, with landings in other U.S. fisheries considered rare and negligible. Because the PBF catch and trip limits implemented for U.S. commercial fisheries in the EPO regularly expire, the baseline conditions for U.S. fishing operations, and thus the potential impacts to the fleets are expected to remain the same for future PBF conservation and management measures that fall within the scope of alternatives analyzed in this section.

A comparison of the data found in Figure 3-4 and Figure 3-5 demonstrate that the coastal purse seine and DGN fleet are the commercial fisheries likely to make a meaningful amount of PBF catch. It is for this reason that impacts from the alternatives on other U.S. fisheries are even less likely. For example, PBF commercial landings by the U.S. West Coast longline fishery and albacore surface hook-and-line fishery average less than 1 mt of annual PBF landings. Additionally, there were no catches of PBF in the EPO by U.S. class size six purse seine vessels from 2006 to 2011. Catches by Hawaii-based longline vessels

---

fishing in the EPO were also negligible during that time. Table 4-1 (below) summarizes the alternatives and their impacts.

#### **4.1 Direct and Indirect Impacts of Alternative 1 (Preferred Alternative)**

Adoption of Alternative 1, the catch limit regime described in Section 2.0, could have minor impacts on U.S. commercial fisheries in the EPO, and could benefit the sustainability of PBF. Recent history of PBF commercial catch in the EPO (Figure 3-4) indicates that the United States has not exceeded 600 mt since 1998.

Establishing PBF catch limits for U.S. commercial fleets equal to or below 600 mt may contribute to the rebuilding of PBF by enabling fish to escape capture by the fleets. However, the conservation benefits of PBF escaping capture by U.S. commercial fishery may be miniscule when considering the small proportion of U.S. catch relative to total catches made in the EPO, and Pacific-wide. The high degree of fluctuations in the availability of the PBF resource to U.S. fisheries is the most constraining factor on catch. For years 2001 to 2012, when catches were unrestrained by regulation, the median of annual PBF landings by the coastal purse seine fleet is 28.5 mt. During these same years, U.S. commercial catches of PBF in the Convention Area did not exceed 500 mt, and exceeded 250 mt once, in 2009. U.S. commercial catches of PBF in the Convention Area exceeded 250 mt again in 2014. However, the annual PBF landings by both the coastal purse seine fleet and DGN fleet for years 2004 to 2014 averaged fewer than 110 mt and only exceeded 50 mt in years 2005, 2009, 2011, and 2014 (Refer to Figure 3-5). Therefore, this alternative is not expected to significantly reduce the supply of this species from baseline levels.

An annual catch limit between 50 and 250 mt could have economic impacts for the U.S. fleet. Had a 250 mt limit been in place from 2001 to 2012, the fleet may have forgone as much as \$195,775 in ex-vessel revenue (in 2011 dollars) for that year (23% of ex-vessel revenue for that year). Had a 50 mt limit been in place for those years, the fleet may have forgone as much as \$1,000,000 in ex-vessel revenue (in 2011 dollars) for that year (87% of the total ex-vessel revenue for those years). Because these examples pertain to high years of bluefin landings and because a closure for fishing PBF in the IATTC Convention Area would not prohibit the fleet from fishing for other species, such as coastal pelagic species or other tunas, the forgone revenue would likely be far less. For example, coastal purse seine catches of other tunas were as much as three to ten times higher during years of lower PBF landings than for 2009 and 2014. Because the incidence and amount of annual PBF landings by the DGN fleet (see Figure 3-5) or other fleets is so low, any potential forgone revenue by the DGN fleet from a closure of PBF fishing in the Convention Area would be very minimal. Nonetheless, establishment of a PBF catch limit for U.S. fisheries operating in the Convention Area that is lower than 250 mt may have some economic impact on participating U.S. fisheries, which are all considered small businesses. As that limit drops below 100 mt, the economic impact of this alternative could become significant for these small businesses. However, in the context of rebuilding, such restrictions would be considered temporary until the stock is rebuilt.

While a catch limit above 250 mt and less than or equal to 600 mt is not expected to create any undue financial hardship on U.S. fisheries, there is some potential that, if PBF were available to U.S. commercial fisheries, the catch limit could be caught in less than a week, and/or a derby-style fishery could ensue among the purse seine fleet. Such conditions could threaten NMFS potential to ensure that the annual catch limits are not exceeded, and/or cause fishermen to feel pressured to fish during an open season and increase health and safety risks by fishing in adverse weather or when conflicts with other fisheries could exist.

