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

AUG 8 2012

To All Interested Government Agencies and Public Groups:

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

TITLE: Finding of No Significant Impact and Supplemental Environmental Assessment: Implementation of the Western and Central Pacific Fisheries Commission Bigeye Tuna Catch Limits for Longline Fisheries in 2012; RIN 0648-BC14

LOCATION: Area of Application of the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean

SUMMARY: In December 2008, the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (hereafter Commission or WCPFC) adopted "Conservation and Management Measure for Bigeye and Yellowfin Tuna in the Western and Central Pacific Ocean" (CMM 2008-01). CMM 2008-01 set forth specific provisions to reduce fishing mortality on western and central Pacific Ocean (WCPO) bigeye tuna (*Thunnus obsesus*) and control fishing mortality on WCPO yellowfin tuna (*Thunnus albacares*). CMM 2008-01 had the stated objective of reducing, over the period 2009-2011, the fishing mortality rate for bigeye tuna in the WCPO by at least 30% from the annual average during the period 2001-2004 or 2004 and ensuring that there was no increase in fishing mortality for yellowfin tuna beyond the annual average during the period 2001-2004 or 2004. In March 2011, the Commission adopted "Conservation and Management Measure for Temporary Extension of CMM 2008-01" (CMM 2011-01), which extends the majority of the provisions of CMM 2008-01 until February 28, 2013. The Commission is scheduled to discuss a follow-on measure to CMM 2008-01 at its next regular session in December 2012.

In 2009, NMFS prepared an Environmental Assessment (EA) that analyzed the effects on the human environment that could result from the promulgation of two rules to implement CMM 2008-01. In order to respond to public comments on the 2009 EA, NMFS prepared a Supplemental EA in 2009. NMFS has prepared a Supplemental EA (2012 SEA) to provide information and analyses to take into consideration significant new information and changed circumstances relevant to the proposed action and the assessment of its potential environmental impacts. The 2012 SEA analyzes the effects of an interim final rule that would extend the bigeye tuna catch limits specified in CMM 2011-01 for U.S. longline fisheries for 2012.

RESPONSIBLE
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The environmental review process led us to conclude that this action will not have a significant impact on the environment. Therefore, an environmental impact statement was not prepared. A copy of the finding of no significant impact (FONSI), including the 2012 SEA, is enclosed for your information.

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

Sincerely,

for Patricia A. Montanio
NEPA Coordinator

Enclosure

# Supplemental Environmental Assessment

# Implementation of the Western and Central Pacific Fisheries Commission Bigeye Tuna Catch Limits for Longline Fisheries in 2012

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**RIN 0648-BC14**

July 2012

This document supplements the following documents:

*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)*; and

*Supplemental 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: Specific Analysis on Bigeye Tuna Catch Limits in Longline Fisheries in 2009, 2010, and 2011 (October 2009).*

## LIST OF ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| CCM | Commission Members, Cooperating Non-Members, and Participating Territories |
| CEQ | Council on Environmental Quality |
| CFCAA | Consolidated and Further Continuing Appropriations Act, 2012 |
| CMM | Conservation and Management Measure |
| CNMI | Commonwealth of the Northern Mariana Islands |
| Convention | Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean |
| Convention Area | Area of Application of the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean |
| EA | Environmental Assessment |
| EEZ | Exclusive Economic Zone |
| EFH | Essential Fish Habitat |
| EPO | eastern Pacific Ocean |
| ESA | Endangered Species Act |
| FADs | Fish aggregating devices |
| FEP | Fishery Ecosystem Plan |
| FMP | Fishery Management Plan |
| HAPC | Habitat Areas of Particular Concern |
| HMS | Highly Migratory Species |
| IATTC | Inter-American Tropical Tuna Commission |
| MMPA | Marine Mammal Protection Act |
| MSA | Magnuson-Stevens Fishery Conservation and Management Act |
| MSY | Maximum Sustainable Yield |
| mt | metric tons |
| NEPA | National Environmental Policy Act |
| NMFS | National Marine Fisheries Service |
| NOAA | National Oceanic and Atmospheric Administration |
| NWR | National Wildlife Refuge |
| PMUS | Pelagic Management Unit Species |
| RIR | Regulatory Impact Review |
| USFWS | United States Fish and Wildlife Service |

| | |
|---|---|
| VMS | vessel monitoring system |
| WCPFC | Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean, also known as the Western and Central Pacific Fisheries Commission |
| WCPFCIA | Western and Central Pacific Fisheries Convention Implementation Act |
| WCPO | Western and Central Pacific Ocean |
| WPFMC | Western Pacific Fishery Management Council |

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# Chapter 1 Background and Purpose and Need

In December 2008, the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (hereafter Commission or WCPFC) adopted "Conservation and Management Measure for Bigeye and Yellowfin Tuna in the Western and Central Pacific Ocean" (CMM 2008-01). CMM 2008-01 set forth specific provisions to reduce fishing mortality on western and central Pacific Ocean (WCPO) bigeye tuna (*Thunnus obsesus*) and control fishing mortality on WCPO yellowfin tuna (*Thunnus albacares*).[1] CMM 2008-01 had the stated objective of reducing, over the period 2009-2011, the fishing mortality rate for bigeye tuna in the WCPO by at least 30% from the annual average during the period 2001-2004 or 2004 and ensuring that there was no increase in fishing mortality for yellowfin tuna beyond the annual average during the period 2001-2004 or 2004. In March 2012, the Commission adopted "Conservation and Management Measure for Temporary Extension of CMM 2008-01" (CMM 2011-01), which extends the majority of the provisions of CMM 2008-01 until February 28, 2013. The Commission is scheduled to discuss a follow-on measure to CMM 2008-01 at its next regular session in December 2012.

National Marine Fisheries Service (NMFS) promulgated regulations to implement specific provisions of CMM 2008-01 for U.S. fleets operating in the WCPO, which expired at the end of 2011 (see 74 FR 38544; 74 FR 63999). The regulations included bigeye tuna catch limits for U.S. longline fisheries and five specific requirements for the U.S. purse seine fleet operating in the WCPO: (1) fishing effort limits; (2) prohibition periods for the use of fish aggregating devices (FADs); (3) catch retention requirements; (4) observer requirements; and (5) closure of certain areas of the high seas to fishing. This Supplemental Environmental Assessment analyzes the effects of an interim final rule that would extend the bigeye tuna catch limits for U.S. longline fisheries.[2]

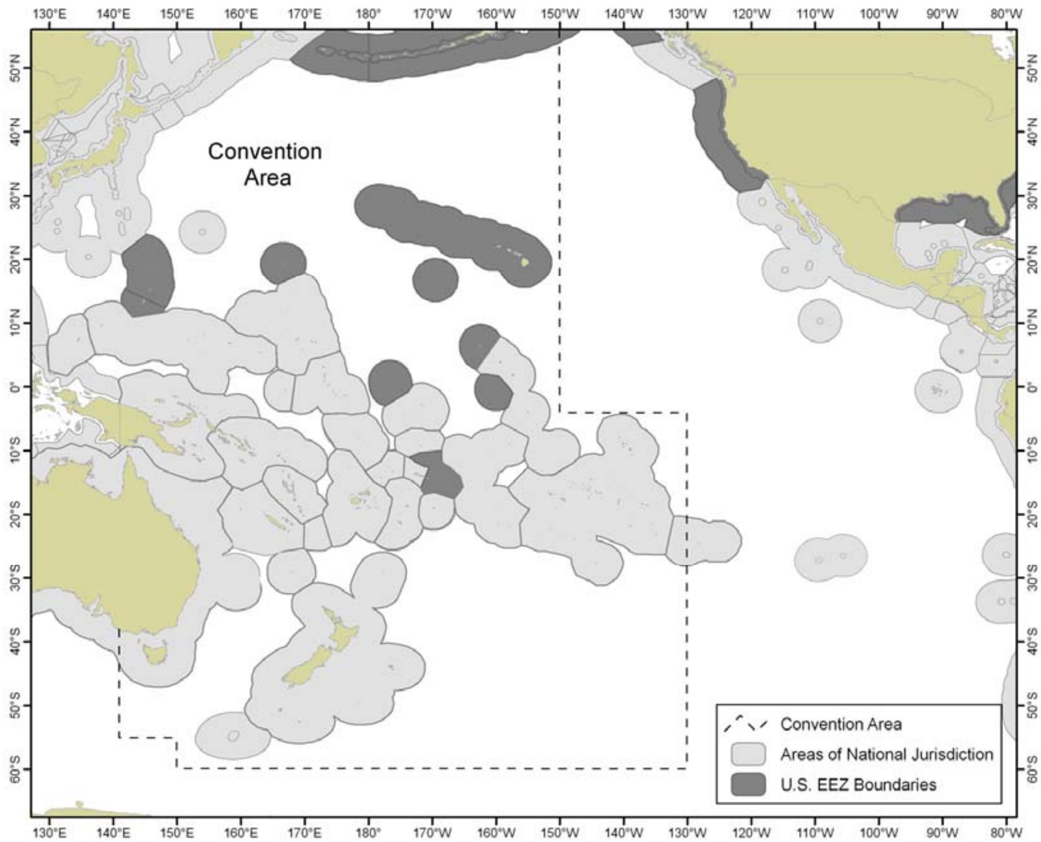
[1] The stock structure of bigeye tuna in the Pacific Ocean is not well known. The WCPFC has to date treated bigeye tuna in the WCPO as a single and entire stock, both in terms of stock assessments and management decisions. The WCPFC decisions and this proposed action, consequently, deal with bigeye tuna in the WCPO, and the term "WCPO bigeye tuna" is used throughout this document to refer to that stock. The same is true with WCPO yellowfin tuna.

[2] The regulations implementing the provisions of CMM 2008-01 for the U.S. purse seine fleet operating in the WCPO were extended to December 31, 2012 by an interim final rule (see 76 FR 82180). However, CMM 2008-01 included provisions for closing certain areas of the high seas to purse seine fishing, which were not extended by CMM 2011-01. Removal of the prohibition on fishing in those high seas areas for U.S. purse seine vessels would be the subject of a separate rulemaking.

## 1.1 Background on the WCPFC

The United States ratified the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (Convention) in 2007.[3] The area of application of the Convention (Convention Area) is shown in Figure 1. The Convention text indicates that the arrangement applies to highly migratory fish species (HMS) and stocks thereof within the Convention Area (see the Convention text for the specific HMS covered).[4] The Convention provides for the conservation and management of target stocks, non-target species, and species belonging to the same ecosystem or dependent upon or associated with the target stocks.

**Figure 1: The Convention Area - high seas (in white); U.S. Exclusive Economic Zone (EEZ) (in dark gray); and foreign jurisdictions ("claimed maritime jurisdictions," in light gray)**




Source: NMFS.

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[3] The Convention was opened for signature in Honolulu on September 5, 2000, and entered into force in June 2004; the Convention entered into force for the United States in 2007. The full text of the Convention is available at: http://www.wcpfc.int/key-documents/convention-text.

[4] Though not stated in the Convention text, it has also been agreed that southern bluefin tuna (*Thunnus maccoyii*) that are found in the Convention Area will continue to be solely managed by the Commission for the Conservation of Southern Bluefin tuna.

The WCPFC – among other things – adopts Conservation and Management Measures (CMMs) for Commission Members, Cooperating Non-Members, and Participating Territories (collectively referred to as CCMs) of the WCPFC to implement through their respective national laws and procedures. The Western and Central Pacific Fisheries Convention Implementation Act (WCPFCIA; Pub. L. 109-479, Sec 501, *et seq*., and codified at 16 USC 6901 *et seq*.) authorizes the Secretary of Commerce, in consultation with the Secretary of State and the Secretary of the Department in which the Coast Guard is operating, to develop such regulations as are needed to carry out the obligations of the United States under the Convention. The authority to promulgate regulations to implement the provisions of the Convention and WCPFC decisions, such as regulations to implement CMMs, has been delegated by the Secretary of Commerce to NOAA Fisheries Service, also known as NMFS.

## 1.2 Previous National Environmental Policy Act (NEPA) Analysis

NMFS prepared an Environmental Assessment (2009 EA) that analyzed the effects on the human environment that could result from the promulgation of two rules to implement certain decisions made by the Commission at its Fifth Regular Session, in Busan, Republic of Korea, in December 2008. One rule implemented specific management measures for the U.S. purse seine fleet operating in the WCPO (hereafter "U.S. Purse Seine Rule"), including specific provisions of CMM 2008-01. The other rule implemented the bigeye tuna catch limits specified in CMM 2008-01 for the U.S. longline fleets in the WCPO (hereafter "U.S. Longline Rule").

NMFS issued the 2009 EA (*Environmental Assessment for the Implementation of the Decisions of the Fifth Regular Annual Session of the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean: Fishing Restrictions and Observer Requirements in Purse Seine Fisheries for 2009-2011 and Turtle Mitigation Requirements in Purse Seine Fisheries and Bigeye Tuna Catch Limits in Longline Fisheries in 2009, 2010, and 2011*) in conjunction with the issuance of the proposed U.S. Purse Seine Rule on June 1, 2009 for public review and comment.

NMFS issued the proposed U.S. Longline Rule on July 8, 2009, for public review and comment, and also reissued the 2009 EA. In order to respond to comments received on the U.S. Longline Rule, NMFS issued a Supplemental EA (2009 SEA), titled *Supplemental 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: Specific Analysis on Bigeye Tuna Catch Limits in Longline Fisheries in 2009, 2010, and 2011*, on December 7, 2009.

This Supplemental EA (2012 SEA) provides additional information and analyses to take into consideration new information and changed circumstances relevant to the proposed action and the assessment of its potential environmental impacts. The 2012 SEA has been prepared pursuant to the provisions of the National Environmental Policy Act (NEPA; 42 U.S.C. 4321, et seq.) and related authorities, such as the Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508) and the National Oceanic and Atmospheric Administration's (NOAA) Environmental Review Procedures for Implementing NEPA (NAO 216-6). This document supplements the 2009 EA and 2009 SEA, and refers to specific sections of the 2009 EA and 2009 SEA, where appropriate; as a supplement it is meant to be read in conjunction with the 2009 EA and the 2009 SEA. Appendix 1 of this document contains the 2009 EA and Appendix 2 contains the 2009 SEA.

The following sections in this chapter provide a summary of the specific issues being analyzed in 2012 SEA, the organization of this document, and the purpose of and need for the action.

## 1.3 Section 113 of the Consolidated and Further Continuing Appropriations Act, 2012

On November 18, 2011, the President signed into law the Consolidated and Further Continuing Appropriations Act, 2012 (CFCAA; Pub. L. 112-55, 125 Stat. 552 et seq.). Section 113(a) of the CFCAA authorizes the U.S. Participating Territories of the Commission (American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands (CNMI)) to enter into arrangements with U.S. vessels that have permits issued under the Fishery Ecosystem Plan for Pacific Pelagic Fisheries of the Western Pacific Region (Pelagics FEP) for the assignment, allocation, and management of catch limits established by the Commission. Under CMM 2008-01, and as extended by CMM 2011-01, Participating Territories are generally subject to an annual catch limit of 2,000 metric tons (mt) of bigeye. However, if these Participating Territories are undertaking responsible development of their domestic fisheries, the bigeye tuna catch limits do not apply. Under Section 113(a), the Secretary of Commerce is to attribute to the U.S. Participating Territories those catches made by vessels operating under arrangements that are authorized under that section for the purposes of annual reporting to the Commission. Section 113(a) remains in effect until December 31, 2012, unless the Western Pacific Fishery Management Council (WPFMC) takes certain action – specified in Section 113(c) – regarding the management of catch and effort limits for the U.S. Participating Territories, and that action is implemented via regulations before December 31, 2012.

In order to take into consideration the provisions of Section 113(a), NMFS has developed a new action alternative, Alternative 6, which was not analyzed in the 2009 EA or 2009 SEA.

## 1.4 Organization of this Document

Chapter 1: (*Background and Purpose and Need*) Provides background information for the 2012 SEA and sets forth the purpose of and need for the interim final rule.

Chapter 2: (*Proposed Action and Alternatives*) Describes the new action alternative – Alternative 6 – and provides a summary of the alternatives analyzed in the 2009 EA and 2009 SEA.

Chapter 3: (*Affected Environment*) Includes descriptive information needed to analyze Alternative 6 as well as new information to supplement the information on the affected environment provided in the 2009 EA and 2009 SEA.

Chapter 4: (*Environmental Consequences*) Sets forth the analysis of direct, indirect, and cumulative impacts that could result from implementation of Alternative 6 and compares the effects of Alternative 6 to those of the other alternatives analyzed in the 2009 EA and 2009 SEA.

## 1.5 Purpose and Need

As stated above, the provisions of CMM 2008-01 are based on an objective to achieve a reduction in fishing mortality on WCPO bigeye tuna and a reduction in the risk of overfishing WCPO yellowfin tuna. With respect to bigeye tuna, the CMM is based in part on the finding by the WCPFC Scientific Committee that WCPO bigeye tuna is experiencing a fishing mortality rate greater than the rate associated with maximum sustainable yield (MSY). With respect to yellowfin tuna, the CMM is based on the finding by the WCPFC Scientific Committee that WCPO yellowfin tuna is being fished at capacity.

One of the provisions of CMM 2008-01 that was extended by CMM 2011-01 requires the United States to implement a specific limit for bigeye tuna caught by its longline fleets for 2012. The interim final rule would ensure NMFS' timely implementation of this catch limit for bigeye tuna. As prescribed by Paragraphs 33 and 35 of CMM 2008-01, the limit would be equal to the amount landed by the Hawaii and west coast longline fleets in 2004, less 10%. The amount landed in 2004, which is specified in CMM 2008-01 based on information provided by the United States to the WCPFC, was 4,181 mt. Consequently, the calculated reduction (less 10%) results in an annual limit of 3,763 mt. Based on the recent historical landings of the U.S. longline fleets operating in the Convention Area, this limit could be reached toward the end of the calendar year.

To comply with the international obligations of the United States, NMFS is issuing the interim final rule under the WCPFCIA pertaining to the U.S. longline fleets for the discrete and limited purpose of implementing the bigeye tuna catch limit for 2012.

The purpose of the interim final rule is for NMFS to ensure the timely implementation by the United States of the bigeye tuna catch limit established by the WCPFC for 2012. The need for the rule is to satisfy the international obligations of the United States as a Contracting Party to the Convention, pursuant to the WCPFCIA, and to make effective, for a fish stock subject to overfishing, a CMM provision that requires immediate implementation.

Chapter 2

# Chapter 2 Proposed Action and Alternatives

This chapter provides a detailed description of the proposed action analyzed in this document – NMFS' new alternative for implementation of the WCPFC longline bigeye tuna catch limit for 2012 (Alternative 6) – as well as a description of the four other action alternatives and the No-Action, or baseline, alternative, analyzed in the 2009 EA and 2009 SEA. The chapter concludes with a section providing more detailed information on the alternatives initially considered but excluded from detailed analysis.

Alternative 6 has been developed to take into consideration the enactment of Section 113 of the CFCAA. Given the changed circumstances created by Section 113, NMFS could not implement any of the other action alternatives analyzed in the 2009 EA and 2009 SEA for 2012. However, Chapter 4 of this document compares Alternative 6 to the action alternatives analyzed in the 2009 EA and 2009 SEA in order to build upon the analyses previously done and to provide the reader with information regarding the potential differences in environmental impacts between the action alternatives originally analyzed and Alternative 6.

## 2.1 Alternative 6 (New Alternative for 2012*)*

The baseline amount of bigeye tuna specified for the United States in the CMM, from which the limit is derived, is from information provided to the WCPFC by the United States. That information is expressed in terms of bigeye tuna that are retained on board, not captured or caught, per se. Consistent with U.S. recordkeeping and reporting conventions, although the bigeye tuna limits established in CMM 2008-01 are termed "catch" limits, the interim final rule would establish a limit on retained catches (as a proxy for catches) of bigeye tuna, similar to the limits established for 2009, 2010, and 2011, as described below.

For the purpose of implementing the bigeye tuna catch limits of CMM 2008-01 for 2012, NMFS would distinguish the catch attributed to the longline fisheries of the three Participating Territories from the catch attributed to the other longline fisheries of the United States, based upon the following:

- The types of Federal longline fishing permits registered to the fishing vessel;
- Where the bigeye tuna are landed; and
- Whether the bigeye tuna are subject to attribution under arrangements under the authorization of Section 113(a) of the CFCCA.

Bigeye tuna landed in any of the three Participating Territories, with certain provisos, would be treated as fish that are harvested in support of the development of the Participating Territory's domestic fisheries and would be attributed to the longline fishery of that Participating Territory. As well, bigeye tuna that are caught and retained by a fishing vessel registered for use under a valid American Samoa Longline Limited Access Permit, with certain provisos, would be treated as fish that are harvested in support of the development of American Samoa’s domestic fisheries and would be attributed to the longline fishery of American Samoa. The provisos in both these cases are the following:

- The bigeye tuna must not have been caught in the portion of the U.S. EEZ around the Hawaiian Archipelago; and
- They must be landed by a U.S. fishing vessel operated in compliance with a permit issued under 50 CFR 660.707 or 665.801.

Any bigeye tuna attributed to the longline fisheries of any of the three Participating Territories as described above would not be subject to the limit.

Vessels operating under an arrangement under the authorization of Section 113(a) of the CFCAA would have catch of bigeye tuna attributed to the Participating Territory with which the arrangement is made. The retained catch of bigeye tuna would be attributed to the particular Participating Territory, regardless of where in the Convention Area the fish are caught and where they are landed.

The interim final rule would include specific administrative criteria that arrangements must meet to be considered eligible under Section 113(a) for the purposes of attributing longline bigeye tuna catch to the U.S. Participating Territories, as specified in Section 113(a). The administrative criteria include the following:

(1) The arrangement must include vessels registered for use with valid permits issued under the Pelagics FEP;
(2) The arrangement must impose no requirements regarding where the vessels fish or land their catch;
(3) The arrangement must be signed by all the owners of the vessels included in the arrangement, or by their designated representative(s);
(4) The arrangement must be signed by an authorized official of the U.S. Participating Territory(ies) or his or her designated representative(s); and
(5) The arrangement must be funded by deposits to the Western Pacific Sustainable Fisheries Fund in support of fisheries development projects identified in a territory’s Marine Conservation Plan adopted pursuant to section 204 of the Magnuson-Stevens Fishery Conservation and Management Act.

In addition the interim final rule may specify when and how NMFS would begin attributing catch of vessels that are included in Section 113(a) arrangements to the relevant U.S. Participating Territory(ies). The range of options for specifying when and how to attribute such catch include the following:

(1) Do not constrain when to attribute bigeye tuna catch to the U.S. Participating Territory – that is, attribute according to the terms of the arrangement;
(2) Start attributing at some point before the U.S. bigeye tuna catch limit is reached; and
(3) Start attributing only to the U.S. Participating Territory only after the 3,763 mt U.S. bigeye tuna catch limit has been reached.

In order to consider the full range of potential environmental impacts that could arise from implementation of this provision of when and how to assign bigeye tuna catch to the U.S. Participating Territories, this document analyzes both option (1) and option (3) as part of the analyses for Alternative 6.

All other bigeye tuna captured by longline gear in the Convention Area by U.S. longline vessels and retained would contribute to the limit.

Once NMFS determines that the 2012 limit is expected to be reached by a specific future date, NMFS would publish a notice in the *Federal Register* announcing that specific restrictions would be effective on that specific future date until the end of the calendar year. NMFS would publish the notice at least seven calendar days before the effective date of the restrictions to provide fishermen advance notice of the restrictions. NMFS would also endeavor to make periodic forecasts of the date the limit is expected to be reached widely available to the public, to help fishermen plan for the possibility of the limit being reached.

Under Alternative 6, starting on the announced date and extending through the last day of that calendar year, it would be prohibited to use a U.S. fishing vessel to do the following:

- Retain on board, transship, or land bigeye tuna captured in the Convention Area by longline gear. However:
- Any bigeye tuna already on board a fishing vessel upon the effective date of the restrictions may be retained on board, transshipped, and/or landed, provided that they are landed within 14 days after the restrictions become effective. In the case of a vessel that has declared to NMFS pursuant to 50 CFR 665.803(a) that the current trip type is shallow-setting, the 14-day limit would be waived, but the number of bigeye tuna retained on board, transshipped, or landed must not exceed the number on board the vessel upon the effective date of the restrictions, as recorded by the NMFS observer on board the vessel.
- Bigeye tuna captured by longline gear may be retained on board, transshipped, and/or landed if they are captured by a fishing vessel registered for use under a valid American Samoa Longline Limited Access Permit or if they are landed in American Samoa, Guam, or the CNMI. However, the bigeye tuna must not have been caught in the portion of the U.S. EEZ surrounding the Hawaiian Archipelago, and, they must be landed by a U.S. fishing vessel operated in compliance with a valid permit issued under 50 CFR 660.707 or 665.801.
- Bigeye tuna caught by a fishing vessel operating under an arrangement under the authorization of Section 113(a) of the CFCAA may be retained on board, transshipped, and/or landed regardless of where in the Convention Area they are caught and where they are landed.

Starting on the announced date and extending through the last day of that calendar year, it would also be prohibited to transship bigeye tuna caught in the Convention Area by longline gear to any vessel other than a U.S. fishing vessel operated in compliance with a valid permit issued under 50 CFR 660.707 or 665.801.

These restrictions do not apply to bigeye tuna caught by longline gear outside the Convention Area, such as in the eastern Pacific Ocean (EPO). However, to help ensure compliance with the restrictions related to bigeye tuna caught by longline gear in the Convention Area, under Alternative 6, two additional, related, prohibitions would be in effect starting on the announced date and extending through the last day of that calendar year.

- First, it would be prohibited to fish with longline gear both inside and outside the Convention Area during the same fishing trip, with the exception of a fishing trip that is in progress at the time the announced restrictions go into effect. In that exceptional case, the vessel, unless on a declared shallow-setting trip, will still be required to land any bigeye tuna taken within the Convention Area within 14 days of the effective date of the restrictions, as described above.
- Second, if a vessel is used to fish using longline gear outside the Convention Area and the vessel enters the Convention Area at any time during the same fishing trip, the longline gear on the fishing vessel must be stowed in a manner so as not to be readily available for fishing while the vessel is in the Convention Area.

These prohibitions would not apply to vessels that land catch in the Participating Territories or that are operating under a valid American Samoa Longline Limited Access Permit, subject to the provisos described above, or to vessels that are operating under an arrangement under the authorization of Section 113(a) of the CFCAA.

## 2.1. The Alternatives Analyzed in the 2009 EA and 2009 SEA

The 2009 EA analyzed three action alternatives as well as the No-Action, or baseline alternative, and the 2009 SEA analyzed an additional action alternative. Each of these alternatives is described below.

### 2.1.1. Alternative 1: The No-Action Alternative to the U.S. Longline Bigeye Tuna Catch Limit Rule

Under Alternative 1, the catch limit for WCPO bigeye tuna established by the WCPFC for the U.S. longline fishery would not be implemented and U.S. longline fleets operating in the Convention Area could continue targeting and landing bigeye tuna after the amount specified in CMM 2008-01 has been reached in 2012. The fleets would continue to operate under the relevant Fishery Management Plans (FMPs) with limited entry and a variety of other regulatory measures currently in place (observers, reporting, vessel monitoring system (VMS), endangered species mitigation, etc.).

### 2.1.2. Alternative 2: Closure of the Deep-Set Fishery

Under Alternative 2, the rule to ensure NMFS' timely implementation of the bigeye tuna catch limit established by the WCPFC for applicable U.S. longline fleets would prohibit deep-set fishing operations (which target tunas) after a catch limit of 3,763 mt has been reached,[5] as well as prohibit the retention on board and landing of bigeye tuna by longline vessels (e.g., by vessels engaged in shallow-setting).[6]

Once NMFS determines that the limit is expected to be reached by a specific future date in 2012, NMFS would publish a notice in the *Federal Register* announcing that the fishery will be closed on that specific date and will remain closed until the end of the calendar year. NMFS would publish the notice at least seven calendar days before the effective date of the restrictions to provide fishermen advance notice of the restrictions. NMFS would also endeavor to make publicly available, such as on a web site, regularly updated estimates and/or projections of bigeye tuna landings in order to help fishermen plan for a possible fishery closure.

Starting on the closure date and extending through the last day of that calendar year, it would be prohibited to use a U.S. fishing vessel to deploy longline gear in the Convention Area, to retain on board bigeye tuna or yellowfin tuna captured by longline gear in the Convention Area, or to land or transship bigeye tuna or yellowfin tuna captured by longline gear in the Convention Area, with the following exceptions:

First, any bigeye tuna or yellowfin tuna already on board a fishing vessel upon the start of the closure may be retained on board, transshipped, and/or landed, provided that it is landed within 14 days after the start of the closure. In the case of a vessel that has declared to NMFS pursuant to 50 CFR 665.23(a) that the current trip type is shallow-setting, the 14-day limit would be waived, but the number of bigeye tuna or yellowfin tuna retained on board, transshipped, or landed could not exceed the number on board the vessel upon the start of the closure, as recorded by the NMFS observer on board the vessel.

Second, any bigeye tuna or yellowfin tuna captured by longline gear could be retained on board, transshipped, or landed, if it is landed in American Samoa, Guam, or the CNMI, provided that it was not caught in the portion of the U.S. EEZ surrounding the Hawaiian Archipelago and that it is landed by a U.S. fishing vessel operated in compliance with a valid permit issued under 50 CFR 660.707 or 665.801.

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[5] The 2009 EA and 2009 SEA described the action alternatives in terms of being implemented in 2009, 2010, and 2011. For the purposes of this document, the descriptions of Alternative 2, Alternative 3, Alternative 4, and Alternative 5 have been changed to specify that the limit would only be implemented for 2012.

[6] The deep-set longline fishery targets tuna species at depths ranging from 100 to 300 meters; the shallow-set fishery targets swordfish at depths less than 100 meters. NMFS manages both fisheries under shared and unique sets of requirements.

Third, vessels could continue to deploy longline gear in a shallow-set manner to target swordfish, provided that no bigeye tuna are landed or retained on board.

The purpose of the prohibitions with respect to yellowfin tuna would be to prevent vessels from targeting yellowfin tuna during the closure, which could potentially result in a large number of unutilized bigeye tuna mortalities, which would undermine the objective of the closure.

These restrictions would not apply to bigeye tuna caught by longline gear outside the Convention Area, such as in the EPO. However, to ensure compliance with the restrictions in the Convention Area, NMFS would prohibit vessels from fishing with longline gear in areas both within and outside the Convention Area during the same fishing trip.

### 2.1.3. Alternative 3: Prohibition on Retention, Landing, or Transshipping of Bigeye Tuna

Under Alternative 3, in order to ensure the timely implementation of the United States with the WCPO bigeye tuna catch limit established by the WCPFC for the U.S. longline fleets, vessels would be prohibited from retaining on board, landing or transshipping any catch of bigeye tuna in the limit's area of application, once the limit has been reached for the calendar year. However, any bigeye tuna already on board a vessel at the time of the closure may be retained on board and landed and any bigeye tuna could be retained on board, transshipped, or landed in American Samoa, Guam, or the CNMI, provided that it was not caught in the portion of the U.S. EEZ surrounding the Hawaiian Archipelago and that it is landed by a U.S. fishing vessel operated in compliance with a valid permit issued under 50 CFR 660.707 or 665.801. In other words, it would differ from Alternative 2 only in that fishing vessels would be allowed to continue deep-set longlining in the affected area after the limit is reached, provided that no bigeye tuna are retained or landed. As for Alternative 2 and Alternative 6, these restrictions would not apply to bigeye tuna caught by longline gear outside the Convention Area, such as in the EPO. However, to ensure compliance with the restrictions in the Convention Area, NMFS would prohibit vessels from fishing with longline gear in areas both within and outside the Convention Area during the same fishing trip.

### 2.1.4. Alternative 4: Closure of the Deep-Set and Shallow-Set Fisheries

Under Alternative 4, in order to ensure the timely implementation of the WCPO bigeye tuna catch limit for the U.S. longline fishery established by the WCPFC, both the shallow-set and deep-set fisheries would be closed once the annual limit of 3,763 mt of bigeye tuna has been reached for the calendar year (i.e., no U.S. vessel would be allowed to conduct longline fishing operations in the Convention Area). However, any bigeye tuna already on board a vessel at the time of the closure may be retained on board and landed and any bigeye tuna could be retained on board, transshipped, or landed in

American Samoa, Guam, or the CNMI, provided that it was not caught in the portion of the U.S. EEZ surrounding the Hawaiian Archipelago and that it is landed by a U.S. fishing vessel operated in compliance with a valid permit issued under 50 CFR 660.707 or 665.801. As for the other action alternatives, these restrictions would not apply to bigeye tuna caught by longline gear outside the Convention Area, such as in the EPO. However, to ensure compliance with the restrictions in the Convention Area, NMFS would prohibit vessels from fishing with longline gear in areas both within and outside the Convention Area during the same fishing trip.

### 2.1.5. Alternative 5: Prohibition on Retention, Landing, or Transshipping of Bigeye Tuna with Provision for American Samoa Longline Limited Access Permitted Vessels

Alternative 5 is the alternative that was analyzed in the 2009 SEA and implemented by NMFS for 2009, 2010, and 2011. This alternative is identical to Alternative 6, described above, with the exceptions that vessels operating under an arrangement under the authorization of Section 113(a) would not have their bigeye tuna catch attributed to the particular U.S. Participating Territory with which the arrangement is made and also would not be excluded from any of the prohibitions that would go into effect once the limit is reached. This alternative is identical to Alternative 3, described above, with the additional criteria that vessels operating under a valid American Samoa Longline Limited Access Permit would have bigeye tuna catch attributed to American Samoa, so long as the bigeye tuna were not caught in the portion of the U.S. EEZ around the Hawaiian Archipelago, and are landed by a U.S. fishing vessel operated in compliance with a permit issued under 50 CFR 660.707 or 665.801.

## 2.2. Alternatives to the U.S. Longline Rule Excluded from Detailed Analysis

As stated in Chapter 1 of this document, the purpose of the interim final rule is to ensure the timely implementation (prior to the limit being reached in 2012) by the United States of the bigeye tuna catch limit established by the WCPFC in CMM 2008-01 and as extended by CMM 2011-01. The need for the rule is to satisfy the international obligations of the United States as a Contracting Party to the Convention, pursuant to the WCPFCIA, and to make effective a CMM provision that requires immediate implementation.

The 2009 EA in Section 2.2.3 indicated that NMFS considered other alternative methods of implementing the WCPO bigeye tuna catch limit in 2009, such as time and/or area closures, other limitations on fishing effort, allocation of the catch limit among vessels, and non-calendar-year catch limits. NMFS did not develop these alternatives in detail. NMFS discussed these alternatives internally and purely on a conceptual basis.

NMFS concluded that these alternatives would exceed the scope of the purpose of and need for the rule because they could not be implemented prior to the United States reaching the limit established by the WCPFC for 2009, and NMFS is again excluding these alternatives from detailed consideration because they could not be implemented prior to the United States reaching the limit established by the WCPFC for 2012. These alternatives would require detailed consideration of many factors, ideally including the national standards established under the Magnuson-Stevens Fishery Conservation and Management Act (MSA; 16 U.S.C. § 1801 *et seq*.) and the objectives set forth in the relevant FMPs. Thus, because these alternatives would exceed the limited purpose of and need for the interim final rule to ensure the United States' timely implementation of the bigeye tuna catch limit established by the WCPFC for 2012, NMFS excludes these alternatives from further consideration.

Although NMFS has not addressed these other alternatives in depth, the WPFMC has discussed the development of several alternative methods of implementing the bigeye tuna catch limits through the MSA process at several of its meetings. Alternatives preliminarily considered include the following: individual transferable quotas; fishery allocation of catch limits (shallow versus deep sets); trip catch limits for non-target fishery; temporary fishery closures triggered by attainment of some proportion of the catch limit; seasonal fishery closures; and catch limits based on an alternative 12 month non-calendar year. The WPFMC has also discussed the implementation of bigeye tuna catch limits for the Participating Territories under the provisions of CMM 2008-01 and has directed staff to work with NMFS in developing an amendment to the Pelagics FEP for the establishment and management of these limits that would take into account the provisions of Section 113 of the CFCAA.

Section 113(c) of the CFCAA specifically states that Section 113(a) shall remain in effect until the earlier of December 31, 2012, or such time as the WPFMC recommends an amendment to the Pelagics FEP and implementing regulations to the Secretary of Commerce that authorize use, assignment, allocation, and management of catch limits of HMS, or fishing effort limits, established by the Commission and applicable to U.S. Participating Territories and the implementing regulations are approved and become effective. Should such implementing regulations become effective before the end of 2012, NMFS would revise the interim final rule accordingly. Given the limited discretion provided to NMFS under Section 113(a), other than the administrative requirements that arrangements must meet to be considered eligible under Section 113(a) for the purposes of attributing longline bigeye tuna catch to the U.S. Participating Territories and the consideration of when and how to attribute catch to the U.S. Participating Territories under Section 113(a), NMFS has not identified other provisions or alternatives for the implementation of Section 113(a) to include in the interim final rule.

# Chapter 3 Affected Environment

This chapter supplements the information compiled in Chapter 3 of the 2009 EA and Chapter 3 of the 2009 SEA, in order to provide the additional background information regarding the affected environment that is needed to analyze Alternative 6 and to provide updated information. Section 3.1 provides updated information on the U.S. longline fleets in the WCPO; Section 3.2 provides updated information on the physical environment, Section 3.3 provides updated information on bigeye tuna, yellowfin tuna, and principal target species; Section 3.4 provides updated information on the biological environment; and Section 3.5 provides updated information on protected resources.

## 3.1 U.S. Longline Fishing Fleets

### 3.1.1. The Hawaii Longline Fleet

This section supplements the information provided in Section 3.3.1 of the 2009 EA and 3.1.1 of the 2009 SEA. The Hawaii-based longline fleet is managed under the Pelagics FEP. Regulations for the management of this fleet are set forth at 50 CFR Part 665. A summary of management measures is provided in the Hawaii longline regulations summary, which is available on the NMFS Pacific Islands Regional Office Web site at http://www.fpir.noaa.gov/. Table 1 below summarizes the key requirements for the fleet.

The Hawaii-based limited entry longline fishery has the largest U.S. longline fleet operating in the Convention Area. The fleet has historically operated, and continues to operate, in two distinct modes based on gear deployment: deep-set longline by vessels that target primarily bigeye tuna and shallow-set longline by those that target swordfish. The sections that follow refer to these two distinct modes as the deep-set longline fishery and shallow-set longline fishery. Fishing effort is mainly exercised to the north and south of the Hawaiian Islands between the Equator and 40° N and longitudes 140° and 180° W. However, the majority of deep-set fishing occurs south of 25° or 30° N. Most fishing occurs in the U.S. EEZ around Hawaii and in adjacent high seas waters. An additional small amount of fishing takes place around Palmyra Atoll, Kingman Reef, and Johnston and Jarvis Islands.

**Table 1: Requirements for the Hawaii-based longline fleet. This table includes key requirements for the fleet and is not all inclusive.**

<table>
<tr><th colspan="2">Both Shallow-Set and Deep-Set Longline Requirements</th></tr>
<tr><td colspan="2">• Carry on board a Hawaii Longline Limited Access Permit established under 50 CFR § 665.801 for Pelagic Fisheries of the Western Pacific Region. There are 164 transferable permits;<br>• A maximum vessel length of 101 feet is permitted;<br>• All U.S. vessels that fish on the high seas are required to have a permit issued by NMFS in accordance with the High Seas Fishing Compliance Act (HSFCA). Permits are valid for five years;<br>• Complete a NMFS Daily Longline Fishing Log sheet for each set after each fishing day;<br>• Carry NMFS-owned and operated Vessel Monitoring System (VMS) units;<br>• If engaging in shallow-setting, possess a valid shallow-set certificate (of which no more than 2,120 are issued each year) for each shallow-set made;<br>• Carry a NMFS observer, if requested by the Pacific Islands Regional Office;<br>• Follow sea turtle mitigation techniques and requirements;<br>• Cease fishing if shallow-set fishery is closed as a result of reaching either sea turtle interaction limit (17 per year for loggerhead and 16 per year for leatherback); and<br>• Seabird mitigation techniques: When deep-setting or shallow-setting north of 23° N latitude or shallow-setting south of 23° N latitude, owners and operators of vessels registered for use under a Hawaii Longline Limited Access Permit, must either:<br>1. side-set according to 50 CFR § 665.815 (a)(1);<br>2. or fish in accordance with 50 CFR § 665.815 (a)(2).</td></tr>
<tr><th>(a)(1). Side setting</th><th>(a)(2). Alternative to side setting</th></tr>
<tr><td>• Mainline must be at least 1 meter forward from the stern of the vessel;<br>• Mainline and branch lines must be set from the port or the starboard side of the vessel;<br>• If a shooter is used it must be mounted at least 1 meter forward from the stern of the vessel;<br>• Branch lines must have weights with a minimum of 45 grams;<br>• 1 weight must be connected to each branch line within 1 meter of each hook;<br>• If seabirds are present, gear must be deployed so that baited hooks remain submerged; and<br>• A bird curtain must be deployed.</td><td>• Discharge fish and offal on the opposite side of the vessel where the longline gear is being set or hauled when seabirds are present;<br>• Retain sufficient fish, offal, and bait for the purpose of strategically discharging it;<br>• Remove all hooks from fish, offal, or spent bait;<br>• Remove the bill and liver of any swordfish that is caught, sever its head, and cut it down the middle;<br>• Use completely thawed bait, dyed blue;<br>• Maintain a minimum of 2 cans of blue dye on board the vessel; and<br>• Follow the requirements for deep-setting and shallow-setting below (a and b).</td></tr>
<tr><th>a. Deep-Setting North of 23°</th><th>b. Shallow-Setting</th></tr>
<tr><td>• Employ a line shooter; and<br>• Attach a weight of at least 45 grams to each branch line within 1 meter of the hook.</td><td>• Deploy gear at least 1 hour after local sunset and complete deployment no later than local sunrise, using the minimum vessel lights; and<br>• Follow short-tailed albatross handling techniques.</td></tr>
</table>

A number of vessels in the Hawaii-based longline fleet also have an American Samoa Longline Limited Access Permit. These are the vessels termed “dual permit vessels” in the 2009 SEA and this document. Section 3.1.3 of this document provides information on the American Samoa longline fishery and the additional requirements that would apply to dual permit vessels.

The recent characteristics and performance of the Hawaii-based longline fleet are summarized in Table 2 below.

**Table 2: Performance of the Hawaii longline fleet, 1993-2010**

| Year | Active vessels | Trips | Tuna-directed trips | Swordfish-directed trips | Hooks set (million) | Bigeye tuna landings (mt) | Sword-fish landings (mt) | Yellowfin tuna landings (mt) | Ex-vessel revenue ($ mill., inf-adj to 2010 dollars) |
|---|---|---|---|---|---|---|---|---|---|
| 1993 | 122 | 1,192 | 542 | 319 | 13.0 | 2,119 | 5,901 | 631 | 78.3 |
| 1994 | 125 | 1,106 | 568 | 310 | 12.0 | 1,785 | 3,172 | 605 | 59.7 |
| 1995 | 110 | 1,125 | 682 | 136 | 14.2 | 2,048 | 2,709 | 978 | 61.0 |
| 1996 | 103 | 1,100 | 657 | 92 | 14.4 | 1,785 | 2,499 | 629 | 58.8 |
| 1997 | 105 | 1,125 | 745 | 78 | 15.6 | 2,446 | 2,877 | 1,139 | 68.4 |
| 1998 | 114 | 1,140 | 760 | 84 | 17.4 | 3,222 | 3,258 | 721 | 63.8 |
| 1999 | 119 | 1,137 | 776 | 65 | 19.1 | 2,716 | 3,096 | 472 | 64.2 |
| 2000 | 125 | 1,103 | 814 | 37 | 20.3 | 2,643 | 2,815 | 1,203 | 65.6 |
| 2001 | 101 | 1,034 | 987 | 4 | 22.4 | 2,352 | 235 | 1,031 | 42.8 |
| 2002 | 100 | 1,163 | 1,163 | 0 | 27.0 | 4,383 | 308 | 559 | 48.8 |
| 2003 | 110 | 1,215 | 1,215 | 0 | 29.9 | 3,588 | 136 | 822 | 49.2 |
| 2004 | 125 | 1,338 | 1,332 | 6 | 32.0 | 4,323 | 249 | 708 | 51.0 |
| 2005 | 124 | 1,496 | 1,397 | 99 | 35.0 | 4,973 | 1,598 | 736 | 68.9 |
| 2006 | 127 | 1,401 | 1,341 | 60 | 35.3 | 4,424 | 1,166 | 962 | 61.0 |
| 2007 | 129 | 1,462 | 1,381 | 81 | 40.2 | 5,772 | 1,713 | 841 | 67.1 |
| 2008 | 128 | 1,414 | 1,333 | 81 | 41.5 | 5,848 | 1,947 | 898 | 73.7 |
| 2009 | 127 | 1,327 | 1,225 | 102 | 39.6 | 4,715 | 1,794 | 506 | 59.7 |
| 2010 | 123 | 1,284 | 1,178 | 106 | 38.9 | 5,388 | 1,593 | 568 | 70.1 |

Source: WPRFMC 2012a. Note: This information is from the WPFMC’s Annual Report for Pelagic Fisheries of the Western Pacific Region and differs from the information submitted in the Annual Report submitted by the United States to the WCPFC due to differences in method of reporting and catch attribution.

### 3.1.2. West Coast Longline Fishery

This information supplements the information provided in Section 3.3.2 of the 2009 EA. Vessels in the West Coast-based longline fishery are managed under the Fishery Management Plan for U.S. West Coast Fisheries for HMS. As stated in the 2009 EA, there have been very few active west coast-based longline vessels and no activity by such vessels in the Convention Area during the last few years. Regulations for management of this fishery in the EPO are set forth at 50 CFR Part 660. A summary of the key requirements is provided in Table 3 below.