Because fishing practices are unlikely to be significantly altered under Alternative 1, or by either Sub Option below, impacts to EFH, ESA listed species, marine mammals, seabirds, and sea turtles are likely to either remain unchanged or have a slightly more beneficial impact compared to baseline levels. Any

---

such benefits (e.g., reduced likelihood of disturbance) would accrue through a reduction in fishing pressure associated with restrictions on commercial PBF fishing. PBF fishing is prosecuted in pelagic habitats. These habitats are not affected by fishing gears used to catch PBF. Purse seine and DGN gear are generally not associated with adverse impacts to ocean and coastal habitats. In addition, PBF fishing is not expected to affect prey species or forage fish biomass. Because no significant impacts to ocean and coastal habitats or protected resources are expected, neither an EFH nor an ESA consultation was required for the PBF conservation and management measures as they will not have an adverse impact on EFH or protected species.

### ***Alternative 1: Sub Options***

The two trip limits, described in Sub Options of Alternative 1 in Section 2.0, are expected to aid in management of the catch limits and also benefit the fishery. The trip limits are expected to enhance the effectiveness of inseason management, such that the fishery will have access to the full catch limit. Further, the trip limits may help alleviate safety risks associated with derby-style fishing pressure as well as the potential for excess supply of PBF in that time, which could drive down market prices. Additionally, the smaller trip limit, which would become effective when 50 mt is left of the annual catch limit, is intended to reduce the likelihood of wasteful discards in non-directed fisheries (e.g., from drift gillnet, hook-and-line).

Reducing the amount of PBF permitted to be landed in any given trip could have economic implications for the U.S. fleet, but may benefit PBF through a reduction in harvest rate. The U.S. coastal purse seine fleet would be most impacted if trip limits were imposed. Assuming that vessels costs and search time are the same for targeting larger versus smaller schools of PBF, profits could decline as trip limits decline if the price paid per lb remained constant. However, smaller catches could also lead to better quality fish being landed and higher prices paid. Despite the potential costs of introducing trip limits into the management of PBF, the notion of adding trip limits to the catch limit regime adopted by the IATTC was raised by the HMS Advisory Subpanel to the PMFC (i.e., comprised of fishing and conservation interests) and recommended to NMFS by the PMFC. A reduction in harvest rate could allow some PBF to escape that otherwise might have been captured by the fishery. However, depending on the captains' ability to target schools by size and/or their ability to provide safe release of a portion of their catch if it exceeds the trip limit, the potential for mortality owed to discarding behavior may offset the conservation benefits of reduced harvest rates. The anticipated impacts of particular trip limits are discussed in more detail in relation to Sub Option A and Sub Option B.

***Sub Option A (Preferred Alternative):*** A trip limit that is equal to or greater than 10 mt and fewer than or equal to 30 mt could have minor economic impacts on the coastal purse seine fleet, but is unlikely to affect other U.S. fleets. The DGN fleet, as well as other fisheries that catch PBF incidentally, would be unlikely to be affected by trip limits, unless the trip limit were fewer than 2 mt. Fewer than 2 mt of PBF were landed for all of the trips in which DGN vessels landed PBF. More than 95 percent of vessel trips in the EPO that included incidental catches of PBF resulted in less than 1 mt of PBF landings. However, the average landing by a coastal purse seine vessel from a trip targeting PBF in the EPO during 2005 to 2014 was 30.6 mt (ranging from 0.04 mt to 75.8 mt; median is 29.2 mt); roughly 36 percent of these trips included landings up to 25 mt, whereas about 23 percent of the trips included landings up to 20 mt, and only about 18 percent of trips included landings up to 10 mt. Hence, a trip limit of 10 mt would have affected roughly 82 percent the trips made between 2004 and 2014; and, a trip limit of 20 mt would have affected roughly 77 percent of those trips. A 25 metric ton trip limit would have affected 64 percent of the trips, and a limit of 30 mt would have affected slightly less than 50 percent of the trips. In other words, the percentage of "affected trips" reflects the proportion of trips that would have had to land fewer fish to comply with the various trip limit options. Refer to Table 4-1 for more detail.

**Sub Option B:** A trip limit that is greater than 30 mt and fewer than or equal to 50 mt may have minor economic impacts on the coastal purse seine fleet, but is unlikely to affect other U.S. fleets. Slightly more than 50 percent of landings by a vessel from a trip targeting PBF in the EPO during 2005 to 2014 were fewer than 30 mt, and about 87 percent of landings for these trips were fewer than 50 mt. Therefore, Sub Option B is expected to have less impact on the coastal purse seine fleet than Sub Option A, but would also do less to slow harvest rates. As stated earlier, the DGN fleet, as well as other fisheries that catch PBF incidentally, would be unlikely to be affected by trip limits, unless the trip limit were fewer than 2 mt; and even a trip limit of 1 mt would have little impact on the fishing activities of these vessels. Refer to Table 4-1 for more detail.