**Table 3: Requirements for Longline Vessels Fishing in the EPO. This table includes key requirements and is not all inclusive.**

| |
|---|
| **The FMP prohibits all pelagic longline fishing inside the west coast U.S. EEZ. as well as shallow-set longline fishing in the adjacent high seas areas, including west of 150° W and north of the equator. Longline vessels operating on the high seas outside the U.S. EEZ are subject to the following controls set forth at 50 CFR Part 660**:<br><br>The length of each float line possessed and used to suspend the main longline beneath a float must be longer than 20 meters (65.6 feet or 10.9 fathoms);<br>From April 1 through May 31, longline gear may not be used in waters bounded on the south by 0°, on the north by 15° N, on the east by 145°, and on the west by 180°, and vessels may not receive, land, or transship HMS harvested by longline gear in that same area;<br>No light stick may be possessed on board a vessel;<br>When a conventional longline is deployed west of 150° and north of the Equator, no fewer than 15 branch lines may be set between any two floats;<br>When using basket-style longline gear north of the Equator, a minimum of 10 branch lines must be set between any two floats;<br>Longline gear deployed west of 150° and north of the Equator must be deployed such that the deepest point of the main longline between any two floats is at a depth greater than 100 meters below the sea surface;<br><br>If no observer is on board the vessel, landing or possession of more than 10 swordfish is prohibited when using J-type fishing hooks;<br>If no observer is on board the vessel, landing or possession of more than 25 swordfish is prohibited when using circle hook-type fishing hooks;<br>Line clippers, dip nets, and bolt cutters meeting NMFS' specifications must be carried aboard each vessel for releasing turtles and specific handling requirements must be followed;<br><br>**While fishing with longline gear north of 23° N latitude, a vessel must**:<br>Use a line-setting machine or line-shooter to set the main longline when making deep sets west of 150°W using monofilament main longline;<br>Attach a weight of at least 45 grams to each branch line within one meter of the hook when making deep sets west of 150°W using monofilament main longline;<br>When using basket-style longline gear, ensure that the main longline is deployed slack to maximize its sink rate;<br>Use completely thawed bait;<br>Use only bait that is dyed blue of an intensity level specified by a color quality control card issued by NMFS;<br>Maintain a minimum of two cans containing blue dye on board the vessel during a fishing trip;<br>Discharge fish, fish parts, or spent bait while setting or hauling longline gear on the opposite side of the vessel from where the longline is being set or hauled;<br>Retain sufficient quantities of offal for the purpose of discharging the offal strategically in an appropriate manner;<br>Remove all hooks from offal prior to discharging the offal;<br>Remove the bill and liver of any swordfish that is incidentally caught, sever its head from the trunk and cut it in half vertically, and periodically discharge the butchered heads and livers overboard on the opposite side of the vessel from which the longline is being set or hauled; and<br>Follow the short-tailed albatross handling techniques.<br><br>**Other requirements**:<br>All U.S. vessels that fish on the high seas are required to have a permit issued by NMFS in accordance with the HSFCA. Permits are valid for five years. Other management measures include the requirement for vessel operators to attend a protected species workshop each year, and the requirement for carrying VMS units. |

### 3.1.3. American Samoa Longline Fishery

This section supplements Section 3.1.2 of the 2009 SEA.

The American Samoa Longline Limited Entry Program was established under Amendment 11 to the Fishery Management Plan for Pelagic Fisheries of the Western Pacific Region (now Pelagics FEP). The regulations implementing the program are codified at 50 CFR 665.816. In order to use longline gear to catch pelagic fish in the U.S. EEZ around American Samoa, fishermen are required to have an American Samoa Longline Limited Access Permit on board the vessel. That permit is also required to land pelagic fish in American Samoa caught with longline gear in the U.S. EEZ around American Samoa, or to transship pelagic fish within the U.S. EEZ around American Samoa caught by longline gear in the U.S. EEZ around American Samoa or on the high seas. The American Samoa Longline Limited Entry Program allows for as many as 60 vessels. Permits are issued by vessel size class and permit holders are restricted to using vessels within their size class or smaller. The class sizes are as follows: Class A vessels are 40 feet long or smaller; Class B (and B-1) vessels are longer than 40 feet, but no longer than 50 feet; Class C (and C-1) vessels are longer than 50 feet, but no longer than 70 feet; and Class D (and D-1) vessels are longer than 70 feet.[7]

On February 23, 2012, NMFS published a notice in the *Federal Register* (77 FR 10724) stating the availability of four Class A permits and two Class D permits. Completed permit applications were due on June 22, 2012.

WPFMC is developing an amendment to the Pelagics FEP to modify the American Samoa limited entry program that may increase participation by smaller vessels, such as changing the vessel size classes from four to two, modifying the minimum pelagic management unit species (PMUS) harvest requirements, and changing the permit eligibility criteria.

The primary regulations and mitigation measures for this fishery, as set forth at 50 CFR Part 665, are summarized in Table 4.

[7] Class A vessels are 12.2 meters or less; Class B (and B-1) vessels are longer than 12.2 meters, but no longer than 15.2 meters; Class C (and C-1) vessels are longer than 15.2 meters, but no longer than 21.3 meters; and Class D (and D-1) vessels are longer than 21.3 meters.

**Table 4: Requirements in the American Samoa longline fishery. This table includes key requirements and is not all inclusive.**

| Longline Requirements |
|---|
| • A vessel of the United States must be registered for use under a valid American Samoa longline limited access permit (50 CFR 665.801(c)) if that vessel is used:<br>(1) To fish for PMUS using longline gear in the U.S. EEZ around American Samoa; or<br>(2) to land shoreward of the outer boundary of the U.S. EEZ around American Samoa Pacific PMUS that were harvested using longline gear in the U.S. EEZ around American Samoa; or<br>(3) to transship shoreward of the outer boundary of the U.S. EEZ around American Samoa Pacific PMUS that were harvested using longline gear in the U.S. EEZ around American Samoa or on the high seas;<br>• All U.S. vessels that fish on the high seas are required to have a permit issued by NMFS in accordance with the High Seas Fishing Compliance Act of 1995 (16 U.S.C. 5501–5509). Permits are valid for five years;<br>• The holder of a size Class C or D American Samoa Longline Limited Access permit and master of the vessel must carry and operate a VMS unit on board whenever the vessel is at sea;<br>• NMFS may notify the permit holder of the obligation to carry an observer aboard the vessel;<br>• Sea turtle mitigation requirements: Any owner or operator of a U.S. longline vessel that has a freeboard of more than 3 feet (0.91 meters) must carry aboard the vessel line clippers, dip nets, and dehookers meeting the specified minimum design standards. Any owner or operator of a U.S. longline vessel that has a freeboard of 3 feet (0.91 meters) or less must carry aboard their vessels line clippers capable of cutting the vessel’s fishing line or leader within approximately 1 foot (0.3 meters) of the eye of an embedded hook, as well as wire or bolt cutters capable of cutting through the vessel's hooks. If a sea turtle is observed to be hooked or entangled in fishing gear, vessel owners and operators must use the required mitigation gear to comply with the designated handling requirements;<br>• Each year, both the owner and the operator of an American Samoa Longline Limited Access Permit must attend and be certified for completion of a workshop conducted by NMFS on interaction mitigation techniques for sea turtles, seabirds, and other protected species;<br>• The operator of any fishing vessel with an American Samoa Longline Limited Access Permit must maintain on board the vessel an accurate and complete record of catch, effort, and other data;<br>• When fishing south of the Equator, owners and operators of vessels longer than 40 feet (12.2 meters) must use the following longline gear configurations: each float line must be at least 30 meters long; at least 15 branch lines must be attached to the mainline between any two float lines attached to the mainline; each branch line must be at least 10 meters long; no branch line may be attached to the mainline closer than 70 meters to any float line; and no more than 10 swordfish may be possessed or landed during a single fishing trip; and<br>• Any person subject to the requirements of 50 CFR 665.801(e) must maintain on board the vessel an accurate and complete NMFS transshipment logbook containing report forms. |

Table 5 includes general information on the overall performance of the American Samoa longline fishery from 1993 to 2010.

**Table 5: Performance of the American Samoa Longline Fishery, 1993-2010**

| Year | Active vessels[1] | Long-line Sets | Hooks set (thousands) | Albacore tuna landings (mt) | Bigeye tuna landings (mt) | Skipjack tuna landing (mt) | Sword-fish landings (mt) | Yellowfin tuna landings (mt) |
|---|---|---|---|---|---|---|---|---|
| 1993 | 4 | 16 | 0 | 0.1 | 0.3 | 0.2 | NA[2] | 1.2 |
| 1994 | 5 | 20 | 0 | 0.7 | 0 | 0 | NA | 0. 8 |
| 1995 | 5 | 187 | 0 | 26.7 | 1.0 | 0.1 | NA | 1.8 |
| 1996 | 12 | 653 | 99 | 86.2 | 3.9 | 0.2 | 0.4 | 11.6 |
| 1997 | 21 | 1,528 | 419 | 312.3 | 4.0 | 1.2 | 0.3 | 22.0 |
| 1998 | 26 | 1,754 | 771 | 445.6 | 10.1 | 18.4 | 1.7 | 42.0 |
| 1999 | 29 | 2,108 | 915 | 336.6 | 8.7 | 25.4 | 1.0 | 63.2 |
| 2000 | 37 | 2,814 | 1,335 | 631.5 | 21.6 | 14.6 | 0.9 | 86.3 |
| 2001 | 62 | 4,801 | 5,795 | 3225.4 | 75.1 | 67.8 | 5.9 | 187.5 |
| 2002 | 58 | 6,872 | 13,096 | 5938.7 | 197.6 | 244.0 | 14.8 | 480.3 |
| 2003 | 50 | 6,221 | 14,165 | 3938.0 | 242.3 | 119.8 | 14.6 | 496.6 |
| 2004 | 41 | 4,853 | 11,742 | 2482.8 | 227.7 | 235.2 | 9.1 | 887.7 |
| 2005 | 36 | 4,359 | 11,129 | 2912.3 | 133.0 | 141.4 | 7.5 | 521.6 |
| 2006 | 31 | 5,069 | 14,262 | 4172.4 | 200.7 | 213.0 | 37.9 | 496.4 |
| 2007 | 29 | 5,919 | 17,552 | 5181.6 | 230.8 | 165.4 | 12.8 | 632.5 |
| 2008 | 28 | 4,754 | 14,444 | 3547.7 | 124.3 | 162.9 | 6.7 | 339.7 |
| 2009 | 26 | 4,911 | 15,077 | 3917.0 | 160.3 | 155.6 | 12.5 | 392.5 |
| 2010 | 26 | 4,533 | 13,171 | 3932.3 | 178.0 | 111.2 | 11.2 | 444.5 |

[1] Indicates the number of boats landing pelagic species by longlining.
[2] NA indicates data not available.
Source: WPRFMC 2012a. This information is from the WPFMC's Annual Report for Pelagic Fisheries of the Western Pacific Region and differs from the information submitted in the Annual Report submitted by the United States to the WCPFC due to differences in method of reporting and catch attribution.

Albacore continued to dominate the catch of pelagic species in 2010. The catch composition for 2010 included primarily tuna species (about 96%): 84% of the tuna landings were albacore (*Thunnus alalunga*); 9% of the tuna landings were yellowfin tuna; 4% of the tuna landing were bigeye tuna; and 2% of the tuna landings were skipjack tuna (*Katsuwonus pelamis*) (WPRFMC 2012a). The majority of the non-tuna landings (64%) were of wahoo (*Acanthocybium solandri*).

This fleet differs from the Hawaii-based longline fleet in having two discrete components based on vessel size and fishing technology: small-scale vessels (mostly alia) 40 feet (12.2 meters) or less in length, generally fishing within 25 nautical miles from shore; and larger monohull vessels, mostly over 50 feet (15.2 meters) in length, fishing throughout and beyond the U.S. EEZ. The recent entry of numerous large (>15 meters) longline vessels resulted in a dramatic increase in longline fishing effort as well as a shift of fishing effort in waters between 50 and 200 nautical miles from shore. On average, the alia fleet has three person crews, while the large vessel fleet generally has six person crews. Currently, the American Samoa longline fleet is primarily a large vessel fleet. In order to reduce the potential for gear conflicts and catch competition, there are area closures for large vessels – vessels longer than 50 feet. NMFS has published a final rule, effective July 11, 2012, that changes the boundaries of these area closures to align with the boundaries of the Rose Atoll Marine National Monument (see 77 FR 34260).

The fishery is based almost entirely on albacore caught for the canneries in Pago Pago, but some catch is also sold to stores, restaurants, and the local population (WPRFMC 2012a). Only one cannery has been operating in Pago Pago since 2009, but according to a document published in early 2012, another canning operation run by Tri-Marine may open in 2012 (WPRFMC 2012b).

Total revenue for the longline fleet in 2010 was approximately $10.4 million, dominated by albacore ($8.7 million) (WPRFMC 2012a).

### 3.1.4. Guam and the CNMI Longline Fishery

During the last few years, there have been a small number of vessels with permits for longline fishing based out of Guam and the CNMI. Due to the limited number of vessels in the fishery, data regarding these vessels is confidential.

### 3.1.5. Transshipments

Vessels in the fisheries of U.S. Participating Territories may transship their catch (which tends to be vessel-to-vessel and is rare) to a receiving vessel. A receiving vessel must be of the United States and must be registered for use with a valid receiving vessel permit if that vessel is used to land or transship, shoreward of the outer boundary of the U.S. EEZ around American Samoa, Hawaii, Guam, CNMI, or the Pacific Remote Island Areas, PMUS that were harvested using longline gear (50 CFR 665.801(e)).

Unpublished NMFS data indicate that from 1993 through 2009 there were approximately 290 transshipments of longline-caught fish to U.S. vessels. Anecdotal information as well as a review of permitting information suggests that most, if not all, of these transshipments took place at sea. The species transshipped were primarily tunas, with some marlins, swordfish and other pelagic species also transshipped. Between 1993 and 2000, a number of the transshipments involved the receipt of shark fins from foreign-flagged vessels; after the passage of the Shark Finning Prohibition Act in 2000, such transshipments were prohibited. Due to the limited number of transshipments per year, much of these data are confidential. The transshipment reports indicate that all recorded transshipments involving shark fins were made from foreign vessels, and, based on the vessel information that NMFS has been able to obtain, it is likely that all transshipments that involved fish other than shark fins were made from U.S. vessels. The number of transshipments appears to have increased in recent years, and the recorded transshipment activity has taken place within the Hawaii and American Samoa longline fleets. It is believed that all transshipments of fish in these fisheries were landed either in Hawaii or American Samoa.

### 3.1.6. Other Regulations for U.S. Longline Fleets in the WCPO

Regulations to implement the basic provisions of the Convention, including requirements related to authorizations to fish, VMS, vessel marking, observers, and boarding and inspection by inspection vessels of other WCPFC members, became effective in 2010. Those requirements apply to U.S. longline vessels insofar as they are used in the Convention Area, with most requirements triggered when a vessel is used on the high seas in the Convention Area.

## 3.2 Physical Environment and Climate Change

This section contains excerpts of information from Section 3.1 of the 2009 EA. The citations in the 2009 EA are included here as well.

The physical reach of the Western and Central Pacific Fisheries Convention, or the Convention Area (as shown in Figure 1 in Chapter 1), comprises all waters of the Pacific Ocean bounded to the south and to the east by the following line: from the south coast of Australia due south along the 141° meridian of east longitude to its intersection with the 55° parallel of south latitude; thence due east along the 55° parallel of south latitude to its intersection with the 150° meridian of east longitude; thence due south along the 150° meridian of east longitude to its intersection with the 60° parallel of south latitude; thence due east along the 60° parallel of south latitude to its intersection with the 130° meridian of west longitude; thence due north along the 130° meridian of west longitude to its intersection with the 4° parallel of south latitude; thence due west along the 4° parallel of south latitude to its intersection with the 150° meridian of west longitude; thence due north along the 150° meridian of west longitude.

There are two main subtropical gyres (the North Pacific subtropical gyre in the northern hemisphere and the South Pacific subtropical gyre in the southern hemisphere) in the Pacific Ocean, as well as other major Pacific Ocean currents.

Subtropical gyres rotate clockwise in the northern hemisphere and counter clockwise in the southern hemisphere in response to trade and westerly wind forces. Due to this, the central Pacific Ocean (~20° N latitude-20° S latitude) 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. Embedded in the mean flow are numerous mesoscale eddies ("Mesoscale eddies are turbulent or spinning flows on scales of a few hundred kilometers" (Stewart 2005)) created from wind and current interactions with the ocean's bathymetry. These eddies, which can rotate either clockwise or counter clockwise, typically have important biological impacts, such as creating areas of high biological productivity.

Variability within the ocean–atmosphere system results in changes in winds, rainfall, currents, water column mixing, and sea-level heights, which can have profound effects on regional climates as well as on the abundance and distribution of marine organisms. In the tropical Pacific there is a limited seasonal variation, yet there is a strong interannual variability which in turn affects the entire Pacific Ocean (Langley, Williams, Lehodey et al. 2004). The scientific community has become increasingly aware of the occurrence and importance of long-term (decadal-scale) oceanographic cycles and of their relationship to cycles in the population sizes of some species of fish (Chavez, Ryan, Lluch-Cota et al. 2003). These naturally occurring cycles can either mitigate or accentuate the impact of fishing mortality on all species, especially those targeted in HMS fisheries. El Niño Southern Oscillation (ENSO) events, including meso-scale events, such as El Niño and La Niña, and shorter term phenomena such as cyclonic eddies near the Hawaiian Islands (Seki, Lumpkin, and Flament 2002), impact the recruitment and fishing vulnerability of HMS.[8]

Climate change can affect the marine environment by impacting the established hydrologic cycle (a change in precipitation and evaporation rates) (Roessig, Woodley, Cech 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 (Intergovernmental Panel on Climate Change 2007). These effects are leading to shifts in the range of species, changes in algal, plankton, and fish abundance (Solomon, Quin, Manning et al. 2007), and causing damage to coral reefs (Scavia et al. 2002). Climate change is also increasing the incidence of disease in aquatic organisms (Roessig, Woodley, Cech et al. 2004). Studies on plankton ecosystems, demonstrate that climate change is affecting phytoplankton, copepod herbivores, and zooplankton carnivores, which cause effects to ecosystem services, such as oxygen production, carbon sequestration, and biogeochemical cycling (Richardson, Jackson, Ducklow et al. 2004). These studies concluded that fish, seabirds, and marine mammals will need to adapt to a changing spatial distribution of primary and secondary production within pelagic marine ecosystems (Richardson, Jackson, Ducklow et al. 2004).

Studies conducted by Perry, Low, Ellis et al. (2005) indicate that climate change is impacting marine fish distributions, which in turn may have important ecological impacts on fish as well as important impacts on commercial fisheries. The impacts of climate change on commercial fisheries include: (1) increases in ocean stratification leading to

[8] ENSO events include the full range of variation observed between El Niño and La Niña events. El Niño is characterized by a large-scale weakening of the tradewinds and warming of the surface layers in the eastern and central equatorial Pacific. El Niño events occur irregularly at intervals of 2–7 years, although the average is about once every 3–4 years. These events typically last 12–18 months, and are accompanied by swings in the Southern Oscillation, an interannual "see-saw" in tropical sea level pressure between the eastern and western hemispheres. During El Niño, unusually high atmospheric sea level pressures develop in the western tropical Pacific and Indian Ocean regions, and unusually low sea level pressures develop in the southeastern tropical Pacific. During La Niña, the opposite effects are seen (NMFS 2004).

less primary production, which in turn leads to less overall energy for fish production; (2) decreases in spawning habitat from shifts in areas of well-mixed water zones leading to decreased stock sizes; and (3) changes in currents that may lead to changes in larval dispersals and retention, which could lead to decreases in stock sizes (Roessig, Woodley, Cech et al. 2004).

## 3.3 Target Species

This section includes information from Section 3.4 of the 2009 EA, as well as updated information, where appropriate. The citations provided in the 2009 EA are included here as well.

Table 6 summarizes the current status of the main target stocks of U.S. longline vessels fishing in the Convention Area: albacore, bigeye tuna, yellowfin tuna, and swordfish. The table expresses overfishing (indicating excessively high exploitation rate) and overfished (indicating excessively low stock size) status in terms of the status determination criteria specified in the relevant FMPs or FEPs, as required by the MSA. Stock status with respect to these two criteria is presented as reported in the NMFS quarterly stock status updates.

**Table 6: Stock status summary of main target HMS for U.S. longline fleets in the Pacific Ocean**

| Species | Stock | Overfishing? | Overfished? |
|---|---|---|---|
| Albacore (*Thunnus alalunga)* | North Pacific | Unknown | Unknown |
| | South Pacific | No | No |
| Bigeye tuna (*Thunnus obesus)* | Pacific | **Yes** | No |
| Yellowfin tuna (*Thunnus albacares)* | Central western Pacific | No | No |
| | Eastern tropical Pacific | No | No |
| Swordfish *(Xiphias gladius)* | North Pacific | No | No |

Source: http://www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm

As Table 6 indicates, using the MSA stock status determination criteria, overfishing is occurring on bigeye tuna throughout the Pacific but the bigeye tuna stock is not overfished.

### 3.3.1. Albacore (Thunnus alalunga)

The primary source used in the following description of the species is Collette and Nauen (1983). Other reviews include Bartoo and Foreman (1994) and Murray (1994).

Information suggests that separate northern and southern stocks of albacore, with separate spawning areas and seasons exist in the Pacific. Temperature plays a large role in the distribution of the species. In the North Pacific, albacore are distributed in a swath centered on 35° N and range as far as 50° N at the western end of their range. In the central South Pacific (150° E to 120° W) they are concentrated between 10° S and 30° S;

in the west they may be found as far south as 50º S. They are absent from the equatorial eastern Pacific. Albacore are both surface-dwelling and deep-swimming. Deep-swimming albacore tuna are generally more concentrated in the western Pacific but with eastward extensions along 30° N and 10° S (Foreman 1980). The 15.6° to 19.4° C SST isotherms mark the limits of abundant distribution although deep-swimming albacore tuna have been found in waters between 13.5° and 25.2° C (Saito 1973). Laurs and Lynn (1991) describe North Pacific albacore tuna distribution in terms of the North Pacific Transition Zone, which lies between the cold, low salinity waters north of the sub-arctic front and the warm, high salinity waters south of the sub-tropical front. This band of water, roughly between 40° and 30-35° N (the zone is not a stable feature) also helps to determine migration routes. Albacore are found to a depth of at least 38 meters and will move into water as cold as 9° C at depths of 200 meters.

Albacore follow complex migration patterns that differ between the North and South Pacific stocks. Most migration is undertaken by pre-adults, two to five years old. A further sub-division of the northern stock, each with separate migration, is also suggested. Generally speaking, a given year class migrates east to west and then east again in a band between 30° N and 45° N, leaving the northeast Pacific in September-October, reaching waters off Japan the following summer and returning to the east in the summer of the following year. In the South Pacific Ocean, mature albacore spawn in tropical and sub-tropical waters between about 10° S and 25° S during the austral summer. Spawning success appears to be related to the prevailing oceanographic conditions with stronger recruitment occurring during La Niña conditions (i.e., positive Southern Oscillation Index) (Langley 2006). Juvenile albacore recruit to surface fisheries in New Zealand coastal waters and in the vicinity of the sub-tropical convergence zone (about 40° S) in the central Pacific about one year later, at a size of 45-50 centimeters (Fork Length).

Albacore are noted for their tendency to concentrate along thermal fronts, particularly the Kuroshio front east of Japan and the North Pacific Transition Zone. Laurs and Lynn (1991) note that they tend to aggregate on the warm side of upwelling fronts. Near continental areas they prefer warm, clear oceanic waters adjacent to fronts with cool turbid coastal water masses. Further offshore, fishing success correlates with biological productivity.