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

Adoption of Alternative 2, the catch limit regime described in Section 2.0, could have minor impacts to the U.S. commercial fisheries in the EPO, and could benefit the sustainability of PBF in nearly all of the same ways as described for Alternative 1. The important distinction between Alternative 1 and Alternative 2 is that the U.S. catch limit would be contingent upon the Commission-wide catch limit in Alternative 2. While this contingency, in practice, is unlikely to yield different impacts than what was described under Alternative 1, it makes a big difference in fishing opportunity. For example, in most years, PBF do not become available to the U.S. commercial fleet (i.e., in sufficient quantities in U.S. waters) before the Commission-wide limit has been met. However, if ocean conditions were such that PBF were available to the U.S. commercial fleet year round, an opportunity might exist for the U.S. fleet to catch a portion of the Commission-wide limit greater than what they could catch under the U.S. limit (or CPC limit) alone. Therefore, Alternative 2 is less restrictive and could result in higher catches than Alternative 1; and therefore, may not yield the same conservation gains for PBF. However, Alternative 2, and Alternative 2 Sub Options A and B, are otherwise to have the same impacts as Alternative 1 and Alternative 1 Sub Options A and B; and they are not repeated here.

Table 4-1: Size of landings (in metric tons (mt)) from trips targeting Pacific bluefin tuna in the EPO from 2004 to 2014.

<b>Trip Size</b>	<b>Number of Trips (39)</b>	<b>Percent of Trips</b>	<b>Cumulative Percent (descending)</b>	<b>Cumulative Percent (ascending)</b>
0-10 mt	7	17.95	17.95	100.00
10-15 mt	1	2.56	20.51	82.04
15-20 mt	1	2.56	23.07	79.85
20-25 mt	5	12.82	35.99	76.92
25-30 mt	7	17.95	53.84	64.10
30-35 mt	5	12.82	66.66	46.15
35-40 mt	5	12.82	79.48	33.33
40-45 mt	0	0.00	79.48	20.51
45-50 mt	3	7.69	87.17	20.51
50-55 mt	2	5.13	92.30	12.82
55-60 mt	0	0.00	92.30	7.69
60-65 mt	0	0.00	92.30	7.69
65-70 mt	1	2.56	94.86	7.69
70-75 mt	2	5.14	100.00	5.13

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

Adoption of Alternative 3, as described in Section 2.0, would prohibit U.S. commercial fisheries from targeting PBF in the IATTC Convention Area but would allow for 50 mt of incidental catch. This

---

alternative would have the greatest economic impact on U.S. commercial fisheries. Because this alternative is the most constraining to fishing, it may also be the most beneficial action to take to contribute to the rebuilding of the PBF stock. However, because U.S. landings make up such a small proportion of total landings of PBF from the EPO, the probability that this alternative would yield any significant conservation benefits may not warrant the potential for considerable economic impacts.

Alternative 3 would impose the greatest economic impact on the U.S. coastal purse seine fleet, which opportunistically targets PBF when they are available. As stated in Section 3.4.1, the ex-vessel revenue of PBF landings caught by the coastal purse seine fleet in the EPO was \$441,102 (in 2011 dollars). Considering that the vessels engaged in coastal purse seine fishing for PBF in the EPO are small business entities and that they are typically few in number, closing fishing for PBF in the IATTC Convention Area could have a significant economic impact for these businesses. It is unlikely that other U.S. fisheries would be impacted by this alternative given the provision for a 50 mt incidental catch limit. As stated in Section 3.2.2, PBF catch in the EPO by U.S. class size six purse seine vessels is rare. The last recorded catch for these vessels was in 2003 and was under 25 mt. Pelagic longline and the West Coast surface hook-and-line commercial fisheries may occasionally catch PBF, but these catches rarely exceed one mt annually (PFMC 2011c) and the DGN fleet has not exceeded annual landings of 20 mt of PBF in more than 10 years. If retaining incidental catches of PBF from the Convention Area were prohibited due to incidental catch of PBF reaching 50 mt, U.S. commercial fisheries that incidentally catch PBF in the EPO already would have landed more PBF than under baseline levels. Therefore, there would be little to no impact of such a closure on U.S. fisheries that incidentally catch PBF in the EPO.

There are no public safety concerns associated with this alternative. Alternative 3 may reduce the supply of this species provided by U.S. fisheries from baseline levels. However, considering that there are only a few U.S. commercial fishing vessels that catch PBF in the EPO and that their catch has been inconsistent from year to year, baseline levels include incidences of low landings. Many years during the last decade resulted in fewer than 50 mt of PBF landings by U.S. fisheries, and some years resulted in fewer than two mt of landings. When PBF are not available, the U.S. fisheries that catch them target other species. For these reasons, the Alternative 3 is not expected to lead to a derby-style fishery in which fishermen might feel pressure to fish during an open season and increase their safety risks by fishing in adverse weather or when conflicts with other fisheries could exist.

Since the IATTC Convention Area would be closed to commercial targeting of PBF, impacts of this alternative to PBF, ESA listed species, marine mammals, seabirds, and sea turtles could be beneficial. Any such benefits (e.g., reduced likelihood of disturbance) would accrue through a reduction in fishing pressure associated with restrictions on commercial PBF fishing. However, advancing conservation of protected species has not been the goal of IATTC Resolutions concerning PBF. Even though commercial coastal purse seine fishing practices could be significantly altered under Alternative 3, this fishing gear is very selective and the practice produces very little bycatch. By removing the opportunity for the coastal purse seine fleet to target bluefin, the fleet may direct more effort to their primary target species, which are forage species. However, there are regulatory mechanisms in place under the respective CPS and HMS FMPs to ensure their sustainability. DGN, longline, albacore surface hook-and-line, and purse seine fishing is prosecuted in pelagic habitats. These habitats are not affected by fishing gears used to catch PBF. These gear types are generally not associated with adverse impacts to ocean and coastal habitats and the incidental catch of small amounts of PBF is not expected to affect prey species or forage fish biomass. No significant impacts to ocean and coastal habitats or protected resources are expected. Therefore, an EFH and ESA consultation was not required for the PBF conservation and management measures as they will not have an adverse impact on EFH or protected species.

---

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

Alternative 4, as described in Section 2.0, would have little to no impact on U.S. commercial fisheries that catch PBF in the EPO. Even though the recent history of PBF catch in the EPO (Figure 3-4) indicates that the United States has not exceeded 500 mt since 1998, there is potential for the fishery to increase effort such that catches legally could exceed 600 mt if a catch limit were not established. A 10,500 mt catch limit would exceed the highest level of U.S. commercial landings of PBF from the EPO in over 20 years. U.S. commercial landings of PBF from the EPO were just over 4,700 mt in 1986 and just over 4,670 mt in 1996. But considering changes in management practices since those years and the poor state of PBF stock conditions described in Sections 3.2.1, 3.2.2, and 3.2.3, it is highly unlikely that PBF would be available to U.S. commercial fleets in such abundance that catches by U.S. vessels would reach a 10,500 mt. Further, allowing high catches of PBF in the IATTC Convention Area during years of low spawning stock biomass could have adverse effects on the stock by hindering rebuilding. This alternative could have positive economic effects on the fisheries that catch U.S. PBF in the EPO, provided that the catch limits of this alternative are within the range of conservation advice for the stock. This alternative is not expected to significantly reduce the supply of this species from baseline levels. Thus, this alternative is not expected to create any undue hardship on U.S. fisheries, or lead to a derby-style fishery in which fishermen might feel pressure to fish during an open season and increase their safety risks by fishing in adverse weather or when conflicts with other fisheries could exist. As stated earlier, if trip limits were to be imposed under this alternative, the DGN fleet, as well as other fisheries that catch PBF incidentally, would be unlikely to be affected unless the trip limit were fewer than 2 mt; and a trip limit of 1 mt would have little impact on the fishing activities of these vessels.

As commercial fishing practices are unlikely to be significantly altered under Alternative 4, impacts to EFH, ESA listed species, marine mammals, seabirds, and sea turtles are likely to remain unchanged compared to baseline levels. PBF fishing is prosecuted in pelagic habitats. These habitats are not affected by fishing gears used to catch PBF. Purse seine and DGN gear are generally not associated with adverse impacts to ocean and coastal habitats. In addition, PBF fishing is not expected to affect prey species or forage fish biomass. No significant impacts to ocean and coastal habitats or protected resources are expected. Therefore, an EFH and ESA consultation was not required for the PBF conservation and management measures as they will not have an adverse impact on EFH or protected species.

#### **4.5 Direct and Indirect Impacts of Alternative 5: No Action**

Because limits on U.S. commercial catches of PBF from the IATTC Convention Area are short-term (i.e., expire), there would be no revisions to U.S. commercial fishing regulations under the no action alternative. While U.S. commercial catches of PBF from the EPO have not exceeded 500 mt in over a decade, the fishery could increase their effort such that catches legally could exceed 500 mt if a catch limit were not established. While such a situation is unlikely to be supported during a rebuilding phase, increases in U.S. commercial catch of PBF could have positive economic impacts for the fleet. However, these positive economic impacts could be short-lived. Any increases in effort could have an adverse effect on the PBF stock by hindering rebuilding, and could lead to negative economic impacts to the fleet through reduced availability of PBF over the long term. Nonetheless, there likely would be no change in the impacts (economic or otherwise) to U.S. fisheries, EFH, or protected resources in the EPO compared to baseline levels given such low incidences of U.S. PBF catch from the EPO during years in which there were no PBF catch limits.

#### **4.6 Cumulative Impacts**

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).