### 3.3.2. Bigeye Tuna (*Thunnus obesus*)

Several studies on the taxonomy, biology, population dynamics, and exploitation of bigeye tuna have been carried out, including comprehensive reviews by Collette and Nauen (1983), and Whitelaw and Unnithan (1997). Miyabe (1994) and Miyabe and Bayliff (1998) reviewed the biology and fisheries for bigeye tuna in the Pacific Ocean.

The species is a mixture between a tropical and temperate water tuna, characterized by equatorial spawning, high fecundity, and rapid growth during the juvenile stage with movements between temperate and tropical waters during its life cycle.

Bigeye tuna are trans-Pacific in distribution, occupying epipelagic and mesopelagic waters of the Indian, Pacific, and Atlantic Oceans. The distribution of the species within the Pacific stretches between northern Japan and the north island of New Zealand in the western Pacific and from 40° N to 30° S in the eastern Pacific (Calkins 1980). Molecular analyses indicate that a single stock exists for Pacific bigeye tuna (Grewe and Hampton 1998). Large, mature-sized bigeye tuna are sought by sub-surface fisheries, primarily longline fleets. Smaller, juvenile fish are taken in many surface fisheries, either as a targeted catch or as a bycatch with other tuna species (Miyabe and Bayliff 1998). Large numbers are taken by purse seiners fishing on drifting objects in equatorial waters. The known depth (and therefore, temperature) range of bigeye tuna is expanding as more data are acquired from sonic tracking and electronic (archival) tagging experiments. Bigeye tuna generally inhabit greater depths, cooler waters, and areas of lower dissolved oxygen, occupying depth strata at or below the "thermocline" at water temperatures of 15° C or lower. Basic environmental conditions favorable for survival include clean, clear oceanic waters between 13° C and 29° C. Hanamoto (1987) estimated optimum bigeye habitat to exist in water temperatures between 10° to 15° C at salinities ranging between 34.5‰ to 35.5‰ where dissolved oxygen concentrations remain above 1 ml/l. He further suggested that bigeye range from the surface layers to depths of 600 meters. However, evidence from archival tagging studies indicates that greater depths and much lower ambient temperatures can be tolerated by the species. Juvenile bigeye occupy an ecological niche similar to juvenile yellowfin of a similar size.

There have been far fewer bigeye tuna tagged in the Pacific in comparison to skipjack and yellowfin tunas. Miyabe and Bayliff (1998) present summary information of some long distance movements of tagged bigeye tuna in the Pacific. Hampton, Bigelow, and Labelle (1998) describe 8,000 bigeye tuna releases made in the western Pacific during 1990-1992. Most of the fish were recaptured close to the point of release; approximately 25% had moved more than 200 nautical miles, and more than 5% had moved more than 1,000 nautical miles. Bigeye tuna are clearly capable of large-scale movements.

Feeding is opportunistic at all life stages, with prey items consisting primarily of crustaceans, cephalopods, and fish (Calkins 1980). There is significant evidence that bigeye feed at greater depths than yellowfin tuna, utilizing higher proportions of cephalopods and mesopelagic fishes in their diet thus reducing niche competition (Whitelaw and Unnithan 1997). Spawning spans broad areas of the Pacific and occurs throughout the year in tropical waters and seasonally at higher latitudes at water temperatures above 23° or 24° C (Kume 1967). Bigeye are serial spawners, capable of repeated spawning at near daily intervals with batch fecundities of millions of ova per spawning event (Nikaido, Miyabe, and Ueyanagi 1991). Sex ratio is commonly accepted to be essentially 1:1 until a length greater than 150 centimeters after which the proportion of males increases. Alverson and Peterson (1963) state that juvenile bigeye less than 100 centimeters generally feed at the surface during daylight, usually near continental land masses, islands, seamounts, banks, or floating objects.

Bigeye tuna, especially during the juvenile stages, aggregate strongly to drifting or anchored objects, large marine animals, and regions of elevated productivity, such as near seamounts and areas of upwelling (Calkins 1980; Hampton and Bailey 1993; Holland, Kleiber, and Kajiura 1999). Major fisheries for bigeye tuna exploit aggregation effects either by targeting biologically productive areas (deep and shallow seamount and ridge features) or by utilizing artificial fish aggregation devices to aggregate commercial concentrations of bigeye tuna. Juvenile and pre-adult bigeye of 35 centimeters to approximately 99 centimeters are regularly taken as a bycatch in the eastern and western Pacific purse-seine fisheries, usually on sets made in association with floating objects (Hampton and Bailey 1993). Juvenile bigeye tuna form mono-specific schools at or near the surface with similar-sized fish or may be mixed with skipjack and/or juvenile yellowfin tuna (Calkins 1980; Holland, Kleiber, and Kajiura 1999). Juvenile and adult bigeye tuna are also known to aggregate near seamounts and submarine ridge features where they are exploited by pole-and-line, handline, and purse seine fisheries (Fonteneau 1991; Holland, Kleiber, and Kajiura 1999).

Small bigeye are caught on the surface by purse seines, while larger fish are caught deeper using longline gear (Gillet and Langley 2007). In the western Pacific, the fishery is diverse, occurring in the waters of a number of island nations as well as the high seas and carried out by both small domestic fleets and distant water fleets from developed nations.

### 3.3.3. Yellowfin Tuna (*Thunnus albacares*)

Several studies on the taxonomy, biology, population dynamics, and exploitation of yellowfin tuna exist, including comprehensive reviews by Collette and Nauen (1983) and Suzuki (1994).

This is a tropical tuna characterized by a rapid growth rate and fast development to maturity. Estimates of length at maturity for central and western Pacific yellowfin tuna vary widely with some studies supporting an advanced maturity schedule for yellowfin tuna in coastal or archipelagic waters (Cole 1980). However, most estimates suggest that the majority of yellowfin tuna reach maturity between two and three years of age on the basis of length-age estimates for the species. Longevity for the species may not be explicitly defined, but a maximum age of six to seven years is commonly used in stock assessment. Itano (2000) notes from a large data set from the western tropical Pacific that 50% of yellowfin tuna sampled from purse seine and longline gear at 105 centimeters were histologically classified as mature and predicts a length at 50% maturity of 104.6 centimeters. Under appropriate conditions, yellowfin tuna exhibit high spawning frequency and fecundity (Cole 1980). Spawning occurs in broad areas of the Pacific. Spawning fish require surface salinity and temperature that remain above 24° C (Itano 2000). This means that spawning can occur throughout the year in tropical waters and seasonally at higher latitudes in areas such as Hawaii (Suzuki 1994).

Yellowfin tuna are trans-Pacific in distribution, occupying the surface waters of all warm oceans, and form the basis of large surface and sub-surface fisheries. The adult distribution in the Pacific lies roughly within latitudes 40° N to 40° S as indicated by catch records of the Japanese purse seine and longline fishery (Suzuki, Tomlinson, and Honma 1978). Blackburn (1965) suggests the range of yellowfin tuna distribution is bounded by water temperatures between 18° C and 31° C with commercial concentrations occurring between 20° C and 30° C. Although the species preferentially occupies the surface mixed layer above the thermocline, archival tagging has revealed dives to depths in excess of 1,000 meters with water temperature of 5.8° C (Dagorn, Holland, and Hallier 2006).

Although tag and recapture programs have documented that yellowfin tuna are clearly capable of large-scale movements, most recaptures occur within a short distance of release. Sibert and Hampton (2003) applied an advection-diffusion model to yellowfin tuna tagging data and determined a median lifetime displacement of 375 miles. Yellowfin tuna are known to aggregate around drifting flotsam, anchored buoys, and large marine animals (Hampton and Bailey 1993). Adult yellowfin tuna also aggregate in regions of elevated productivity, high zooplankton density (e.g., seamounts), and regions of upwelling and convergence. This association has presumably evolved to capitalize on the elevated forage available (Cole 1980; Suzuki 1994). Major fisheries for yellowfin tuna exploit aggregation effects either by utilizing artificial FADs or by targeting areas with vulnerable concentrations of tuna.

Some genetic analyses suggest that there may be several semi-independent yellowfin tuna stocks in the Pacific Ocean including possible eastern and western stocks, which may diverge around 150° EW (Grewe and Hampton 1998; Itano 2000). Other analyses have failed to distinguish the presence of geographically distinct populations (Appleyard, Grewe, Innes et al. 2001). Tagging studies have shown individual animals are capable of large east west movements that would suggest considerable pan-Pacific mixing of the stock.

Purse seining and longlining are the main gear employed in catching yellowfin tuna. Small yellowfin tuna may be caught on the surface by purse seine vessels, while larger fish are typically caught deeper using longline gear (Gillet and Langley 2007). In the western Pacific, the fishery is diverse, occurring in the waters of a number of island nations and on the high seas and carried out by both small domestic fleets and distant water fleets from developed nations.

### 3.3.4. Swordfish (Xiphias gladius)

Ward and Elscot (2000) authored an extensive review of the biology of swordfish and status of swordfish fisheries around the world.

Information on the age and growth of swordfish is the subject of intense study, and findings have been somewhat contradictory. Age studies based on otolith analysis and other methods (length, frequency, vertebrae, fin rays, inter alia) are reviewed by Ehrhardt, Robbins, and Arocha (1996). Wilson and Dean (1983) estimated a maximum age of nine years for males and 15 years for females from otolith analysis. Larvae and juveniles occur in warmer tropical and subtropical regions where spawning also occurs. Swordfish have separate sexes with no apparent sexual dimorphism, although females attain a larger size. Fertilization is external and the fish are believed to spawn close to the surface. Maturity is thought to occur at about five years of age, a size of 140-180 centimeters (eye to fork length) and there is some evidence for the pairing of spawning adults as the fish apparently do not school (Palko, Beardsley, and Richards 1981).

Swordfish are worldwide in distribution in all tropical, subtropical, and temperate seas, ranging from around 50° N to 50° S (Nakamura 1985). Swordfish are found in waters with a wide range of Sea Surface Temperatures (SSTs), from 5°-27° C, but are normally found in areas with SSTs above 13° C (Nakamura 1985). Archival tagging experiments indicate that they spend prolonged periods in deep, cooler water and can therefore tolerate water temperatures that are considerably cooler than at the surface (Takahashi, Okamura, Yokawa et al. 2003). Studies have noted a general pattern of remaining at depth, sometimes near the bottom, during the day and rising near the surface during the night in what is believed to be a foraging strategy. Oceanographic features such as frontal boundaries that tend to concentrate forage species (especially cephalopods) apparently have a significant influence on adult swordfish distributions in the North Pacific. Swordfish are relatively abundant near boundary zones where sharp gradients of temperature and salinity exist (Palko, Beardsley, and Richards 1981).

## 3.4 Biological Environment

This section provides information on non-target species and biodiversity and ecosystem function.

### 3.4.1. Non-target species

The primary non-target species caught by the U.S. longline fleets operating in the WCPO include skipjack tuna (*Katsuwonus pelamis*), Pacific bluefin tuna (*Thunnus orientalis*), blue marlin (*Makaira mazara*), striped marlin (*Tetrapturus audax*), mahimahi or dolphinfish (*Coryphaena hippurus*), wahoo (*Acanthocybium solandri*), opah (*Lampris regius*), pomfret (family Bramidae), blue shark (*Prionace glauca*), thresher shark (*Alopias vulpinus*), oceanic whitetip shark (*Carcharhinus longimanus*), shortfin mako shark (*Isurus oxyrinchus*, and longfin mako shark (*Isurus paucus*) (WPRFMC 2011). Table 7 indicates the stock status of these species in the Pacific Ocean, using the MSA stock status determination criteria.

**Table 7: Stock Status summary of main non-target HMS for U.S. longline fleets in the Pacific Ocean (excluding shark species)**

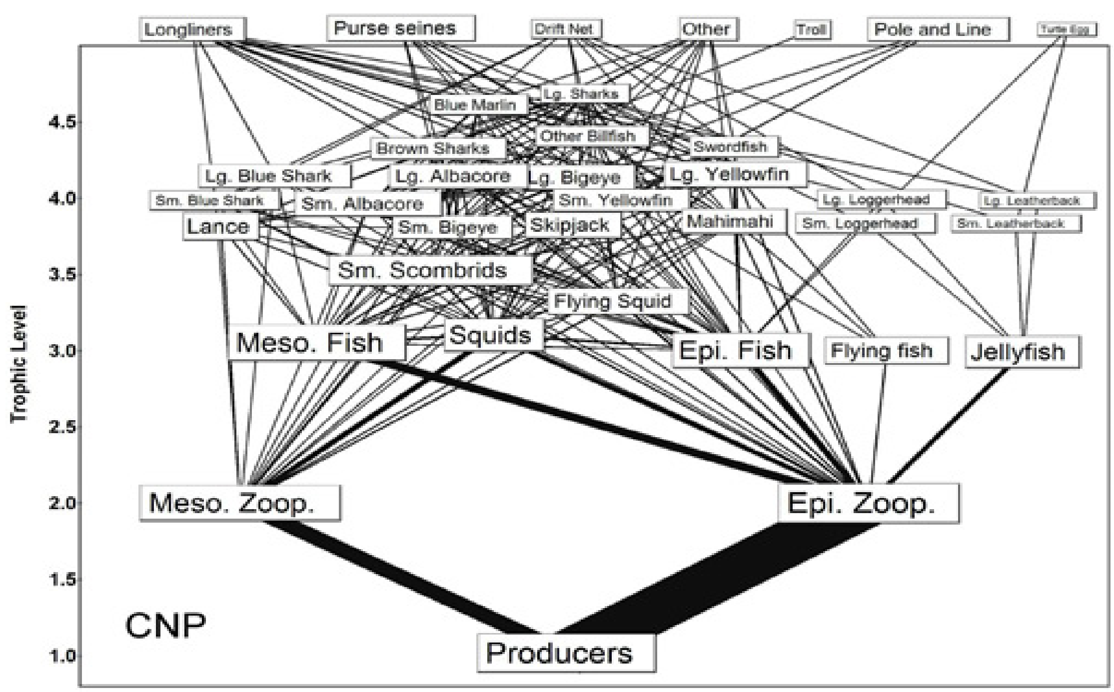
| Species | Stock | Overfishing? | Overfished? |
|---|---|---|---|
| Skipjack tuna (*Katsuwonus pelamis*) | Central western Pacific | No | No |
| Pacific bluefin tuna (*Thunnus orientalis*) | Pacific | **Yes** | No |
| Blue marlin (*Makaira nigricans*) | Pacific | No | No |
| Striped marlin (*Kajikia audax*) | Central western Pacific | Unknown | Unknown |
| Mahimahi (*Coryphaena* spp.) | Pacific | Unknown | Unknown |
| Wahoo (*Acanthocybium solandri*) | Pacific | Unknown | Unknown |
| Opah (*Lampris* spp.) | Pacific | Unknown | Unknown |
| Pomfret (family Bramidae) | Western Pacific | Unknown | Unknown |
| Blue shark (*Prionace glauca*) | Pacific | No | No |
| Thresher shark (*Alopias vulpinus*) | North Pacific | Unknown | Unknown |
| Oceanic whitetip shark (*Carcharhinus longimanus*) | Tropical Pacific | Unknown | Unknown |
| Shorfin mako shark (*Isurus oxyrinchus*) | North Pacific | Unknown | Unknown |
| Longfin mako shark (*Isurus paucus*) | North Pacific | Unknown | Unknown |

Source: http://www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm

### 3.4.2. Biodiversity and Ecosystem Function

Figure 2 depicts an idealized food chain model from the central North Pacific Ocean.

**Figure 2: Trophic levels in the Central North Pacific Ocean**




Source: Hinke, Kaplan, Aydin et al. 2004.

Understanding an ecosystem implies understanding its food web and the exchanges between the different trophic levels in the food chain. Food webs show the dynamics of biomass production and partitioning in an ecosystem. Even minor changes in abiotic factors can cause changes in the spatial distribution of primary and secondary pelagic production (Richardson, Jackson, Ducklow et al. 2004). These changes can be increases in sea surface temperatures which may lead to increases in phytoplankton abundance or decreases in phytoplankton abundance in cooler regions (Richardson, Jackson, Ducklow et al. 2004). Removing tuna by commercial fisheries or other changes in biotic factors implies possible positive effects on mid-trophic level species because competition by top predators is eliminated so more mid-trophic level species will survive (Halpern, Cottenie, and Broitman et al. 2006).

Due to the unique recruitment history of each stock, the variability in biomass over time and among stocks is not attributed entirely to fishing (Sibert, Hampton, Kleiber et al. 2006). Cox, Essington, Kitchell et al., (2002) found that it was possible that declines in top predators could result in an increase in smaller tunas that constitute prey for the larger tunas. The magnitude of predation as a component of natural mortality is still unclear, as are the effects of fishing mortality on predation rates and abundance (Cox, Essington, Kitchell et al. 2002).

## 3.5 Protected Resources

This section provides information on protected resources in the WCPO, updated since publication of the 2009 EA and 2009 SEA.

### 3.5.1. Threatened and Endangered Species

Table 8 includes species listed under the U.S. Endangered Species Act (ESA; 16 USC 1531 *et seq*.) that could be affected by any changes to fishing patterns and practices in the Convention Area. NMFS has jurisdiction over all the species listed except for the dugong (*Dugong dugon),* Short-tailed Albatross (*Phoebastria albatrus*), Newell's Shearwater (*Puffinus auricularis newelli*), Hawaiian Dark-rumped Petral (*Pterodroma phaeopygia sandwichensis*), Chatham Petrel (*Pterodroma axillaris*), Fiji Petrel (*Pseudobulweria macgillivrayi*), and Magenta Petrel (*Pterodroma magentae*). The U.S. Fish and Wildlife Service (USFWS) has jurisdiction over these seven species.

**Table 8: Listing Status of Species in the WCPO Listed as Endangered or Threatened Under the U.S. Endangered Species Act**

| Scientific name | Common name | ESA Status |
|---|---|---|
| *Balaenoptera musculus* | Blue whale | Endangered |
| *Balaena mysticetus* | Bowhead whale | Endangered |
| *Balaenoptera physalus* | Fin whale | Endangered |
| *Megaptera novaeangliae* | Humpback whale | Endangered |
| *Eubalaena japonica* | North Pacific right whale | Endangered |
| *Balaenoptera borealis* | Sei whale | Endangered |
| *Physeter macrocephalus* | Sperm whale | Endangered |
| *Eubalaena australis* | Southern right whale | Endangered |
| *Monachus schauinslandi* | Hawaiian monk seal | Endangered |
| *Eumetopias jubatus* | Steller sea lion (western stock) | Endangered |
| *Dugong dugon* | Dugong | Endangered |
| *Phoebastria albatrus* | Short-tailed Albatross | Endangered |
| *Puffinus auricularis newelli* | Newell's Shearwater | Threatened |
| *Pterodroma phaeopygia sandwichensis* | Hawaiian Dark-rumped Petrel | Endangered |
| *Pterodroma axillaris* | Chatham Petrel | Endangered |
| *Pseudobulweria macgillivrayi* | Fiji Petrel | Endangered |
| *Pterodroma magentae* | Magenta Petrel | Endangered |
| *Dermochelys coriacea* | Leatherback turtle | Endangered |
| *Caretta caretta* | Loggerhead turtle<br>North Pacific and South Pacific distinct population segments | Endangered[1] |
| *Chelonia mydas* | Green turtle | Threatened |
| *Lepidochelys olivacea* | Olive Ridley turtle | Threatened |
| *Eretmochelys imbricata* | Hawksbill turtle | Endangered |

Source: http://www.nmfs.noaa.gov/pr/; http://www.fws.gov/pacificislands/teslist.html.
[1]In September 2011, NMFS and USFWS listed nine distinct population segments of loggerhead turtles. Five of the distinct population segments were listed as endangered and four were listed as threatened. The two distinct population segments in the Pacific Ocean (North Pacific and South Pacific) are listed as endangered. See 76 FR 58868.

### 3.5.2. Marine Mammals

All marine mammals receive protection under the Marine Mammal Protection Act (MMPA; 16 USC 1361, *et seq*.). The marine mammals found in the WCPO but not listed under the ESA as threatened or endangered (i.e., not included in Table 8, above) are listed in Table 9 below.

**Table 9: Non-Listed Marine Mammals that Occur in the WCPO**

| Species name | Common name |
|---|---|
| *Balaenoptera acutorostrata* | Minke whale |
| *Balaenoptera bonaerensis* | Antarctic minke whale |
| *Balaenoptera edeni* | Bryde's whale |
| *Berardius arnuxii* | Arnoux's beaked whale |
| *Callorhinus ursinus* | Northern Fur Seal |
| *Caperea marginata* | Pygme right whale |
| *Delphinus delphis* | Short-beaked common dolphin |
| *Eschrichtius robustus* | Gray whale |
| *Feresa attenuata* | Pygmy killer whale |
| *Globicephala macrorhynchus* | Short-finned pilot whale |
| *Globicephala melas* | Long-finned pilot whale |
| *Grampus griseus* | Risso's dolphin |
| *Hyperoodon planifrons* | Southern bottlenose whale |
| *Indopacetus pacificus* | Longman's beaked whale |
| *Kogia breviceps* | Pygme sperm whale |
| *Kogia sima* | Dwarf sperm whale |
| *Lagenodelphis hosei* | Fraser's dolphin |
| *Lagenorhynchus cruciger* | Hourglass dolphin |
| *Lagenorhynchus obliquidens* | Pacific white sided dolphin |
| *Lagenorhynchus obscurus* | Dusky dolphin |
| *Lissodelphis peronii* | Southern right whale dolphin |
| *Mesoplodon bowdoini* | Andrew's beaked whale |
| *Mesoplodon densirostris* | Blainville’s Beaked Whale |
| *Mesoplodon ginkgodens* | Ginkgo-toothed whale |
| *Mesoplodon grayi* | Gray's beaked whale |
| *Mesoplodon hectori* | Hector's beaked whale |
| *Mesoplodon layardii* | Strap-toothed whale |
| *Mesoplodon stejnegeri* | Stejneger's beaked whale |
| *Mesoplodon traversii* | Spade-toothed whale |
| *Mirounga angustirostris* | Northern Elephant Seal |
| *Orcinus orca* | Killer whale |
| *Peponocephala electra* | Melon headed whale |
| *Phocoena dioptrica* | Spectacled porpoise |

| | |
|---|---|
| *Phocoena phocoena* | Harbor porpoise |
| *Phocoenoides dalli* | Dall's porpoise |
| *Pseudorca crassidens* | False killer whale[9] |
| *Stenella attenuata* | Pantropical spotted dolphin |
| *Stenella coeruleoalba* | Striped dolphin |
| *Stenella longirostris* | Spinner dolphin |
| *Steno bredanensis* | Rough toothed dolphin |
| *Tursiops truncatus* | Bottlenose dolphin |
| *Ziphius cavirostris* | Cuvier's beaked whale |

Source: http://www.wpcouncil.org/Protected/species_mammals.html; http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/; 2009 EA.