The proposed action is not likely to result in significant cumulative impacts to U. S. commercial or recreational fisheries when added to other past, present, and reasonably foreseeable future actions. In 2011, commercial vessel capacity regulations were revised to lessen the regulatory restraints on the U.S. industry, but required all participating U.S. vessels to register their participation each year; and purse seine vessels may incur fees for doing so. The catch limits for PBF proposed in this action lessen the incentive for commercial fishermen to register. As stated earlier, the proposed action does not apply to recreational fisheries, and it is likely that the IATTC will continue to modify PBF conservation and management measures at least until the stock is rebuilt; therefore, the cumulative impact on U.S. commercial and recreational fisheries is unlikely to be significant. Additionally, since the proposed action is not expected to significantly alter U.S. fishing activities, no cumulative impacts to EFH or protected species are expected compared to baseline levels.

The primary past, present, and foreseeable actions likely to significantly impact the DGN or coastal purse seine commercial fleet are those associated with the directed commercial harvest of the primary target species for these fleets. For the coastal purse seine fleet, this includes actions that may impact the harvest of Pacific mackerel, Pacific sardine, anchovy, market squid, and yellowfin and skipjack tunas. For the DGN fleet, this includes swordfish and thresher shark. The proposed action is not expected to alter the harvest strategy of either of these fleets, or any other U.S. commercial fleet. Even in the event that ocean conditions are such that PBF becomes available and the catch limit for PBF is reached, the commercial fleets will have had the opportunity to make PBF landings equal to or greater than that of the past 10 years as well as retain their ability to fish for the aforementioned target species (see Figure 3-4 for U.S. landings of PBF).

The proposed action could result in overall positive cumulative impacts for the PBF resource. Even though it is unlikely that U.S. fisheries would be heavily restricted by this action compared to baseline conditions, there is potential for the U.S. vessels catching PBF to increase effort such that catches legally could exceed 600 mt if a catch limit were not established. Removing this possibility of increased fishing effort could contribute to the sustainability of the PBF stock, and the same is true for reducing harvest rates with trip limits. Compliance with IATTC resolutions is expected among all IATTC Members and to result in beneficial impacts to the PBF stock. Further, this compliance is essential to urging the Western Central Pacific Fishery Commission to continue to take complementary and effective measures to reduce the mortality of PBF throughout its range by “establish[ing] management and regulatory measures in all the WCPFC commercial fleets” (as stated in IATTC resolutions). Such an outcome would result in beneficial impacts to the PBF stock that could benefit U.S. vessels catching PBF by way of ensuring sustainability of the stock and ending overfishing.

### ***Cumulative Impacts and Alternative Analysis***

As explained in Section 4.1, it is unlikely that Alternative 1, with or without Sub Option A (the preferred alternative) or B, and Alternative 2, with or without Sub Options A or B, would have a significant impact on U.S. commercial fishing. As indicated in Figure 3-4, the United States has not exceeded 600 mt since 1998. Even in the instances of the Commission-wide PBF catch limits being reached in 2013 and again in 2014, this proposed action in combination with past, present, and reasonably foreseeable future actions is unlikely to significantly impact the fishing activities of the DGN or coastal purse seine fleet since PBF is not their primary target species or that of any other U.S. commercial fishery in the EPO. Additionally, since there would be little, if any, change compared to baseline commercial fishing levels, there is no foreseeable cumulative impacts of Alternative 1, whether to commercial fishing or protected species.

---

Alternative 3 is more restrictive than Alternative 1 and 2, and more restrictive than recent IATTC resolutions require. Therefore, it is more likely to have negative socioeconomic impacts on U.S. fisheries that could lead to significant cumulative effects if implemented on an ongoing basis. While the U.S. commercial coastal purse fleet is not wholly dependent on catches of PBF, a persistent loss of the opportunity to target and catch PBF could affect their customary fishing portfolio and revenue and necessitate substitution of PBF with another species.

Alternative 4 is not likely to have any impact to U.S. commercial fishing. However, Alternative 4 is also less likely to benefit the PBF stock. Given the overfished conditions of the PBF stock, increases in fishing effort could result in negative cumulative impacts for the U.S. commercial fisheries operating in the EPO. Without the United States taking a precautionary action to limit fishing, PBF stock conditions may worsen such that the resource would be less available to U.S. commercial fisheries in future years.

Alternative 5 (i.e, the “no action” alternative) is not likely to alter U.S. commercial fishing practices in the EPO compared to baseline levels. It is not expected that this alternative would impact protected species compared to baseline levels either. However, given the overfished conditions of the PBF stock, repeated increases in fishing effort under this alternative could result in negative cumulative impacts to PBF. Should unrestricted U.S. commercial catches hinder rebuilding of the stock, U.S. commercial fisheries operating in the EPO that land PBF may experience negative and recurring losses in revenue. Without the United States taking a precautionary action to limit fishing, PBF stock conditions may worsen such that the resource would be less available to U.S. commercial fisheries in future years.

## **5.0 APPLICABLE MANDATES: Federal Laws and Executive Orders (EO)**

### **5.1 Coastal Zone Management Act (CZMA)**

Section 307(c)(1) of the Coastal Zone Management Act 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 (PFMC 2011b). The proposed action is not expected to affect any state’s coastal management program.

### **5.2 Endangered Species Act (ESA)**

A Section 7 consultation was conducted for the tuna purse seine fishery in the EPO in 1999, and the incidental take statement was amended in 2004. The 1999 consultation concluded that the purse seine fishery would be unlikely to jeopardize the continued existence of endangered or threatened species. Additionally, a Biological Opinion of U.S. west coast fisheries for HMS was also completed in 2003 and in 2013. NMFS estimates that the proposed action would be within the scope of these previous Biological Opinions and the amended 2004 and 2013 incidental take statements (ITS). The actual observed take and mortality rates have been substantially lower than the estimated take and mortality rates in the Biological Opinions and ITSs. Because the commercial fishing activities pursuant to this proposed action will not affect endangered and threatened species or critical habitat in any manner that has not been considered in prior consultations, a formal consultation was not required for this action.

---

### **5.3 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 is in compliance with this act and has an HSFCA permit.

### **5.4 Marine Mammal Protection Act (MMPA)**

Under the MMPA, NMFS is responsible for the management and conservation of 153 stocks of whales, dolphins, porpoises, seals, sea lions, and fur seals. As amended in 1972, the MMPA is the principle Federal legislation that guides marine mammal species protection and conservation policy in the United States. Vessels that would be affected by the proposed action are in compliance with this act. While there is no directed effort towards PBF by the DGN fleet, regulatory measures are in place, including the use of pingers and net extenders, to reduce marine mammal interactions with DGN gear. In the U.S. purse seine fishery, interactions with marine mammals are uncommon throughout the Pacific Ocean. The tuna purse seine fisheries operating in the EPO are currently listed as a Category III fishery under Section 118 of the MMPA, i.e., remote likelihood of/no known incidental mortality or serious injury of marine mammals (78 FR 53336, August 29, 2013).

### **5.5 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.

### **5.6 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. Section 1 of EO 12866 states, “In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory measures, including the alternative of not regulating.” 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 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 complete RIR can be found on [regulations.gov](http://regulations.gov) as a supporting document to the proposed rule.

---

## **5.7 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. National Oceanic Atmospheric Administration (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.

## **5.8 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. This action does not contain policies with federalism implications under EO 13132.

## **5.9 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. The proposed action will not have tribal implications as defined in EO 13175.

## **5.10 EO 13186 Responsibilities of Federal Agencies to Protect Migratory Birds**

EO 13186 supplements the MBTA. On June 14, 2012, a Memorandum of Understanding (MOU) between NMFS and the USFWS was signed to aid in the conservation of migratory birds. This MOU focuses on avoiding or minimizing to the extent practicable adverse impacts on migratory birds and strengthening migratory bird conservation through enhanced collaboration between NMFS and USFWS. Per this MOU and EO, NMFS must integrate migratory bird conservation principles, measures, and practices into NMFS activities and science and resource-management plans. NMFS must also ensure, to the extent

practicable, that environmental analyses required by NEPA evaluate the effects of actions on seabirds and their habitats. The analysis included in this EA indicates that the proposed action will have no impact to seabirds when compared to baseline conditions.

**5.11 EO 12114 Environmental Effects Abroad of Major Federal Actions**

EO 12114 enables responsible officials of Federal agencies that have ultimate responsibility for authorizing and approving actions encompassed by this Order to be informed of pertinent environmental considerations and to take such considerations into account, with other pertinent considerations of national policy, in making decisions regarding such actions. This EO governs environmental actions and decisions relating to the environment outside the United States, its territories, and possessions. The responsible official must comply with the provisions of this EO when applicable. This EA analyzes the impacts to the human environment from the proposed action and the alternatives and therefore, satisfies the requirements of EO 12114.

**6.0 LIST OF PREPARERS AND PERSONS AND AGENCIES CONSULTED**

<b>Preparer Names and Affiliations</b>	<b>Responsibility</b>
Amber Rhodes, Fishery Policy Analyst, NMFS SWR	Primary author
Heidi Taylor, Supervisory Fishery Policy Analyst, NMFS SWR	Project management, Edits and revisions
<b>Persons and Agencies Consulted</b>	<b>Roles and Responsibilities</b>
NMFS did not consult on the proposed action with any other persons or agencies.	Not applicable