### 3.5.3. Essential Fish Habitat (EFH)

The EFH provisions (50 CFR Part 600 Subpart J) of the MSA are intended to maintain sustainable fisheries. NMFS and the Fishery Management Councils must identify and describe EFH and Habitat Areas of Particular Concern (HAPC) for each managed species using the best available scientific data and must ensure that fishing activities being conducted in such areas do not have adverse effects to the extent practicable. This process consists of identifying specific areas and the habitat features within them that provide essential functions to a particular species for each of its life stages. Both the EFH and the HAPC are documented in the FEPs established under the MSA.[10]

EFH and HAPC have been designated in the WCPO for pelagic, bottomfish and seamount groundfish, precious corals, crustaceans, and coral reef species. Table 10 lists the EFH and HAPC for species managed under the various western Pacific FEPs.

[9] NMFS completed a comprehensive status review of the Hawaiian insular false killer whale in response to a petition submitted by the Natural Resources Defense Council to list the Hawaiian insular false killer whale as an endangered species. NMFS has issued a proposed rule to list the Hawaiian insular false killer whale as a distinct population segment that is endangered (see 75 FR 70169; November 17, 2010).

[10] The FEPs being the FEP for the American Samoa Archipelago, the FEP for the Mariana Archipelago; the FEP for the Pacific Remote Island Areas; the FEP for the Hawaii Archipelago; and the FEP for Pacific Pelagic Fisheries of the Western Pacific Region.

**Table 10: EFH and HAPC for Management Unit Species for the Western Pacific Region[1]**

| Species Group | EFH (juveniles and adults) | EFH (eggs and larvae) | HAPC |
|---|---|---|---|
| Pelagics | Water column down to 1,000 meters | Water column down to 200 meters | Water column down to 1,000 meters that lies above seamounts and banks |
| Bottomfish | Water column and bottom habitat down to 400 meters | Water column down to 400 meters | All escarpments and slopes between 40-280 meters, and three known areas of juvenile opakapaka habitat |
| Seamount Groundfish | (adults only): water column and bottom from 80 to 600 meters, bounded by 29°-35°N and 171°E-179°W | (including juveniles): epipelagic zone (0-200 meters) bounded by 29°-35°N and 171°E-179°W | Not identified |
| Precious Corals | Keahole, Makapuu, Kaena, Wespac, Brooks, and 180 Fathom gold/red coral beds, and Milolii, S. Kauai and Auau Channel black coral beds | Not applicable | Makapuu, Wespac, and Brooks Bank beds, and the Auau Channel |
| Crustaceans | Lobsters: Bottom habitat from shoreline to a depth of 100 meters<br><br>Deepwater shrimp: The outer reef slopes at depths between 300-700 meters | Water column down to 150 meters<br><br>Water column and associated outer reef slopes between 550 and 700 meters | All banks with summits less than 30 meters<br><br>No HAPC designated for deepwater shrimp |
| Coral Reef Ecosystems | Water column and benthic substrate to a depth of 100 meters | Water column and benthic substrate to a depth of 100 meters | All Marine Protected Areas identified in FEP, all PRIAs,[2] many specific areas of coral reef habitat |

Source: FEP for the American Samoa Archipelago, Table 20 (WPRFMC 2009).
[1] All areas bounded by the shoreline and the outward boundary of the U.S. EEZ, unless otherwise indicated.
[2] Pacific Remote Island Areas.

### 3.5.4. National Wildlife Refuges and Monuments

Pursuant to the National Wildlife System Administration Act of 1966 (NWSAA; 16 USC 668dd, *et seq.*), USFWS carries out the mission of National Wildlife Refuges (NWRs), which is "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans." National Monuments are designated by the President using the authority of the Antiquities Act of 1906 (16 U.S.C. 431). This act allows the President to protect areas of “historic or scientific significance.” There are 10 NWRs and four National Monuments in the Convention Area: Guam NWR; Baker Island NWR; Howland Island NWR; Jarvis Island NWR; Johnston Island NWR; Kingman Reef NWR; Palmyra Atoll NWR; Rose Atoll NWR; Hawaiian Islands NWR; Midway Atoll NWR; Papahanaumokuakea Marine National Monument; the Marianas Trench Marine National Monument; the Pacific Remote Islands Marine National Monument; and the Rose Atoll Marine National Monument.

Chapter 4

# Chapter 4 Environmental Consequences

This chapter analyzes the environmental consequences that could result from the implementation of Alternative 6, the new alternative for implementation of the longline bigeye tuna catch limit in 2012. Section 4.1 presents the analyses of the direct, indirect, and cumulative impacts for Alternative 6, including analytical information on the other alternatives, as necessary. Section 4.2 compares the potential environmental impacts of implementing Alternative 6 to the potential environmental impacts of implementing the other alternatives analyzed in the 2009 EA and 2009 SEA, using the updated information presented in Chapter 3 of this document, where appropriate. As stated in Chapter 2 of this document, due to the new circumstances created by the enactment of Section 113(a) of the CFCAA, NMFS would not be able to implement the action alternatives analyzed in the 2009 EA and 2009 SEA for calendar year 2012. However, this chapter provides a comparison of Alternative 6 to the previously analyzed action alternatives in order to build upon the analyses previously done and to provide the reader with information regarding the potential differences in environmental impacts between the new alternative and the alternatives previously considered.

## 4.1 Alternative 6: Direct, Indirect, and Cumulative Impact*s*

### 4.1.1. Direct and Indirect Effects[11] to the Affected Fisheries

Section 2.1 of this document describes Alternative 6. This alternative is similar to Alternative 3, analyzed in the 2009 EA and Alternative 5, analyzed in the 2009 SEA. Alternative 5 was implemented via regulations that were effective for 2009, 2010, and 2011. Under these three alternatives, U.S. vessels would be prohibited from retaining on board, landing, or transshipping any catch of bigeye tuna captured by longline gear in the limit's area of application, once the limit has been reached for the calendar year, unless the fish is landed in American Samoa, Guam, or CNMI. For such bigeye tuna to be considered part of the fishery of one of these territories, they must not have been caught in the portion of the U.S. EEZ surrounding the Hawaiian Archipelago, and must be landed by a U.S. fishing vessel operated in compliance with a valid permit issued under 50 CFR 660.707 or 665.801. Under Alternative 5, bigeye tuna caught by a vessel registered for use under an American Samoa Longline Limited Access Permit would also be considered to be fish caught as part of the American Samoa longline fishery, so long as they are not caught in the portion of the U.S. EEZ surrounding the Hawaiian Archipelago and are landed by a U.S. fishing vessel operated in compliance with a valid permit issued under 50 CFR 660.707 or 665.801, and thus would not be subject to the limit or to the prohibitions established once the limit is reached. Under the new

[11] Similar to the CEQ's regulations for implementing NEPA at 40 CFR 1508.8, the terms effects and impacts as used in this document are synonymous. The choice of which term to use when is based solely on NMFS' stylistic preference for this document.

alternative – Alternative 6 – vessels operating under an arrangement under the authorization of Section 113(a) of the CFCAA would have their catch attributed to the U.S. Participating Territory with which the arrangement is made, and also would not be subject to the limit or to the prohibitions established once the limit is reached regardless of where the fish is caught and landed. Section 4.1.1.1 describes the potential effects that all of the vessels in the Hawaii longline fleet could experience under Alternative 6.[12] Section 4.1.1.2 sets forth the potential effects that vessels operating under an arrangement under the authorization of Section 113(a) of the CFCAA could experience.

#### 4.1.1.1 Direct and Indirect Effects to All Affected Vessels

Alternative 6 could cause changes to the fishing patterns and practices of the Hawaii longline fleet. If and when the bigeye tuna catch limit is reached in a given year and the prohibitions are consequently put into effect, affected fishing businesses would be expected to cease fishing for the remainder of the calendar year or, if they typically engage in deep-setting, shift from deep-setting for bigeye tuna in the WCPO to the next best opportunity. Although those opportunities cannot be predicted with certainty, one opportunity that would appear to be particularly attractive to vessels in the fishery is deep-setting for bigeye tuna in other areas, specifically the EPO. Making such a shift could bring costs to the affected fishing operations, but the magnitude of those costs cannot be projected.

For calendar year 2009, the catch limit was projected to be reached on December 29, 2009, so the prohibitions were put into effect from December 29, 2009 through end of the 2009 calendar year. In 2010, the catch limit was projected to be reached on November 22, 2010, so the prohibitions were put into effect from November 22, 2010, through the end of the 2010 calendar year. For the 2011 calendar year, the catch limit was originally projected to be reached on November 27, 2011, but as a result of the enactment of Section 113 of the CFCAA on November 18, 2011, and an arrangement between the Hawaii Longline Association (HLA) and American Samoa, NMFS began attributing catches to American Samoa that would otherwise have contributed to the catch limit. Thus, the prohibitions were not put into effect in 2011.

Based on the findings of a study of the 2010 bigeye tuna fishery closure (Richmond et al. 2012), some vessel operators continued to fish in the EPO during the period of time when the prohibitions were put into effect in 2010, while other vessel operators decided to stay in port. The size of the vessel may have been a determining factor, with the operators of smaller vessels tending more to choose to stay in port, so as not to have to travel longer distances to the EPO during the relatively rough fall/winter months. However, NMFS has implemented the longline bigeye tuna catch limit in the Inter-American Tropical Tuna Commission's (IATTC) Resolution C-11-01, "Resolution on a Multiannual Program for the Conservation of Tuna in the Eastern Pacific Ocean in 2011-2013." This catch limit is set at 500 mt for U.S. longline vessels over 24 meters in overall length operating in the

[12] Although the catch limit applies to both the Hawaii longline fleet and west-coast based longline vessels, there have been very few active west-coast based vessels in the Convention Area in recent years.

EPO (i.e., the IATTC's area of competence), so larger vessels fishing in the EPO during the period of time the prohibitions are in effect would be subject to that limit.

Based on the information from the past three years, if the catch limit is reached in 2012, it would be reached towards the end of 2012, and the prohibitions in the interim final rule accordingly would be expected to go into effect towards the end of 2012. The establishment of a competitive limit could cause a "race to fish" effect in that part of the year prior to the prohibitions going into effect. This race to fish effect could also be expected in the time period between when announcement of the prohibition is made and when the prohibition takes place, leading to some potential safety and operational effects; vessel owners could forego maintenance or fish in unsafe weather or ocean conditions in order to compete for their share of the limit. However, due to the limited time period that the prohibitions would be in effect – only, at the most, for several months of 2012 – and the other opportunities available to the affected vessels, it is unlikely that any race to fish effect would be pronounced. Catch patterns in 2009-2011 do not reveal any obvious evidence of a race to fish, and in 2010, in the period between the announcement being made and the prohibitions going into effect, there appears to have been the opposite effect – many vessels ceased retaining bigeye tuna and headed to port soon after the announcement, presumably – at least for some – so that they could prepare for a trip to the EPO during the closure (see Richmond et al. 2012).

This alternative would be expected to bring costs to the affected fishing operations (e.g., through lost revenues and/or greater operating costs associated with the next-best opportunity that they engage in), as well as economic impacts to forward- and backward-linked economic sectors, including businesses that supply fishing vessels and businesses that market the fish. Detailed discussion of economic impacts is included in the 2012 Regulatory Impact Review (RIR) for the interim final rule.

After the prohibitions go into effect, vessels could continue to land bigeye tuna in American Samoa, Guam, or the CNMI. For all vessels other than those operating under arrangements authorized by Section 113(a) of the CFCAA, the bigeye tuna must not have been caught in the portion of the U.S. EEZ surrounding the Hawaiian Archipelago, and they must be landed by a U.S. fishing vessel operated in compliance with a valid permit issued under 50 CFR 660.707 or 665.801.

#### 4.1.1.2 Direct and Indirect Effects to Vessels Operating Under Arrangements Authorized by Section 113(a) of the CFCAA

Given the potential benefits to fishing businesses from participation in an arrangement under the authorization of Section 113(a) (i.e., relief from the fishing prohibitions should the catch limit be reached), it is likely that many vessels in the Hawaii-based longline fleet would choose to operate under such arrangements if the cost of participation is not excessive. Indeed, as soon as Section 113 was enacted in 2011, the majority of the vessels in the fleet participated under the arrangement between HLA and American Samoa, suggesting that the benefits of participating in that arrangement outweigh the costs associated. If there is no requirement for when or how to assign bigeye tuna catch to the

U.S. Participating Territories (see option 1 in Section 2.2 of this document), arrangements authorized under Section 113(a) could provide for catch to be attributed to the U.S. Participating Territories throughout the year. In that case, it is unlikely that the catch limit would be reached. Thus, there would be no direct or indirect effects to any vessels in the fleet. In other words, the effects of Alternative 6 would be identical to those of Alternative 1, the No-Action Alternative.

Under option 3 (see Section 2.2 of this document), the catch limit would be reached in 2012 before any catch would be attributed to the U.S. Participating Territories. After the limit is reached, vessels operating under Section 113(a) arrangements would be allowed to continue to use longline gear to fish for bigeye tuna in the Convention Area, regardless of where the fish is caught and landed, after the limit is reached and the prohibitions go into effect. If these vessels compose all or a majority of the vessels in the fleet, there would be no direct or indirect effects to these vessels and conditions would be similar, if not identical to, the No-Action Alternative. The prohibition on transshipment of bigeye tuna caught in the Convention Area by longline gear to any vessel other than a U.S. fishing vessel operated in compliance with a valid permit issued under 50 CFR 660.707 or 665.801 would still apply; given that transshipments from U.S. longline vessels are generally to other U.S. longline vessels, it is unlikely that this prohibition would affect fishing patterns or practices. If vessels operating under Section 113(a) arrangements are a subset of all the vessels in the fleet, their fishing patterns and practices might experience some change after the prohibitions go into effect. Under this scenario, it is possible that bigeye tuna price in the Hawaii market after the catch limit is reached would be greater than it would be than under the No-Action Alternative, since supply would be less than under the No-Action Alternative, though demand would be the same. Thus, the subset of vessels operating under arrangements under the authorization of Section 113(a) could exert more fishing effort than they otherwise would while the prohibitions are in effect to take advantage of the increased prices and reduced supply, due to other vessels in the fleet being affected by the prohibitions. However, these vessels may already be exerting their maximum level of effort.

### 4.1.2. Effects to Bigeye Tuna and Yellowfin Tuna and Other Target Stocks

Implementation of Alternative 6 might lead to a direct reduction in fishing mortality on WCPO bigeye tuna, because a catch limit would be imposed where one currently does not exist, and thus, there could be a direct negative impact on the stock’s fishing mortality rate and a consequent positive impact on its stock size. However, those impacts are likely to be negligible because: (1) the prohibitions after reaching the limit would be in effect for only at the most several months in 2012, if at all; (2) after the limit is reached, all of the affected longline vessels in the fleet could transfer their effort to other areas, such as the EPO, or to other species, mitigating any diminishing effect of the prohibition on fishing mortality rates (as stated in Chapter 3, Section 3.4 of the 2009 EA, the stock structure of bigeye tuna in the Pacific Ocean is not well known, but there is some degree of mixing between the EPO and the WCPO, so any fishing mortality in the EPO would likely affect the status of the stock in the WCPO and fishing for other species in the Convention Area would result in at least some bigeye tuna being incidentally caught); (3) dual permit vessels could continue fishing for bigeye tuna in the Convention Area outside of the U.S. EEZ surrounding the Hawaiian Archipelago; and (4) vessels operating under arrangements under the authorization of Section 113(a) of the CFCAA could continue fishing for bigeye tuna in the Convention Area regardless of where the fish are caught and landed. Moreover, based on recent catch statistics, the Hawaii-based longline fleet comprises only about 3 percent of the total catches of WCPO bigeye tuna, so its contribution to the stock's fishing mortality rate is relatively small (NMFS 2010; NMFS 2012; WCPFC 2011).

Under this alternative, longline vessels could still be used to both deep-set and shallow-set in the Convention Area after the prohibitions go into effect. The amount of bigeye tuna incidentally caught (and discarded) in the shallow-set fishery would likely be very small (based on NMFS unpublished data, the amount of bigeye tuna retained in the shallow-set fishery has been approximately 41 mt per year from 2007-2011). However, given that bigeye tuna is one of the most commonly caught species in the deep-set fishery, it is likely (unless fishing methods are radically modified to reduce catch rates) that substantial amounts of bigeye tuna would be caught in any deep-setting that occurs in the Convention Area after the limit is reached. Moreover, the dual permit vessels and vessels operating under an arrangement under the authorization of Section 113(a) of the CFCAA could continue targeting bigeye tuna in the Convention Area after the limit is reached.

The opportunity costs of deep-setting for species other than bigeye tuna is not known; that is, it is not known whether it would be an economically viable activity for any of the affected vessels. The opportunity cost of simply shifting to the EPO to deep-set for bigeye would seem to be almost certainly less, so substantial deep-setting in the Convention Area by vessels without dual permits or vessels without arrangements under the authorization of Section 113(a) of the CFCAA in the Convention Area after the limit is reached would not be expected (and appears not to have occurred during the 2010 closure). However, the dual permit vessels and vessels operating under arrangements under the authorization of Section 113(a) of the CFCAA could continue to fish for bigeye tuna in the Convention Area.

Any reduction in deep-setting effort for bigeye tuna could have beneficial impacts on yellowfin tuna, which is also caught by deep-set longlining. However, yellowfin tuna could continue to be retained, landed, and transshipped by vessels affected by the prohibitions under Alternative 6. In addition, the overall effects on WCPO bigeye tuna and WCPO yellowfin tuna would be so minor, that any effects to ecosystem function and biodiversity would not be expected.

The amount of additional bigeye tuna caught after the catch limit is reached under Alternative 6 would be greater than under the other action alternatives analyzed in the 2009 EA or 2009 SEA and would likely be identical to the amount of bigeye tuna caught under the No-Action Alternative. Under Alternative 6, it is reasonable to expect that all or most of the vessels in the Hawaii-based longline fleet would operate under an arrangement authorized under Section 113(a) of the CFCAA and be unaffected by the catch limit or the prohibitions in 2012, given that the majority of the vessels in the fleet are part of the existing arrangement between HLA and American Samoa. For the other previously analyzed action alternatives, incidental catch of bigeye tuna from shallow-setting for swordfish in the Convention Area and deep-setting for other species, as well as any shift in fishing effort to targeting bigeye tuna in the EPO, would contribute to the increase over the 3,763 mt catch limit.

Under Alternative 5, the fishing activities of dual permit vessels outside the U.S. EEZ surrounding the Hawaiian Archipelago would also contribute to the increase of bigeye tuna caught after the 3,763 mt catch limit is reached. Indeed, during the 2010 closure, Richmond et al. (2012) found the bigeye landings of dual permit vessels to increase after the closure began. However, the overall bigeye tuna catch would likely be less than the amount under the No-Action Alternative, due to the costs, restrictions, and requirements involved in shifting to other opportunities or having additional vessels become dual permit vessels and the operational constraints imposed on the dual permit vessels under this alternative (e.g., bigeye tuna must be caught outside of the U.S. EEZ surrounding the Hawaiian Archipelago), as discussed above.

As discussed above, overfishing of the WCPO bigeye tuna stock has been determined by NMFS to be occurring, meaning that if it continues, the stock size can be expected to decline to levels smaller than those needed to produce MSY. Thus, all of the action alternatives have the potential to contribute to some minor beneficial impacts to the stock of WCPO bigeye tuna. Given that Alternative 6 has more similarities to the No-Action Alternative than the other alternatives do, Alternative 6 would have the least potential for beneficial impacts.

The other principal target species for U.S. longline fleets in the Convention Area are albacore and swordfish. Albacore is targeted by vessels in the American Samoa longline fleet, which would not be subject to the catch limit or the prohibitions. It is unlikely that the vessels that would be affected by the catch limit would switch to targeting albacore once the prohibitions go into effect, given that other opportunities – targeting bigeye tuna in the EPO – are likely more cost effective. Therefore, albacore mortality would likely be unaffected by the interim final rule. The American Samoa fleet targets South Pacific albacore, while the Hawaii-based fleet does not target but takes some North Pacific albacore. Should vessels cease fishing as a result of the prohibitions triggered by reaching the bigeye tuna catch limit, effects to North Pacific albacore would likely be negative with respect to its fishing mortality rate and positive with respect to stock size.

As shown in Figure 12 in Chapter 4 of the 2009 EA, for the years 2005-2008, and in Figure 4 of the 2012 RIR prepared for the interim final rule for the years 2005-2011, in the Convention Area the majority of swordfish was landed by the fleets in the beginning of the calendar year. Therefore, since the catch limit would likely be reached toward the end of the calendar year, if at all, it is unlikely that any shift in effort to the shallow-set fishery would cause large increases in swordfish mortality.

### 4.1.3. Effects to Non-Target Species

Alternative 6 would not be expected to cause large changes to the overall amount of secondary target stocks caught by the U.S. longline fleets operating in the Convention Area (relative to catch amounts under the No-Action Alternative). Should the catch limit be reached, both the deep-set and shallow-set fisheries would remain open once the prohibitions go into effect, and any transfer of fishing effort would be expected to result in catch rates of non-target species that are similar to existing conditions. Should vessels cease fishing during the prohibition, effects to non-target stocks would be negative with respect to fishing mortality rate and positive with respect to stock size. The other action alternatives would have the potential for more beneficial effects to non-target species than Alternative 6, since Alternative 6 is more similar than the other action alternatives are to the No-Action Alternative.

### 4.1.4. Effects to Protected Resources

Alternative 6 could lead to a shift of fishing effort to other areas and to other target species, if the prohibitions go into effect. If this transfer of fishing effort leads to an increase in fishing activity in areas where there is a greater incidence of protected resources, the potential for vessels to interact with protected resources could be increased. However, any effects in terms of catches and fishing mortality rates to protected species are expected to be small compared to, for example, typical year-to-year variations in catches among species driven by changing oceanic and economic conditions. Thus, any effects that may occur as a result of Alternative 6 would be minor. To the extent that there could be a slight reduction in fishing effort, any effects to ESA-listed species or critical habit of these species would be a reduction in the risk of interaction with the protected species. The other action alternatives would have more potential for this reduced risk of interaction than Alternative 6, since Alternative 6 is more similar than the other action alternatives are to the No-Action Alternative.

Pursuant to the regulations implementing the MMPA at 50 CFR Part 229, the Hawaii deep-set longline fishery targeting tuna is classified as a Category I fishery. This means that the fishery has the potential for frequent incidental mortality and serious injury to marine mammals. The Hawaii shallow-set longline fishery targeting swordfish is classified as a Category II fishery. This means that the fishery has occasional incidental mortality or serious injury of marine mammals. However, it is unlikely that the proposed action would affect the number of interactions between either of these fisheries and marine mammals. As discussed above, any effects in terms of catches and fishing mortality rates to protected species from shifts in fishing effort from Alternative 6 are expected to be small compared to, for example, typical year-to-year variations driven by changing oceanic and economic conditions.

Alternative 6 would not cause any adverse impacts to areas designated as EFH or HAPC, as described in Chapter 3, Section 3.5.3 of this document, or to ocean and coastal habitats. Any changes to fishing practices and any geographical shifts in fishing effort likely would be minor and unlikely to affect these areas.

Alternative 6 would not cause any impacts to the NWRs or National Monuments described in Chapter 3, Section 3.5.4 of this document. Any geographical shifts in fishing effort likely would be minor and would not be expected to affect these areas.

Any potential shifts in fishing effort would be small and would take place in the open ocean, without any contact to the ocean floor or any increased potential to affect anthropogenic objects or areas used for traditional practices. Thus, the interim final rule is not the type of undertaking that would cause effects to historic properties, if such historic properties were present, or cause potential loss or destruction of significant scientific, cultural, or historical resources.

### 4.1.5. Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," states that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." As discussed above, the overall environmental effects from implementation of the interim final rule under Alternative 6 would be either neutral or minor and generally beneficial. The interim final rule would apply the same to all U.S. vessels, but depending on where a given vessel is used to fish, what species it targets, whether it is dual-permitted, and whether it is included in an arrangement authorized under Section 113(a) of the CFCAA, the impacts on particular vessels and their associated fishing businesses would differ. Please see the 2012 RIR for a discussion of economic impacts. Because the environmental effects from implementation of the interim final rule under Alternative 6 or any of the action alternatives would be neutral or minor and generally beneficial, this rule would not lead to substantial adverse human health or environmental effects on any population – minority, low income, or otherwise.

### 4.1.6. Transferred Effects

As discussed in Chapter 3 of the 2009 SEA, market transferred effects can arise from actions such as implementation of the interim final rule. The 2012 RIR discusses the possibility of increased imports of bigeye tuna if the supply of bigeye tuna from the Hawaii-based longline fleet is substantially constrained as a result of the catch limit being reached or increased bigeye tuna production from the Hawaii troll and handline fleets. Should the interim final rule lead to an increase of imports to Hawaii and the United States of bigeye tuna from fisheries that have less stringent environmental regulations or to fisheries that function in an area that could cause more environmental impacts (e.g., more interactions with protected resources), adverse transferred effects, such as impacts to protected resources could result.

While quantification of any transferred effects is not possible at this time, any effects or adverse transferred effects stemming from the interim final rule likely would be minor or negligible. The specific behavior of the fleets that would be affected by the interim final rule cannot be predicted with certainty, but it is likely that that most or all of the affected vessels would operate under arrangements under the authorization of Section 113(a) of the CFCAA and would continue fishing for bigeye tuna in the Convention Area to meet the demand for bigeye tuna in the Hawaii market once the catch limit is reached, if it is reached at all in 2012. It is also likely that other affected vessels would fish for bigeye tuna in the EPO and continue to supply the Hawaii market. This would decrease the likelihood for increased imports of bigeye tuna or increased bigeye tuna from the Hawaii troll and handline fleets in the Hawaii market. Moreover, due to the projected limited time that the prohibition for longline vessels would be in place – a maximum of a few months in 2012 – any potential environmental impacts from transferred effects likely would be small compared to typical year-to-year variations in fishing effort driven by changing oceanic and economic conditions.

### 4.1.7. Cumulative Impacts

This section presents the cumulative impacts analysis for the implementation of Alternative 6. This section is similar to Chapter 5 of the 2009 EA and Section 4.1.7 of the 2009 SEA, but includes additional information regarding other actions that was not available at the time of the writing of the 2009 EA and the 2009 SEA.

A cumulative impact is defined by the CEQ’s regulations at 40 CFR 1508.7 as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.” And further: “cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.”

Before beginning a cumulative impacts analysis, the geographic area of the analysis and the time frame for the analysis must be identified to determine the appropriate scope for the analysis (CEQ 1997). The geographic area of the analysis here is the Pacific Ocean area as described in Chapter 3 of this document, Chapter 3 of the 2009 SEA, and Chapter 3 and Section 5.1.1 of the 2009 EA. The time frame for this analysis is from the present to some years into the future.

#### 4.1.7.1 Past, Present, and Reasonably Foreseeable Future Actions

This section describes the other actions that have the potential to affect the same resources as the interim final rule to implement the catch limit for 2012. The analysis of cumulative impacts is presented in the following section. For the purposes of this cumulative impacts analysis, the past actions are all the fishery management actions and the actions of the fleets that have been taken in the affected environment to date, which together have resulted in the current management regime, current fishing patterns, and have affected the current status of the stocks. The effects of those actions are reflected in the baseline, as described in Chapter 3 of this document, Chapter 3 of the 2009 SEA, and Chapter 3 and Section 5.1.1 of the 2009 EA.

#### 4.1.7.1.1 Other Present Actions

The other present actions would include specific actions being taken to manage the fisheries in the Convention Area and are described below. Implementation of the interim final rule has independent utility and there are no other actions that would depend upon the implementation this rule. Thus, there are no actions that are connected actions for the purposes of 40 CFR 1508.25(a)(1).

NMFS issued an interim final rule to extend the dates of applicability of the provisions of CMM 2008-01 for purse seine vessels through December 31, 2012 (see 76 FR 82180). These provisions include fishing effort limits, periods of time prohibiting the use of FADs, high seas area closures, catch retention, and observer coverage. However, CMM 2008-01 included provisions for closing certain areas of the high seas to purse seine fishing, which were not extended by CMM 2011-01. Removal of the prohibition on fishing in those high seas areas for U.S. purse seine vessels would be the subject of a separate rulemaking.

On February 15, 2012, NMFS issued a proposed rule to implement provisions of several WCPFC CMMs (see 77 FR 8759). The CMMs include: CMM 2009-06, “Conservation and Management Measure on the Regulation of Transhipment;” CMM 2009-01, “WCPFC Record of Fishing Vessels and Authorization to Fish;” CMM 2009-02, “Conservation and Management Measure on the Application of High Seas FAD Closure and Catch Retention”; and CMM 2010-02, “Conservation and Management Measure for the Eastern High-Seas Pocket Special Management Area.” The proposed rule would implement notice, reporting, and observer coverage requirements for transshipments, requirements regarding notification of entry into or exit from a particular area of the high seas, and requirements regarding discards from purse seine vessels. An EA was issued in conjunction with the proposed rule. NMFS also plans to implement a decision of the WCPFC that would implement measures to prohibit fishing on data buoys in the Convention Area, which could have some beneficial effects on species that aggregate near data buoys, and the WCPFC’s recent decision that would prohibit the retention of oceanic whitetip sharks.

Based on a WPFMC recommendation, NMFS issued a final rule on June 11, 2012 (see 77 FR 34260; effective July 11, 2012), that modifies the boundaries of the American Samoa large vessel prohibited area to align with the boundaries of the Rose Atoll Marine National Monument. Also based on a WPFMC recommendation, NMFS has published a final rule to revise the number of swordfish that can be retained or landed during a Hawaii-based deep-set longline trip north of the Equator (see 77 FR 43721) and a proposed rule to revise the annual number of incidental interactions that are allowed between the Hawaii-based shallow-set pelagic longline fishery and leatherback and loggerhead sea turtles (see 77 FR 34335).

NMFS is in the process of developing a False Killer Whale Take Reduction Plan (TRP), which would include gear requirements, longline prohibited areas, training and certification in marine mammal handling and release, captains' supervision of marine mammal handling and release, and posting of NMFS-approved placards on longline vessels (see 76 FR 42082). When certain conditions are met, the TRP could result in closure of the Southern Exclusion Zone, which might have a minimal, but beneficial, impact on fish stocks due to decreased fishing effort.

NMFS has implemented other provisions of IATTC Resolution C-11-01 for purse seine vessels that are effective through the end of 2013 in addition to the longline bigeye tuna catch limit, described in Section 4.1.1.1 above (see 76 FR 68332). These provisions include the following: a period of time when all purse seine fishing is prohibited – vessel owners can choose between two closure periods; an area of the high seas that is closed to fishing during certain times of the year; and catch retention. NMFS also implemented IATTC Resolution C-11-03, "Resolution Prohibiting Fishing on Data Buoys," and IATTC Resolution C-11-10, "Resolution on the Conservation of Oceanic Whitetip Sharks Caught in Association with Fisheries in the Antigua Convention Area" (see 76 FR 68332).

#### 4.1.7.1.2. Reasonably Foreseeable Future Actions

The categories of reasonably foreseeable future actions identified here are: (1) future fishery management actions, or actions taken by fishery managers; and (2) actions that contribute to changes in oceanic conditions.

It is reasonably foreseeable that WCPFC CCMs will implement requirements similar to those in this interim rule to implement CMM 2011-01. Given that CMM 2011-01 is a temporary extension of the majority of the provisions of CMM 2008-01, it is also reasonably foreseeable that the WCPFC would adopt CMMs similar (in the sense that fishing mortality on these stocks would somehow be constrained) to CMM 2008-01 for bigeye tuna and yellowfin tuna that would require implementation for 2013 and beyond.

Other future fishery management actions in the first category include actions taken by the United States and other nations to manage their fisheries in the Convention Area, and to some extent, Pacific Ocean as a whole, particularly HMS fisheries. In the United States, such actions will be driven by a variety of factors, including a number of different statutes with different mandates (e.g., the MSA for federal fisheries generally, the ESA with respect to threatened and endangered marine species, the South Pacific Tuna Act to implement the South Pacific Tuna Treaty or terms and conditions as a result of a renegotiated Treaty, the WCPFCIA to implement the decisions of the WCPFC, and the Tuna Conventions Act or other appropriate authority to implement the decisions of the

IATTC). Internationally and as a whole, such actions would be driven largely by, in addition to local issues and mandates, internationally agreed measures, including those adopted by the WCPFC and the IATTC.

Although specific conservation and management measures by other nations and the United States can be difficult to predict, given the fishing pressure on target stocks of HMS in the Pacific Ocean, it is likely that internationally agreed upon management measures will further constrict fishing capacity, effort, and/or catch. The consequences of such measures being implemented in the fisheries in the WCPO and the Pacific Ocean would be, generally, to improve the status of affected resources.

As an example, the WPFMC has recently – in June 2012 – recommended to amend the Pelagics FEP to provide American Samoa, Guam, and CNMI the authority to use, assign, allocate, and manage catch limits of highly migratory fish stocks, or fishing effort limits, established by the WCPFC through arrangements with U.S. vessels permitted under the Pelagics FEP. Further, the authority provided in this Pelagics FEP amendment may be subject to maximum annual limits, and any other terms or conditions, as recommended by the WPFMC and approved by the Secretary of Commerce. The WPFMC also recommended that the U.S. Participating Territories may only assign up to 1,000 mt per year of their annual longline bigeye catch limits through arrangements with U.S. vessels permitted under the Pelagics FEP, and that that the WPFMC review this limit on an annual basis.

The second category of future actions are any anthropogenic actions that contribute to changes in oceanographic conditions. Any changes in climate patterns would likely be associated with changes in oceanographic patterns that would have the potential to impact fishery and other biological resources. The target and non-target species that interact with the fisheries subject to this action tend to be highly migratory, wide-ranging organisms that are biologically tied to temperature regimes. Such species would be expected to respond to global or regional changes in climate and oceans in various aspects of their physiology and behavior. Examples include shifts in their geographic ranges, in the spatial (both horizontal and vertical) and temporal aspects of their migration patterns, and in their reproductive patterns. There could be interactive effects among species, such as local depletion of a given species resulting in less forage available for its predators.

#### 4.1.7.2 Discussion of Impacts

As discussed throughout this chapter, the overall effects to fisheries, target stocks and non-target species, and protected resources from the interim final rule under Alternative 6 are expected to be neutral or minor and generally beneficial. The objective of the rule is to implement a catch limit from a conservation and management measure for a brief period of time – less than one year. Implementation of Alternative 6 could lead to a direct reduction in fishing mortality on WCPO bigeye tuna, because a catch limit would be imposed where one currently does not exist, and thus, there could be a direct negative impact on the stock’s fishing mortality rate and a consequent positive impact on its stock size. However, those impacts are likely to be negligible because: (1) the prohibitions after reaching the limit would be in effect for at the most only several months in 2012, if at all; (2) after the limit is reached, all of the affected longline vessels in the fleet could transfer their effort to other areas, such as the EPO, or to other species, mitigating any diminishing effect of the prohibition on fishing mortality rates (as stated in Chapter 3, Section 3.4 of the 2009 EA, the stock structure of bigeye tuna in the Pacific Ocean is not well known, but there is some degree of mixing between the EPO and the WCPO, so any fishing mortality in the EPO would likely affect the status of the stock in the WCPO and fishing for other species in the Convention Area would result in at least some bigeye tuna being incidentally caught); (3) dual permit vessels could continue fishing for bigeye tuna in the Convention Area outside of the U.S. EEZ surrounding the Hawaiian Archipelago; and (4) vessels operating under arrangements under the authorization of Section 113(a) of the CFCAA could continue fishing for bigeye tuna in the Convention Area regardless of where the fish are caught and landed. Moreover, based on recent catch statistics, the Hawaii-based longline fleet comprises only about 3 percent of the total catches of WCPO bigeye tuna, so its contribution to the stock's fishing mortality rate is relatively small (NMFS 2010; NMFS 2012; WCPFC 2011). The effects to other stocks and protected resources would consequently be minor or negligible as well.

As discussed above, the other present actions and the first category of reasonably foreseeable future management actions would also be expected to cause generally beneficial impacts to resources in the affected environment. Specifically, should other CCMs implement the provisions of the CMM 2011-01 that will be implemented in the interim final rule or the WCPFC adopt other similar CMMs that are implemented, the potential beneficial impacts to resources from the interim final rule would be enhanced.

There could be some associated adverse effects from the implementation of the other present actions and the first category of reasonably foreseeable future management actions. For example, implementation of a measure for the conservation of one resource could lead to adverse effects on another resource. But again, given that the objective of these actions would be to improve the status of resources in the affected environment, it is unlikely that any adverse effects would be substantial.

The second category of reasonably foreseeable future actions (anthropogenic actions that lead to changes in ocean conditions, including climate change) could cause substantial adverse impacts to the resources in the affected environment but could cause some beneficial impacts as well. As discussed in Chapter 3, Section 3.1.1 of the 2009 EA, changes to oceanographic conditions have been documented to affect fishing effort and catch.

Therefore, the overall cumulative, or additive, impacts on the affected environment from this interim final rule under Alternative 6 or any of the action alternatives, other present actions, and all reasonably foreseeable future actions would likely be beneficial. Due to the small size of any effects to the affected environment under Alternative 6 (the minor effects as described throughout Chapter 4 of the 2012 SEA would be present for at most a few months of 2012, if at all), the synergistic or interactive effects of implementation of the interim final rule and any reasonably foreseeable management measures and other actions in the affected environment would not be substantial.

## 4.2 Comparison of Alternative 6 to the Alternatives Analyzed in the 2009 EA and 2009 SEA

As described in Chapter 2 of this document, the 2009 EA analyzed three action alternatives for the U.S. Longline Rule, as well as the No-Action Alternative. Chapter 6 of the 2009 EA includes a comparison of these four alternatives. Section 4.2 of the 2009 SEA includes a comparison of Alternative 5 to the alternatives analyzed in the 2009 EA. Below, is an updated version of this discussion, including Alternative 6. As discussed above, only Alternative 6 could be implemented for 2012, since the other action alternatives do not take into consideration Section 113 of the CFCAA. However, the following discussion assumes that all the action alternatives could be implemented, for the purposes of presenting a comparative analysis.

Implementation of the interim final rule under any of the action alternatives could have some minor beneficial effects to WCPO bigeye tuna as well as other fish stocks present in the WCPO. The rule would implement the WCPFC's established catch limit for WCPO bigeye tuna for 2012, which, if the catch limit is reached and the prohibitions go into effect, might cause some beneficial effects on the stocks. Each of the action alternatives could cause some shift in fishing effort from targeting bigeye tuna in the WCPO, which could cause effects to other fish stocks in both the WCPO and EPO. Such shifts in fishing effort could also cause effects to protected resources, but these effects would be minor, since the shift in fishing effort would likely be less than that caused by typical year-to-year variations in catches among species driven by changing oceanic and economic conditions. Thus, because the duration of the rule would be limited to less than one year and because the rule would not cause substantial changes to the fishing practices and patterns of the affected fleets, the overall direct and indirect impacts from implementation of the rule under any of the action alternatives would be neutral or minor and generally beneficial.

In terms of cumulative effects, as stated in 4.1.7 the effects of the interim final rule under any of the action alternatives, in combination with the effects of similar actions taken by other WCPFC members, as well as possible future actions to implement any future WCPFC decisions with respect to tuna species, could have beneficial effects on the stocks. These effects would be greater than if the interim final rule were implemented in isolation. However, the contribution of the interim final rule to cumulative effects on resources in the affected environment under any of the action alternatives would be essentially the same under all the action alternatives.

**Table 11: Summary of direct and indirect effects for the alternatives**

| Alternative | Restrictiveness Ranking[1] | Effects to WCPO Bigeye Tuna | Effects to WCPO Yellowfin Tuna | Effects to WCPO Swordfish | Effects to Other Stocks | Effects to Protected Resources |
|---|---|---|---|---|---|---|
| Alternative 1 (No-Action) | No restrictions | Direct: None<br><br>Indirect: Increased Potential for Long-Term negative | Direct: None<br><br>Indirect: Increased Potential for Long-Term negative | Direct: None<br><br>Indirect: Increased Potential for Long-Term negative | Direct: None<br><br>Indirect: Increased Potential for Long-Term negative | Direct: None<br><br>Indirect: Increased Potential for Long-Term negative |
| Alternative 2 (Closure of Deep-Set Fishery) | More restrictive than Alternatives 3, 5, and 6; Less restrictive than Alternative 4 | Direct: Minor beneficial<br><br>Indirect: Minor beneficial or None | Direct: Minor beneficial<br><br>Indirect: Minor beneficial or None | Direct: Minor detrimental or None<br><br>Indirect: Minor detrimental or None | Direct: Minor detrimental or beneficial or None<br><br>Indirect: Minor detrimental or beneficial or None | Direct: Minor<br><br>Indirect: Minor |
| Alternative 3 (No Retention, Landing, or Transshipment of Bigeye Tuna) | More restrictive than Alternative 5 and Alternative 6; Less restrictive than Alternatives 2 and 4 | Direct: Minor beneficial<br><br>Indirect: Minor beneficial or None | Direct: Minor beneficial[13] or None<br><br>Indirect: Minor beneficial or None | Direct: Minor detrimental or None<br><br>Indirect: Minor detrimental or None | Direct: Minor detrimental or beneficial or None<br><br>Indirect: Minor detrimental or beneficial or None | Direct: Minor<br><br>Indirect: Minor |

[13] The effects to WCPO yellowfin tuna have been updated from the 2009 EA and 2009 SEA. In the 2009 EA and 2009 SEA, overfishing was occurring on the stock of EPO yellowfin tuna. Thus, given that there are no distinct boundaries between WCPO and EPO yellowfin tuna, the potential for increased effort in the EPO was considered potentially detrimental on the stock of WCPO yellowfin tuna for the purposes of the 2009 EA and 2009 SEA. The stock status of EPO yellowfin tuna is currently neither overfishing nor overfished.

| Alternative | Restrictiveness Ranking[1] | Effects to WCPO Bigeye Tuna | Effects to WCPO Yellowfin Tuna | Effects to WCPO Swordfish | Effects to Other Stocks | Effects to Protected Resources |
|---|---|---|---|---|---|---|
| Alternative 4 (Closure of Fishery) | Most restrictive | Direct: Minor beneficial<br><br>Indirect: Minor beneficial or None | Direct: Minor beneficial<br><br>Indirect: Minor beneficial or None | Direct: Minor beneficial<br><br>Indirect: Minor beneficial or None | Direct: Minor detrimental or beneficial or None<br><br>Indirect: Minor detrimental or beneficial or None | Direct: Minor<br><br>Indirect: Minor |
| Alternative 5 (No Retention, Landing, or Transshipment of Bigeye Tuna with Dual Permit Vessel Exception) | More restrictive than Alternative 6, less restrictive than Alternative 2, Alternative 3, or Alternative 4 | Direct: Minor beneficial<br><br>Indirect: Minor beneficial or None | Direct: Minor beneficial or None<br><br>Indirect: Minor beneficial or None | Direct: Minor detrimental or None<br><br>Indirect: Minor detrimental or None | Direct: Minor detrimental or beneficial or None<br><br>Indirect: Minor detrimental or beneficial or None | Direct: Minor<br><br>Indirect: Minor |
| Alternative 6 (No Retention, Landing, or Transshipment of Bigeye Tuna – Prohibitions Do Not Apply to Dual Permit Vessels and Section 113 of the CFCAA Vessels) | Least restrictive | Direct: Minor beneficial or None<br><br>Indirect: Minor beneficial or None | Direct: Minor beneficial or None<br><br>Indirect: Minor beneficial or None | Direct: Minor detrimental or None<br><br>Indirect: Minor detrimental or None | Direct: Minor detrimental or beneficial or None<br><br>Indirect: Minor detrimental or beneficial or None | Direct: Minor or None<br><br>Indirect: Minor or None |

[1] More restrictive reflects the degree of constraints on fishermen, which generally would result in greater positive impacts to the condition of living marine resources with attendant potential for greater benefits to be derived from those resources.

Table 11 indicates that the overall effects from the alternatives would be similar and minor. However, each of the action alternatives would cause some slightly disparate effects to the resources in the area. As stated in Chapter 4 of the 2009 EA, additional management measures that lead to a reduction in the fishing mortality of bigeye tuna and that ensure no increase in the fishing mortality of yellowfin tuna are needed to sustain

WCPO tuna stocks at or greater than their MSY levels. Thus, the No-Action Alternative would have increased potential for long-term negative impacts on these fish stocks over the action alternatives.

Alternative 3 is the least restrictive of the action alternatives analyzed in the 2009 EA. Under this alternative, once the limit for WCPO bigeye tuna established by the WCPFC is reached, U.S. longline vessels would be prohibited from retaining on board, landing, or transshipping any bigeye tuna captured in the limit's area of application for the remainder of the calendar year, except that any bigeye tuna already on board a vessel at the time of the closure may be retained on board and landed. Under this alternative, vessels could continue to fish in both the shallow-set fishery and deep-set fishery, provided that no bigeye tuna are kept. As a result, there could be a shift in effort to the shallow-set fishery, to deep-setting for bigeye tuna in the EPO, or to deep-setting for species other than bigeye tuna in the WCPO. Thus, to the extent that deep-setting for species other than bigeye tuna in the WCPO does occur after the limit is reached, the beneficial impacts to WCPO bigeye tuna would be less than under the other action alternatives analyzed in the 2009 EA, since WCPO bigeye tuna would likely be caught and discarded in the course of such fishing activities (to an unknown degree).[14]

Alternative 2 is more restrictive than Alternative 3, but less restrictive than Alternative 4. Under this alternative, once the WCPO bigeye tuna limit is reached, vessels would be prohibited from deep-setting in the limit's area of application. This could lead vessels to shift their effort to deep-setting for bigeye tuna in the EPO or to shallow-setting in the WCPO, although, as discussed in Chapter 4 of the 2009 EA the degree of such shifts in effort cannot be predicted with certainty or estimated quantitatively at this juncture. Because no deep-setting would be allowed in the limit's area of application, this alternative could have some beneficial effects on both WCPO bigeye tuna and to a lesser degree WCPO yellowfin tuna. However, this alternative could cause increased fishing in the shallow-set fishery, leading to increased fishing mortality on swordfish and other species caught in that fishery, including sea turtles (but any such increase would be slight, as it would be constrained by the existing annual limits on shallow-set effort and on interactions with loggerhead and leatherback turtles). Under this alternative, the overall beneficial impacts to WCPO bigeye tuna could be greater than under Alternative 3; because deep-setting would be prohibited in the WCPO, there would be less WCPO bigeye tuna being caught and discarded (but only to the extent that under Alternative 3 deep-setting for species other than bigeye tuna in the WCPO would occur and bigeye tuna would be caught after the limit is reached).