---

## 7.0 REFERENCES CITED

- Baumgartner, T.R., A. Soutar, and V. Ferreira-Bartrina. 1992. Reconstruction of the history of Pacific sardine and the northern anchovy populations over the past two millennia from sediments of the Santa Barbara Basin, California. California Cooperative Oceanic Fisheries Investigations. Rep. 33:24-40.
- Bayliff, W. 1993. Growth and age composition of northern bluefin tuna, *Thunnus thynnus*, caught in the eastern Pacific Ocean, as estimated from length–frequency data, with comments on trans-Pacific migrations. Inter-American Tropical Tuna Commission Bulletin. IATTC, La Jolla, CA, USA. 20(9):503-513.
- Bayliff, W. 2000. Status of Bluefin Tuna in the Pacific Ocean. Inter-American Tropical Tuna Commission. La Jolla, CA, USA.
- Bigelow, K.A., C.H. Boggs, and X. He. 1999. Environmental effects on swordfish and blue shark catch rates in the US North Pacific longline fishery. Fisheries Oceanography. 8(3):178-198
- Boustany, A.M., R. Matteson, M. Castleton, C. Farwell, and B.A. Block. 2010. Movements of Pacific bluefin tuna (*Thunnus orientalis*) in the Eastern North Pacific revealed with archival tags. Progress in Oceanography. 86:94–104.
- Field, J.C. and S.R. Ralston. 2005. Spatial distribution of California Current fish. In: Boldt JL (ed) Fisheries and the environment: Ecosystem indicators for the North Pacific and their implications for stock assessment. Proceedings of the first annual meeting of the National Marine Fisheries Service’s Ecological Indicators Research Program. AFSC Processed Report 2005-04, 45-48
- Field, D. B., T. R. Baumgartner, V. Ferreira, D. Gutierrez, H. Lozano-montes, R. Salvattecchi, and A. Soutar. 2009. Variability from scales in marine sediments and other historical records. Pp. 45-63. In, Checkley, D. J. Alheit, Y. Oozeki, and C. Roy (editors), Climate Change and Small Pelagic Fish. Cambridge Univ. Press, Cambridge, UK.
- Inter-American Convention for the Protection and Conservation of Sea Turtles. 2012. Conservation Status and Habitat use of Sea Turtles in the Eastern Pacific Ocean.
- Inter-American Tropical Tuna Commission (IATTC). Document SAC-02-09. 2011a. Status of Swordfishes in the Eastern Pacific Ocean in 2010 and Outlook for the Future. Scientific Advisory Committee, La Jolla, California, May 15-18, 2012.
- IATTC. Document IATTC-82-05. 2011b. Tunas and Billfishes in the Eastern Pacific Ocean in 2010. La Jolla, California, 2011.
- IATTC. 2013. Annual Report of the Inter-American Tropical Tuna Commission, 2009. La Jolla, California, 2013.
- Intergovernmental Panel on Climate Change (IPCC). 2007a. Climate Change 2007: Synthesis Report. An assessment of the Intergovernmental Panel on Climate Change, IPCC Plenary Session XXVII, Valencia, Spain.
- IPCC. 2007b. Climate Change 2007: The Physical Science Basis: Summary for Policymakers. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. This Summary for Policymakers was formally approved at the 10th Session of Working Group I of the IPCC, Paris, February 2007. Available at: [http://hosted.ap.org/specials/interactives/\\_documents/climate\\_report.pdf](http://hosted.ap.org/specials/interactives/_documents/climate_report.pdf)
- International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC). 2008. Report of the Pacific Bluefin Tuna Working Group Workshop. International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean, May 28 to June 4, 2008. Shimizu, Japan.
- ISC. 2010. Report of the Pacific Bluefin Tuna Working Group Workshop. International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean. July 6-9, 2010. Nanaimo, Canada.
- ISC. 2012a. Pacific Bluefin Tuna Stock Assessment Summary. International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean. December 19-21, 2012.