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[14] The discussion of the action alternatives for the interim final rule in this section focuses on comparing the impacts of the alternatives on WCPO bigeye tuna – to which the WCPFC's established catch limited directly applies. As stated in Chapter 3, Section 3.4 of the 2009 EA, the stock structure of bigeye tuna in the Pacific Ocean is not well known, but there is some degree of mixing between the EPO and WCPO, so any fishing mortality in the EPO would likely affect the status of the stock in the WCPO as well as in the EPO. Consequently, though the direct effects to WCPO bigeye tuna under the alternatives would differ, the overall effects from any of the alternatives to WCPO bigeye tuna would be similar.

Alternative 4 is the most restrictive of the action alternatives. Under this alternative, once the limit for WCPO bigeye tuna established by the WCPFC is reached, U.S. fishing vessels would be prohibited from longline fishing in the limit's area of application. This could cause vessels to shift their effort to deep-setting in the EPO, although, as discussed in Chapter 4 of the 2009 EA the likely degree of such a shift cannot be predicted. Under this alternative, the overall beneficial impacts to WCPO bigeye tuna could be greater than under the other action alternatives; because the entire fishery would be closed, no WCPO bigeye tuna would be caught by longlining in the limit's area of application.

Alternative 5 is less restrictive than the action alternatives analyzed in the 2009 EA. This alternative would be similar to Alternative 3, in that U.S. longline vessels would be prohibited from retaining on board, landing, or transshipping any bigeye tuna captured in the limit's area of application for the remainder of the calendar year, except that any bigeye tuna already on board a vessel at the time of the closure may be retained on board and landed. Under this alternative, vessels could continue to fish in both the shallow-set and deep-set fisheries, provided that no bigeye tuna are kept. As a result, there could be a shift in effort to the shallow-set fishery, to deep-setting for bigeye tuna in the EPO, or to deep-setting for species other than bigeye tuna in the WCPO. Thus, to the extent that deep-setting for species other than bigeye tuna in the WCPO does occur after the limit is reached, the beneficial impacts to WCPO bigeye tuna would be less than under Alternatives 2 or 4, since WCPO bigeye tuna would likely be caught and discarded in the course of such fishing activities (to an unknown degree).

Also, under Alternative 5, the dual permit vessels would be able to continue fishing for bigeye tuna in the Convention Area outside of the portion of the U.S. EEZ surrounding the Hawaiian Archipelago and land their catch in Hawaii after the limit is reached, and their catches made outside of the U.S. EEZ surrounding the Hawaiian Archipelago would not be counted towards the limit prior to the limit being reached.

Alternative 6 would be the least restrictive of the action alternatives and the only alternative that could be implemented in 2012, due to the enactment of the CFCAA. This alternative would be similar to Alternative 5. However, under this alternative, vessels operating under an arrangement under the authorization of Section 113(a) of the CFCAA would be able to continue fishing for bigeye tuna in the Convention Area after the limit is reached, regardless of where the fish is caught and landed. Thus, should the majority of vessels that would otherwise be affected by this interim final rule enter into such arrangements, as is likely, this alternative would be more similar than the other action alternatives would be to the No-Action Alternative, and could essentially be the same as the No-Action Alternative.

**Table 12: List of Agencies and Persons Consulted**

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| Department of State – Office of Marine Conservation |
| NMFS – Headquarters – Office of International Affairs |
| NMFS – Pacific Islands Regional Office – Sustainable Fisheries Division |
| NMFS – Pacific Islands Fisheries Science Center |
| NMFS – Southwest Regional Office – Sustainable Fisheries Division |
| NMFS – Southwest Science Center |
| NOAA Office of Law Enforcement |
| North Pacific Fishery Management Council |
| Pacific Fishery Management Council |
| U.S. Coast Guard – 14th Coast Guard District |
| Western Pacific Fishery Management Council |

## References


Alverson, F.G. and C.L. Peterson. 1963. Synopsis of the biological data on bigeye tuna *Parathunnus sibi* (Temminck and Schlegel) 1844. FAO Fisheries Report 6(2):482-514. Rome, Food and Agricultural Organization for the United States.

Appleyard, S., P. Grewe, B. Innes, and R. Ward. 2001. Population structure of yellowfin tuna (*Thunnus albacares*) in the western Pacific Ocean, inferred from microsatellite loci. *Marine Biology* 139(2):383-393.

Bartoo, N. and T.J. Foreman. 1994. A review of the biology and fisheries for North Pacific albacore (*Thunnus alalunga*). *In* Shomura, R. S., J. Majkowski, and S. Langi (eds.) Interactions of Pacific Tuna Fisheries. Proceedings of the First FAO Expert Consultation on Interactions of Pacific Tuna Fisheries, 3-11 December 1991, Noumea, New Caledonia. Vol. 2: Papers on Biology and Fisheries. FAO Fisheries Report 336(2):173-187. Rome, Food and Agriculture Organization for the United Nations.

Blackburn, M. 1965. Oceanography and ecology of tunas. *Oceanography and Marine Biology: An Annual Review* 3:299-322.

Calkins, T.P. 1980. Synopsis of biological data on the bigeye tuna, *Thunnus obesus* (Lowe, 1839), in the Pacific Ocean. *In* Bayliff, W.H. (ed.) Synopses of Biological Data on Eight Species of Scombrids. IATTC Special Report 2. La Jolla, California, Inter-American Tropical Tuna Commission.

Chavez, F.P., J. Ryan, S.E. Lluch-Cota, and C.M. Niquen. 2003. From anchovies to sardines and back: Multidecadal change in the Pacific Ocean. *Science* 299(5604):217-221.

Cole, J.S. 1980. Synopsis of biological data on the yellowfin tuna *(Thunnus albacares)* (Bonnaterre 1788) in the Pacific Ocean. IATTC Special Report 2:75-150. La Jolla, California, Inter-American Tropical Tuna Commission.

Collette, B.B. and C.E. Nauen. 1983. *Scombrids of the world: An annotated and illustrated catalogue of tunas, mackerels, bonitos, and related species known to date*. Rome: Food and Agriculture Organization for the United Nations.

Council on Environmental Quality. 1997. Considering cumulative effects under the National Environmental Policy Act. Washington D.C., Executive Office of the President of the United States.

Cox, S.P., T.E. Essington, J.F. Kitchell, S.J.D. Martell, C.J. Walters, C. Boggs, and I. Kaplan. 2002. Reconstructing ecosystem dynamics in the central Pacific Ocean, 1952-1998. II. A preliminary assessment of the trophic impacts of fishing and effects on tuna dynamics. *Canadian Journal of Fisheries and Aquatic Sciences* 59:1736-1747.

Dagorn, L. K.N. Holland, J.P. Hallier, M. Taquet, G. Moreno, G. Sancho, D.G. Itano et al. 2006. Deep diving behavior observed in yellowfin tuna (*Thunnus albacores*). *Aquatic Living Resources* 19:85-88.

Ehrhardt, N.M., R.J. Robbins, and F. Arocha. 1996. Age validation and growth of swordfish, *Xiphias gladius*, in the northwest Atlantic. *Collected Volume of Scientific Papers* 45(2):358-367.

Fonteneau, A. 1991. Sea mounts and tuna in the tropical eastern Atlantic. *Aquatic Living Resources* 4(1):13-25.

Foreman, T.J. 1980. Synopsis of biological data on the albacore tuna, *Thunnus alalunga* (Bonnaterre, 1788), in the Pacific Ocean. *In* W.H. Bayliff (ed.) Synopses of Biological Data on Eight Species of Scombrids. IATTC Special Report No. 2, 17-70. La Jolla, California, Inter-American Tropical Tuna Commission.

Gillet, R. and A. Langley. 2007. Tuna for tomorrow? Some of the science behind an important fishery in the Pacific Islands. Noumea, New Caledonia, Asian Development Bank and Secretariat of the Pacific Community.

Grewe, P.M. and J. Hampton. 1998. An assessment of bigeye (*Thunnus obesus*) population structure in the Pacific Ocean based on mitochondrial DNA and DNA microsatellite analysis. University of Hawaii, Joint Institute for Marine and Atmospheric Research Contribution 98-320.

Halpern, B.S., K. Cottenie, and B.R. Broitman. 2006. Strong top-down control in southern California kelp forest ecosystems. *Science* 312:1230-1232.

Hampton, J. and K. Bailey. 1993. Fishing for tunas associated with floating objects: A review of the western Pacific fishery. SPC Report 31. Noumea, New Caledonia, South Pacific Commission, Tuna and Billfish Assessment Programme, South Pacific Commission.

Hampton, J., K. Bigelow, and M. Labelle. 1998. A summary of current information on the biology, fisheries, and stock assessment of bigeye tuna (*Thunnus obesus*) in the Pacific Ocean, with recommendations for data requirements and future research. SPC Report 36. Noumea, New Caledonia, Oceanic Fisheries Programme, Secretariat of the Pacific Community.

Hanamoto, E. 1987. Effect of oceanographic environment on bigeye tuna distribution. *Bulletin of the Japanese Society of Fisheries Oceanography* 51:203-216.

Hinke, J.T., I.C. Kaplan, K. Aydin, G.M. Watters, R.J. Olson, and J.F. Kitchell. 2004. Visualizing the food-web effects of fishing for tunas in the Pacific Ocean. *Ecology and Society* 9(1) Article 10.

Holland, K., P. Kleiber, and S. Kajiura. 1999. Different residence times of bigeye and yellowfin tuna occurring in mixed aggregations over a seamount. *Fisheries Bulletin* 97:392-395.

Intergovernmental Panel on Climate Change. 2007. Climate change 2007: Synthesis report. An assessment of the Intergovernmental Panel on Climate Change, IPCC Plenary Session XXVII, Valencia, Spain.

Itano, D.G. 2000. The reproductive biology of yellowfin tuna (*Thunnus Albacares*) in Hawaiian waters and the western tropical Pacific Ocean: Project summary. SOEST/Jimar Report SOEST contribution 00-01 JIMAR Contribution 00-328. Honolulu, Joint Institute for Marine and Atmospheric Research and the School for Ocean and Earth Science and Technology, University of Hawaii.

Kume, S. 1967. Distribution and migration of bigeye tuna in the Pacific Ocean. *Report of the Nankai Regional Fisheries Research Laboratory* 25:75-80.

Langley, A., P. Williams, P. Lehodey, and J. Hampton. 2004. The western and central Pacific tuna fishery 2003: Overview and status of tuna stocks. Noumea, New Caledonia, Oceanic Fisheries Programme, Secretariat of the Pacific Community.

Langley, A.D. 2006. The South Pacific albacore fishery: A summary of the status of the stock and fishery management issues of relevance to Pacific Island countries and territories. Noumea, New Caledonia, Oceanic Fisheries Programme, Secretariat of the Pacific Community.

Laurs, R.M. and R.J. Lynn. North Pacific albacore ecology and oceanography. 1991. North Pacific Transition Zone Workshop, Honolulu, 9-11 May, 1988. NOAA Report TR-NMFS-105. Honolulu, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

Miyabe, N. 1994. A review of the biology and fisheries for bigeye tuna, *Thunnus obesus*, in the Pacific Ocean. FAO Fisheries Report T336 Volume 2. Rome, Food and Agriculture Organization for the United Nations.

Miyabe, N. and W.H. Bayliff. 1998. A review of information on the biology, fisheries, and stock assessment of bigeye tuna, *Thunnus obesus*, in the Pacific Ocean. *In* Deriso, R.B., W.H. Bayliff, and N.J. Webb (eds.) Proceedings of the First World Meeting on Bigeye Tuna, 129-170. La Jolla, California: Inter-American Tropical Tuna Commission.

Murray, T. 1994. A review of the biology and fisheries for albacore, *Thunnus alalunga*, in the South Pacific Ocean. FAO Fisheries Report 366(2):188-206. Rome, Food and Agriculture Organization for the United Nations.

Murray, T. 1994. A review of the biology and fisheries for albacore, *Thunnus alalunga*, in the South Pacific Ocean. FAO Fisheries Report 366(2):188-206. Rome, Food and Agriculture Organization for the United Nations.

Nakamura, I. 1985. Billfishes of the world: An annotated and illustrated catalogue of marlins, sailfishes, spearfishes, and swordfishes known to date. *Fisheries Synopsis* 125(5): 1-4.

National Marine Fisheries Service. 2004. Environmental assessment for the third extension of the South Pacific Tuna Treaty. Honolulu, United States Deparment of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Islands Regional Office.

National Marine Fisheries Service. 2010. 2010 Annual Report to the Western and Central Pacific Fisheries Commission Part 1: Information on Fisheries, Research, and Statistics. Honolulu, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Islands Fisheries Science Center.

National Marine Fisheries Service. 2012. 2012 Annual Report to the Western and Central Pacific Fisheries Commission Part 1: Information on Fisheries, Research, and Statistics. Honolulu, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Islands Fisheries Science Center.

Nikaido, H., N. Miyabe, and S. Ueyanagi. 1991. Spawning time frequency of bigeye tuna, *Thunnus obesus. Bulletin of Natural Resources: Institute of the Far Seas Fisheries* 28:47-73.

Palko, B.J., G.L. Beardsley, and W.J. Richards. 1981. Synopsis of the biology of the swordfish, *Xiphias gladius*. NOAA Report TR-NMFS-CIRC-441. Seattle, Washington, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

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.

Richardson, T.L., G.A. Jackson, H.W. Ducklow, and M.R. Roman. 2004. Planktonic food webs 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.

Richmond, L., D. Kotowicz, J. Hospital and S. Allen. 2012. Adaptations in a fishing community: Monitoring socioeconomic impacts of Hawai‘i ’s 2010 bigeye tuna closure. PIFSC Internal Report IR-12-019. Honolulu, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Islands Fisheries Science Center.

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.

Saito, S. 1973. Studies on fishing of albacore, *Thunnus alalunga* (Bonnaterre) by experimental deep-sea tuna long-line. *Memoirs of the Faculty of Fisheries* 21(2):107-184.
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.

Seki, M.P., R. Lumpkin, and P. Flament. 2002. Hawaii cyclonic eddies and blue marlin catches: The case study of the 1995 Hawaiian International Billfish Tournament. *Journal of Oceanography* 58(5):739-745.

Sibert, J. and J. Hampton. 2003. Mobility of tropical tunas and implications for fisheries management. *Marine Policy* 27(1):87-95.

Sibert, J., J. Hampton, P. Kleiber, and M. Maunder. 2006. Biomass, size, and trophic status of top predators in the Pacific Ocean. *Science* 314(5806):1773-1776.

Solomon, S., D. Quin, M. Manning, Z. Chen, M. Marquis, K.B. Avryt, M. Tignor et al. 2007. Summary for policy makers. *In* Climate Change 2007: The Physical Science Basis. WGI-IPCC Report 4. Cambridge and New York, Cambridge University Press.

Stewart. R.H. 2005. *Introduction to physical oceanography*. September 2005 Edition. Galveston, Texas: Department of Oceanography, Texas A&M University.

Suzuki, Z. 1994. A review of the biology and fisheries for yellowfin tuna (*Thunnus albacares*) in the western and central Pacific Ocean. *In* Shomura, R. S., J. Majkowski, and S. Langi (eds.) Interactions of Pacific Tuna Fisheries. Volume 2: Papers on biology and fisheries, 108-137. Rome, Food and Agriculture Organization for the United Nations.

Suzuki, Z., P.K. Tomlinson, and M. Honma. 1978. Population structure of Pacific yellowfin tuna. *Inter-American Tropical Tuna Commission Bulletin* 17(5):227-446.

Takahashi, M., H. Okamura, K. Yokawa, and M. Okazaki. 2003. Swimming behavior and migration of a swordfish recorded by an archival tag. *Marine and Freshwater Research* 54(4):527-534.

Ward, P. and S. Elscot. 2000. Broadbill swordfish: Status of world fisheries. Report 3:208-213. Canberra, Australia, Bureau of Rural Sciences.

Western and Central Pacific Fisheries Commission. 2011. Tuna Fishery Yearbook 2010. Noumea, Secretariat of the Pacific Community, Oceanic Fisheries Programme.

Western Pacific Regional Fishery Management Council. 2009. Fishery Ecosystem Plan for the American Samoa Archipelago. Honolulu, Western Pacific Fishery Management Council.

Western Pacific Regional Fishery Management Council. 2011. Pelagic fisheries of the western Pacific region: 2009 annual report (updated August 30, 2011). Honolulu, Western Pacific Fishery Management Council.

Western Pacific Regional Fishery Management Council. 2012a. Pelagic fisheries of the western Pacific region: 2010 annual report (updated May 8, 2012). Honolulu, Western Pacific Fishery Management Council.

Western Pacific Regional Fishery Management Council. 2012b. Regulatory Amendment: Modifications to the American Samoa Large Vessel Prohibited Areas including an Environmental Assessment and Regulatory Impact Review (February 28, 2012). Honolulu, Western Pacific Regional Fishery Management Council.

Whitelaw, A.W. and V.K. Unithan. 1997.Synopsis on the distribution, biology, and fisheries of the bigeye tuna (*Thunnus obesus*) with a bibliography. Hobart, Australia, Australian Commonwealth Scientific and Research Organization.

Wilson, C. A. and J. M. Dean. 1983. The potential use of sagittae for estimating age of Atlantic swordfish, *Xiphias gladius*. Proceedings of the International Workshop on Age Determination of Oceanic Pelagic Fishes: Tunas, Billfishes and Sharks. NOAA Report TR-NMFS-8, 151-156. United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

# Appendix 1 – 2009 EA

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# Errata

## 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

The National Marine Fisheries Service (NMFS) issued the proposed rule, "Fishing Restrictions and Observer Requirements in Purse Seine Fisheries for 2009-2011 and Turtle Mitigation Requirements in Purse Seine Fisheries," for public review and comment on June 1, 2009. The Environmental Assessment (EA) was made available simultaneously in draft form. The comment period closed on June 22, 2009, and two comment letters were received. One of the comment letters did not address the EA. The other comment letter contained substantive comments pertaining to the EA, which have been addressed in the preamble to the final rule.[1]

NMFS has identified several matters in the EA that require clarification. These matters are presented below and have been modified in the attached EA:

1. The first part of the title of the EA is changed to "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."
2. The correct citation on page 18 of the EA for The Western and Central Pacific Fisheries Convention Implementation Act is 16 U.S.C. § 6901 et seq.

[1] The Environmental Assessment also includes analysis of another action, "Bigeye Tuna Catch Limits in Longline Fisheries in 2009, 2010, and 2011," which is part of a separate rulemaking.

3. Table 8 of the EA is updated to reflect the April 6, 2009, version of the Western Pacific Regional Fishery Management Council's 2007 Annual Report, and reads as presented below. The updates to the table are few and minor and do not affect the EA's analyses or conclusions.

**Table 1 Performance of the Hawaii longline fishery, 1996-2007**

| Year | Active vessels | Trips | Tuna-directed trips | Swordfish-directed trips | Hooks set (million) | Total catch (mt) | Bigeye tuna catch (mt) | Sword-fish catch (mt) | Yellow-fin tuna catch (mt) | Ex-vessel revenue ($ mill., inf-adj to 2007 dollars) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1996 | 103 | 1,100 | 657 | 92 | 14.4 | 9,781 | 1,787 | 2,502 | 630 | 54.9 |
| 1997 | 105 | 1,125 | 745 | 78 | 15.6 | 12,320 | 2,449 | 2,881 | 1,141 | 64.0 |
| 1998 | 114 | 1,140 | 760 | 84 | 17.4 | 12,998 | 3,226 | 3,263 | 722 | 59.6 |
| 1999 | 119 | 1,137 | 776 | 65 | 19.1 | 12,872 | 2,719 | 3,100 | 473 | 60.0 |
| 2000 | 125 | 1,103 | 814 | 37 | 20.3 | 10,789 | 2,647 | 2,815 | 1,205 | 61.3 |
| 2001 | 101 | 1,034 | 987 | 4 | 22.4 | 7,167 | 2,356 | 235 | 1,033 | 40.0 |
| 2002 | 100 | 1,163 | 1,163 | 0 | 27.0 | 7,888 | 4,388 | 309 | 560 | 45.7 |
| 2003 | 110 | 1,215 | 1,215 | 0 | 29.9 | 8,008 | 3,593 | 137 | 823 | 45.9 |
| 2004 | 125 | 1,338 | 1,332 | 6 | 32.0 | 8,380 | 4,325 | 249 | 707 | 47.7 |
| 2005 | 124 | 1,496 | 1,397 | 99 | 35.0 | 10,578 | 4,979 | 1,600 | 735 | 64.4 |
| 2006 | 127 | 1,401 | 1,341 | 60 | 35.3 | 9,762 | 4,429 | 1,167 | 962 | 57.0 |
| 2007 | 129 | 1,462 | 1,381 | 81 | 40.2 | 11,208 | 5,779 | 1,715 | 846 | 62.7 |
| 5 year average | 123 | 1,382 | 1,333 | 49 | 34.5 | 9,587 | 4,621 | 974 | 815 | 55.5 |

Source: Western Pacific Regional Fishery Management Council. 2009. Pelagic fisheries of the western Pacific region: 2007 annual report (updated April 6, 2009). Honolulu, Western Pacific Regional Fishery Management Council.

# 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

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July 2009

# LIST OF ABBREVIATIONS AND ACRONYMS

## Abbreviations and acronyms

| | |
|---|---|
| CCM | Commission Members, Cooperating Non-Members, and Participating Territories |
| CEQ | Council on Environmental Quality |
| CI | Confidence Interval |
| CL | Catch Limit |
| CMM | Conservation and Management Measures |
| CNMI | Commonwealth of the Northern Mariana Islands |
| CNP | Central North Pacific Ocean |
| Convention | Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean |
| Convention Area | Area of Application of the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean |
| CPUE | Catch per Unit of Effort |
| CV | Corrected Value |
| EA | Environmental Assessment |
| EEZ | Exclusive Economic Zone |
| EFH | Essential Fish Habitat |
| EIS | Environmental Impact Statement |
| EL | Effort Limits |
| ENSO | El Niño – Southern Oscillation |
| EPO | Eastern Pacific Ocean |
| ESA | Endangered Species Act |
| F | Fishing Mortality Rate |
| FAD | Fish Aggregating Device |
| FEIS | Final Environmental Impact Statement |
| FFA | Forum Fisheries Agency |
| FMP | Fishery Management Plan |
| FSM | Federated States of Micronesia |
| FSM Arrangement | 1994 Federated States of Micronesia Arrangement for Regional Fisheries Access |
| HAPC | Habitat Areas of Particular Concern |
| HMS | Highly Migratory Species |
| HSFCA | High Seas Fishing Compliance Act of 1995 |
| IATTC | Inter-American Tropical Tuna Commission |

| | |
|---|---|
| IRFA | Initial Regulatory Flexibility Analysis |
| ISC | International Scientific Committee for Tunas and Tuna-like Species in the North Pacific Ocean |
| IUCN | International Union for the Conservation of Nature |
| IWC | International Whaling Commission |
| MARWG | Marlin Working Group |
| MMPA | Marine Mammal Protection Act |
| MSA | Magnuson-Stevens Fishery Conservation and Management Act |
| MSY | Maximum Sustainable Yield |
| mt | Metric Tons |
| MUS | Management Unit Species |
| Nauru Agreement | Nauru Agreement Concerning Cooperation in the Management of Fisheries of Common Interest |
| NEPA | National Environmental Policy Act |
| NMFS | National Marine Fisheries Service |
| NOAA | National Oceanic and Atmospheric Administration |
| NWR | National Wildlife Refuge |
| NWSAA | National Wildlife System Administration Act of 1966 |
| OFP | Oceanic Fisheries Program |
| PacFin | Pacific Coast Fisheries Information Network |
| Palau Arrangement | 1992 Palau Arrangement for the Management of the Western Pacific Purse Seine Fishery |
| PFMC | Pacific Fishery Management Council |
| PIC | Pacific Island Countries |
| PMUS | Pelagic Management Unit Species |
| PNA | Parties to the Nauru Agreement |
| PRIA | Pacific Remote Island Areas |
| RIR | Regulatory Impact Review |
| ROP | Regional Observer Program |
| SEIS | Supplemental Environmental Impact Statement |
| SFPA | Shark Finning Prohibition Act of 2000 |
| SPC | Secretariat of the Pacific Community |
| SPTA | South Pacific Tuna Act of 1988 |
| SPTT | South Pacific Tuna Treaty (formally, the Treaty on Fisheries between the Governments of Certain Pacific Island States and the Government of the United States of America) |
| SST | Sea Surface Temperature |

| | |
|---|---|
| USFWS | United States Fish and Wildlife Service |
| VDS | Vessel Day Scheme |
| VMS | Vessel Monitoring System |
| WCPFC | Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean, also known as the Western and Central Pacific Fisheries Commission |
| WCPFCIA | Western and Central Pacific Fisheries Convention Implementation Act |
| WCPO | Western and Central Pacific Ocean |
| WPFMC | Western Pacific Fishery Management Council |

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# Chapter 1

# Chapter 1 Introduction and Purpose and Need

This Environmental Assessment (EA) has been prepared pursuant to the provisions of the National Environmental Policy Act (NEPA; 42 U.S.C. § 4321, et seq.) and related authorities, such as the Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508) and the National Oceanic and Atmospheric Administration's (NOAA) Environmental Review Procedures for Implementing NEPA (NAO 216-6).