- 
- ISC. 2012b. Report of the Pacific Bluefin Tuna Working Group Workshop. International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean. January 31 to February 7, 2012. La Jolla, California, United States.
- ISC. 2014a. Report of the Fourteenth Meeting of the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean. Plenary Session. July 16-21, 2014. Taipei, Taiwan.
- ISC. 2014b. Stock assessment of Pacific bluefin tuna in the Pacific Ocean in 2014. Report of the Pacific Bluefin Tuna Working Group of the International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean.
- Kitagawa, T. A.M. Boustany, C.J. Farwell, T.D. Williams, M.R. Castleton, and B.A. Block. 2007. Horizontal and vertical movements of juvenile bluefin tuna (*Thunnus orientalis*) in relation to seasons and oceanographic conditions in the eastern Pacific Ocean. *Fisheries Oceanography*. 16(5):409-421.
- Mantua, N. J., Hare, S. R., Wallace, J. M, and Francis, R. C. 1997: *A Pacific decadal climate oscillation with impacts on salmon production*. *Bulletin of the American Meteorological Society*. 78, 1069-1079.
- NMFS. 2009. 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. July 2009.
- NMFS. 2011. Characterization of the West Coast Deep-set Longline Fishery Operating Outside of the U.S. Exclusive Economic Zone Draft Environmental Assessment. April 2011.
- NMFS. 2012. The Proceedings of the U.S. West Coast Swordfish Workshop: Working Towards Sustainability, May 11-12, 2011, San Diego, California. Prepared by Amber Rhodes, Jennifer Isé, and Mark Helvey for the National Marine Fisheries Service, Long Beach, CA. 65pp.
- NMFS. 2014. Regulatory Impact Review of Vessel Monitoring System and Pre-trip Observer Notification Requirements for the West Coast Large-Mesh Drift Gillnet Fishery. February 2015. Available on the following website:  
<http://www.regulations.gov/#!searchResults;rpp=25;po=0;s=drift%25Bgillnet%25BVMS;fp=true;ns=true>
- Pacific Fishery Management Council (PFMC). 2010. Status of the Pacific Coast Coastal Pelagic Species Fishery and Recommended Acceptable Biological Catches: Stock assessment and fishery evaluation 2010. Portland, Oregon, Pacific Fishery Management Council.
- PFMC. 2011a. Coastal Pelagic Species Fishery Management Plan as Amended Through Amendment 13. Portland, Oregon, Pacific Fishery Management Council.
- PFMC. 2011b. Highly Migratory Species Fishery Management Plan as Amended Through Amendment 2. Portland, Oregon, Pacific Fishery Management Council.
- PFMC. 2011c. Status of the U.S. West Coast Fisheries for Highly Migratory Species through 2010: Stock assessment and fishery evaluation. Portland, Oregon, Pacific Fishery Management Council.
- PFMC. 2012. Status of the U.S. West Coast Fisheries for Highly Migratory Species through 2011: Stock assessment and fishery evaluation. Portland, Oregon, Pacific Fishery Management Council.
- PFMC. 2014. Status of the U.S. West Coast Fisheries for Highly Migratory Species through 2014. Published online: <http://www.pcouncil.org/highly-migratory-species/stock-assessment-and-fishery-evaluation-safe-documents/current-hms-safe-document/>
- Perry, A.L., P.J. Low, J.R. Ellis, and J.D. Reynolds. 2005. Climate change and distribution shifts in marine fishes. *Science* 308(5730):1912-1915.
- Pinkas, L., M.S. Oliphant, I.L.K. Iverson. 1971. Food Habits of Albacore, Bluefin Tuna, and Bonito in California Waters. State of California. Fish Bulletin 152. Available through Online Archive of California:  
[http://www.oac.cdlib.org/view?docId=kt8290062w&brand=oac4&doc.view=entire\\_text](http://www.oac.cdlib.org/view?docId=kt8290062w&brand=oac4&doc.view=entire_text)

- 
- Polovina, J.L. 1996. Decadal variation in the trans-Pacific migration of northern bluefin tuna (*Thunnus thynnus*) coherent with climate-induced change in prey abundance. *Fisheries Oceanography* 5: 114–119.
- Richardson, T.L., G.A. Jackson, H.W. Ducklow, and M.R. Roman. 2004. Planktonic foodwebs of the equatorial Pacific at 0°, 140° W: a synthesis of EqPac time-series carbon flux data. *Deep-Sea Research I* 51(9): 1245-1274.
- Roessig, J.M., C.M. Woodley, J.J. Cech, and L.J. Hansen. 2004. Effects of global climate change on marine and estuarine fishes and fisheries. *Reviews in Fish Biology and Fisheries* 14(2):251-275.
- Scavia, D., J.C. Field, D.F. Boesch, R.W. Buddemeier, V. Burkett, D.R. Cayan, M. Fogarty et al. 2002. Climate change impacts on U.S. coastal and marine ecosystems, *Estuaries* 25(2):149-164.
- Schwing, F. 2005. Decadal-scale climate events. In: King J (ed) Report of the study group on fisheries and ecosystem responses to recent regime shifts. PICES Scientific Report No. 28, 9-36
- Wallace B.P. and Saba. 2009. Environmental and anthropogenic impacts on intra-specific variation in leatherback turtles: opportunities for targeted research and conservation. *Endangered Species Research* 7:1-11.
- Yokota, Takio, M. Toriyama, F. Kani, and S. Nomura. 1961. Studies on the feeding habits of fishes. Rept. Nankai Fish Res. Lab., (14) : 1–234.
- Yamanaka, H., and staff. 1963. Synopsis of biological data on kuromaguro, *Thunnus orientalis*, (Temminck and Schlegel) 1842 (Pacific ocean). In *FAO World Scientific Meeting on the Biology of Tunas and Related Species*. Proc. Species Synop. (6), (also *FAO Fish. Biol. Synop.* 49). *FAO Fish Rept.*, 6 (3) : 180–217.