The National Marine Fisheries Service (NMFS) is issuing two proposed rules to implement certain decisions made by the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC) at its Fifth Regular Session, in Busan, Republic of Korea, in December 2008. One rule would implement specific management measures for the U.S. purse seine fleet operating in the western and central Pacific Ocean (WCPO). The other rule would implement a specific catch limit established by the WCPFC for bigeye tuna for the U.S. longline fleets in the WCPO. This EA assesses the potential environmental impacts on the human environment that could result from implementation of either or both of the rules.

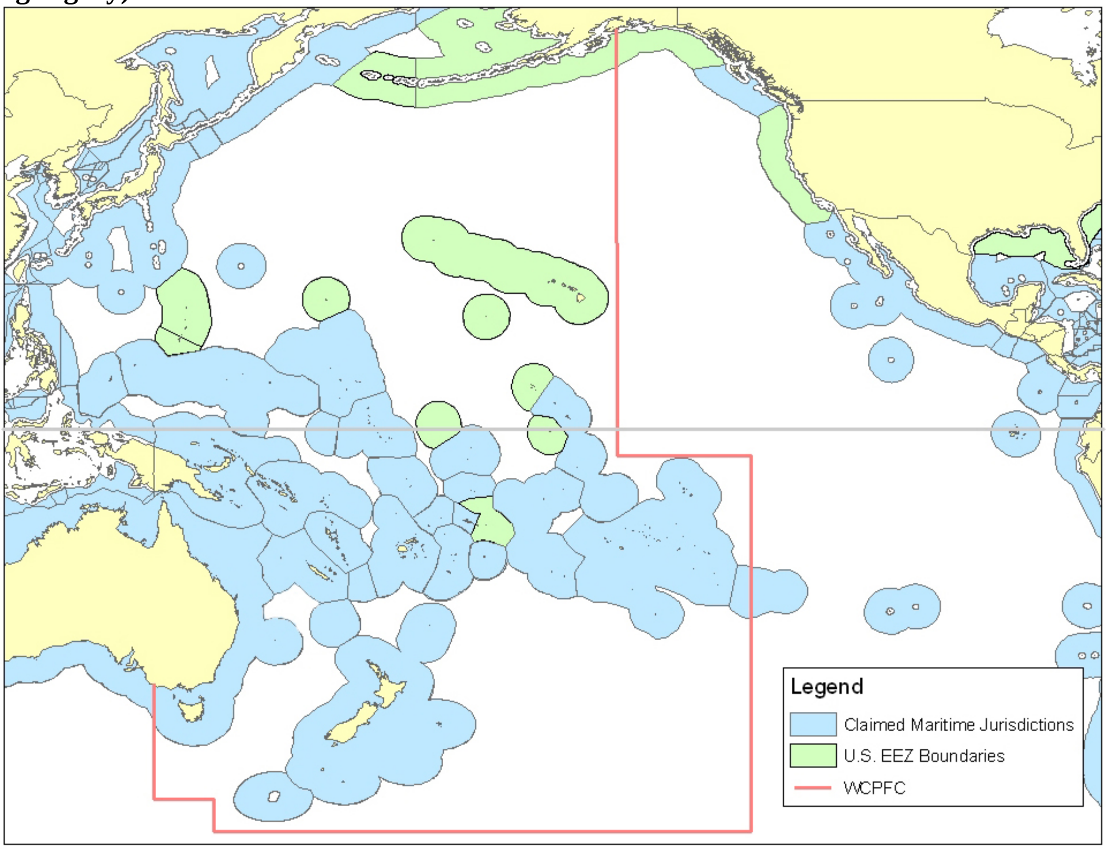
The CEQ's regulations at 40 CFR § 1508.25(a)(3) state that agencies may analyze similar actions (e.g., actions that have common timing or geography) in the same NEPA document, although they are not required to do so. The two rules described above are separate actions and have been distinguished as such throughout this document. However, both rules stem from the same WCPFC decisions and share common objectives, as well as common timing and geography. Thus, in order to implement the immediately necessary provisions of the recent WCPFC decisions in an efficient manner, NMFS has prepared one EA document for the two proposed rules.

## *1.1 Background*

The United States ratified the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (Convention) in 2007. The Convention was opened for signature in Honolulu on September 5, 2000, and entered into force in June 2004; the Convention entered into force for the United States in 2007. The full text of the Convention is available at: http://www.wcpfc.int/convention.htm. The area of application of the Convention (Convention Area) is shown in Figure 1. The Convention text indicates that the agreement is focused on highly migratory species (HMS) and fish stocks within the Convention Area (see the Convention text for the specific HMS covered).[1] The Convention also provides for the conservation and management of non-target, associated, and dependent species.

[1] Though not stated in the Convention text, it has also been agreed that bluefin tuna that are found in the Convention Area will continue to be solely managed by the Commission for the Conservation of Southern Bluefin tuna.

**Figure 1 The Convention Area: high seas (in white); U.S. Exclusive Economic Zone (EEZ) (in green); and foreign jurisdictions ("claimed maritime jurisdictions," in blue); Equator (in light gray)**




Source: NMFS unpublished data.

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

The current Members of the WCPFC are Australia, Canada, China, Chinese Taipei (Taiwan), Cook Islands, European Community, Federated States of Micronesia (FSM), Fiji, France (extends to French Polynesia, New Caledonia, and Wallis and Futuna), Japan, Kiribati, Korea, Marshall Islands, Nauru, New Zealand (extends to Tokelau), Niue, Palau, Papua New Guinea, Philippines, Samoa, Solomon Islands, Tonga, Tuvalu, United States (extends to the Territory of American Samoa, the Commonwealth of the Northern Mariana Islands (CNMI), and the Territory of Guam), and Vanuatu. The current Participating Territories are French Polynesia, New Caledonia and Wallis and Futuna (affiliated with France); Tokelau (affiliated with New Zealand); and the Territory of

American Samoa, the CNMI, and the Territory of Guam (affiliated with the United States of America). The Cooperating Non-Members for 2009 are Belize, El Salvador, Indonesia, Mexico, and Senegal.

The WCPFC – among other things – adopts Conservation and Management Measures (CMMs) for Commission Members, Cooperating Non-Members, and Participating Territories (CCM) of the WCPFC to implement through their respective national laws and procedures. The Western and Central Pacific Fisheries Convention Implementation Act (WCPFCIA; Pub. L. 109-479, Sec 501, et seq., and codified at 16 U.S.C. § 6901 et seq.) authorizes the Secretary of Commerce, in consultation with the Secretary of State and the Secretary of the Department in which the Coast Guard is operating, to develop such regulations as are needed to carry out the obligations of the United States under the Convention. The authority to promulgate regulations to implement the provisions of the Convention and WCPFC decisions, such as regulations to implement CMMs, has been delegated by the Secretary of Commerce to NMFS.

The WCPFC adopted six CMMs at its Fifth Regular Session, in Busan, Republic of Korea, in December 2008, related to living marine resource conservation and management. Two of the CMMs contain provisions that require implementation by the United States.[2] Conservation and Management Measure for Bigeye and Yellowfin Tuna in the Western and Central Pacific Ocean (CMM 2008-01), sets forth specific provisions to reduce fishing mortality on WCPO bigeye tuna and control fishing mortality on WCPO yellowfin tuna. The provisions are based on an objective to achieve a 30% reduction in fishing mortality on WCPO bigeye tuna[3] and a reduction in the risk of overfishing WCPO yellowfin tuna in a three-year period, commencing in 2009. With respect to bigeye tuna, the CMM is based in part on the finding by the WCPFC Scientific Committee that the stock of bigeye tuna in the WCPO is experiencing a fishing mortality rate greater than the rate associated with maximum sustainable yield (MSY). With respect to yellowfin tuna, the CMM is based on the finding by the WCPFC Scientific Committee that the stock of yellowfin tuna in the WCPO is being fished at capacity. The Convention calls for the WCPFC to adopt measures designed to maintain or restore stocks at levels capable of producing MSY, as qualified by relevant environmental and economic factors. Accordingly, CMM 2008-01 has the stated objective of reducing, over the period 2009-2011, the fishing mortality rate for bigeye tuna in the WCPO by at least 30% from the annual average during the period 2001-2004 or 2004 and ensuring that there is no increase in fishing mortality for yellowfin tuna beyond the annual average during the period 2001-2004 or 2004. Conservation and Management of Sea Turtles

[2] Copies of these and previously adopted measures are available on the WCPFC's website at http://www.wcpfc.int/.

[3] As discussed in Chapter 3, Sections 3.4 and 3.4.1, the stock structure of bigeye tuna in the Pacific Ocean is not well known. The WCPFC has to date treated bigeye tuna in the WCPO as a single and entire stock, both in terms of stock assessments and management decisions. The WCPFC decisions and this proposed action, consequently, deal with bigeye tuna in the WCPO, and the term "WCPO bigeye tuna" is used throughout this document to refer to that stock. The same is true with WCPO yellowfin tuna.

(CMM 2008-03), sets forth specific provisions to reduce sea turtle mortality from fishing operations in the Convention Area.[4]

Section 1.2 of this EA provides a general description of the proposed rule for the U.S. WCPO purse seine fleet (hereafter "U.S. Purse Seine Rule") and the specific CMM provisions to be implemented in the rule, and sets forth the purpose of and need for the rule.

Section 1.3 of this EA provides a general description of the proposed rule to implement a specific catch limit established by the WCPFC for bigeye tuna for the U.S. longline fleets in the WCPO (hereafter "U.S. Longline Rule"), and sets forth the purpose of and need for the rule.

## *1.2. The U.S. Purse Seine Rule*

The U.S. Purse Seine Rule would implement six provisions set forth in CMM 2008-01 and CMM 2008-03 for the U.S. purse seine fishery operating in the Convention Area. These provisions are described below.

### 1.2.1 Provision 1: Fishing Effort Limit

Paragraph 10 of CMM 2008-01 requires the United States to impose a cap on the number of U.S. purse seine fishing days (purse seine fishing effort) that may be spent by U.S. purse seine vessels on the high seas in the Convention Area. The fishing effort is not to exceed the 2004 level or the average of the levels in 2001-2004. Paragraphs 12 and 18 of CMM 2008-01 require the United States to take measures to reduce purse seine fishing mortality on bigeye tuna in the U.S. Exclusive Economic Zone (EEZ) in a way that is compatible with certain measures that the Parties to the Nauru Agreement (PNA)[5] are to implement within their respective areas of national jurisdiction (as prescribed in Paragraphs 11 and 17 of the CMM), which include limits on fishing days.

The U.S. Purse Seine Rule would implement this provision by establishing a limit on the number of fishing days per year that may be spent by the U.S. purse seine fleet on the high seas and in areas of U.S. jurisdiction (including the U.S. EEZ) within the Convention Area.

---

[4]Although the provisions include requirements for both the purse seine and longline fisheries, the United States is already in full compliance with the requirements for the longline fisheries through existing regulations at 50 CFR Parts 660 (for west coast-based longline vessels) and 665 (for western Pacific-based longline vessels), so only the provisions applicable to the U.S. WCPO purse seine fishery need be implemented at this time.

[5] PNA member countries are Palau, Nauru, Federated States of Micronesia, Solomon Islands, Marshall Islands, Kiribati, Tuvalu, and Papua New Guinea.

### 1.2.2 Provision 2: Use of Fish Aggregating Devices

Paragraphs 12 and 18 of CMM 2008-01 place the responsibility on the United States to take measures to reduce purse seine fishing mortality on bigeye tuna in the U.S. EEZ, in a way that is compatible with the measures that the PNA adopt within their respective areas of national jurisdiction (as prescribed in Paragraphs 11 and 17 of the CMM). Paragraphs 13 and 19 of CMM 2008-01 call for the United States to implement prohibitions on deploying, servicing, or fishing on schools associated with Fish Aggregating Devices (FADs) on the high seas for purse seine vessels during August and September in 2009 and during July through September in 2010 and 2011. Paragraphs 13 and 19 prescribe that the United States should allow vessels to fish during these periods only if they have approved observers on board to monitor that no fishing on FADs takes place.

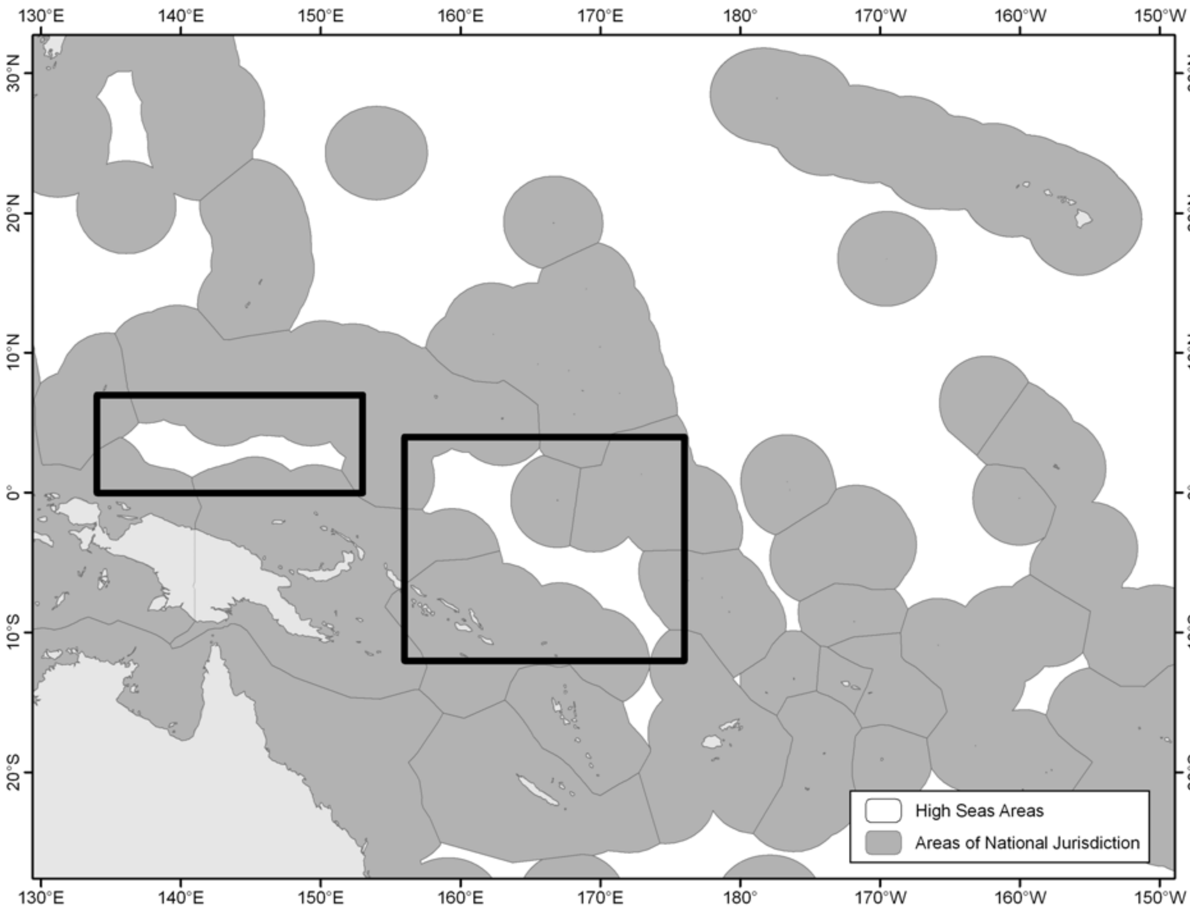
The U.S. Purse Seine Rule would implement this provision by establishing periods during which deploying, servicing,[6] or fishing on schools associated with FADs would be prohibited on the high seas and in the U.S. EEZ (August and September in 2009 and July through September in 2010 and 2011) (FAD prohibition period).

### 1.2.3 Provision 3: Closed Areas

Paragraph 22 of CMM 2008-01 specifies two areas of the high seas in which fishing by purse seine vessels would be prohibited from January 1, 2010 through 2011, unless the WCPFC decides otherwise at its regular annual session in December 2009. These areas are shown in Figure 2.

[6] The prohibition would include servicing electronics associated with FADs.

**Figure 2 Proposed high seas closed areas. (Areas of high seas are indicated in white; areas of national jurisdiction, including territorial seas, archipelagic waters, and exclusive economic zones, are indicated in dark shading. Approximate areas that would be closed to purse seine fishing are all high seas areas within the two rectangles bounded by the bold black lines. This map displays indicative maritime boundaries only.)**




The U.S. Purse Seine Rule would implement this provision by closing the two areas to fishing by U.S. purse seine vessels, effective January 1, 2010 through 2011, subject to the WCPFC deciding otherwise at its regular annual session in December 2009.

### 1.2.4 Provision 4: Catch Retention

Paragraph 27 of CMM 2008-01 requires the United States to ensure that owners and operators of U.S. purse seine vessels retain 100% of their catch of skipjack tuna, bigeye tuna, and yellowfin tuna, up to the point of first landing or transshipment, effective January 1, 2010 through the end of 2011. Exceptions would be provided for fish that are unfit for human consumption for reasons other than their size, for the last set of the trip if there is insufficient well space to accommodate the entire catch, and for cases of serious malfunction of equipment that makes fish in the wells unsafe for human consumption.

The provision is contingent on the WCPFC Regional Observer Program (ROP) developing to the point of being able to provide 100% observer coverage. The stated purpose of this provision is to create a disincentive to the capture of small fish and to encourage the development of technologies and fishing strategies designed to avoid the capture of small bigeye tuna and yellowfin tuna.

The U.S. Purse Seine Rule would implement this provision by prohibiting the discard of bigeye tuna, yellowfin tuna, or skipjack tuna from a U.S. purse seine vessel at sea within the Convention Area, subject to the exceptions and observer coverage requirement described above.

### 1.2.5 Provision 5: Observer Coverage

Paragraph 13 of CMM 2008-01 prescribes that the United States require U.S. purse seine vessels to carry observers during the FAD prohibition period in 2009 when fishing on the high seas, and starting in 2010, on all trips. Paragraph 12 prescribes that the United States require U.S. purse seine vessels to take measures to reduce purse seine fishing mortality on bigeye tuna in the U.S. EEZ in a way that is compatible with the measures that the PNA adopt within their respective areas of national jurisdiction (as prescribed in Paragraphs 11 and 17 of the CMM), which includes observer coverage during the FAD prohibition period in 2009. Paragraph 28 of CMM 2008-01 prescribes that the United States require U.S. purse seine vessels to carry an observer from the WCPFC's ROP on all trips, effective January 1, 2010.

The U.S. Purse Seine Rule would implement this provision by requiring observer coverage for all U.S. purse seine vessels during the FAD prohibition period in 2009 and, effective January 1, 2010 until the end of 2011, for all trips.

### 1.2.6 Provision 6: Sea Turtle Take Mitigation Requirements

Paragraphs 4 and 5 of CMM 2008-03 prescribe that the United States require U.S. purse seine vessels to take specific sea turtle interaction mitigation requirements. These mitigation requirements include specific requirements for the resuscitation of captured sea turtles, for carrying dip nets on board to handle sea turtles, and for taking measures to release turtles that are encountered in fishing gear.

The U.S. Purse Seine rule would implement this provision by requiring U.S. purse seine vessels to carry specific equipment and use specific measures to disentangle, handle, and release sea turtles that are encountered in fishing gear.

### 1.2.7 Purpose and Need

The purpose of the U.S. Purse Seine Rule is for NMFS to implement the applicable provisions of CMM 2008-01 and CMM 2008-03 for the U.S. WCPO purse seine fishery in order to reduce fishing mortality on WCPO bigeye tuna, control fishing mortality on WCPO yellowfin tuna, and mitigate fisheries interactions with sea turtles. The need for the rule is to satisfy the international obligations of the United States as a Contracting Party to the Convention, pursuant to the authority of the WCPFCIA.

## 1.3 U.S. Longline Rule

The U.S. Longline Rule would ensure NMFS' timely implementation of the annual catch limit (CL) for bigeye tuna established by the WCPFC for the U.S. longline fleets for each of the years 2009 through 2011. As prescribed by Paragraph 33 of CMM 2008-01 for 2009, the limit would be equal to the amount landed by the Hawaii and west coast longline fleets in 2004, less 10%.[7] The amount landed in 2004, which is specified in CMM 2008-01, based on information provided by the United States to the WCPFC, was 4,181 metric tons (mt). Consequently, the calculated reduction (less 10%) results in a 2009-2011 annual 3,763 mt limit. The limit does not apply to Participating Territories or small island developing States that are undertaking responsible development of their domestic fisheries. Thus, the proposed rule would not apply to the longline fisheries of the Territory of American Samoa, the Territory of Guam, or the CNMI. Pursuant to Paragraph 35 of CMM 2008-01, this limit continues in effect for the years 2010 and 2011.[8]

The U.S. longline fleets operating in the WCPO[9] generally are regulated through the Fishery Management Plan (FMP) for the Pelagic Fisheries of the Western Pacific Region developed by the Western Pacific Fishery Management Council (WPFMC) and the FMP for U.S. West Coast Fisheries for HMS developed by the Pacific Fishery Management Council (PFMC), pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MSA; 16 U.S.C. § 1801, et seq.). As stated above, the WCPFCIA authorizes NMFS (on behalf of the Secretary of Commerce) to promulgate such regulations as are needed to implement the decisions of the WCPFC. The regulations may, in cases where the Secretary of Commerce has discretion in implementing the decisions of the WCPFC, and where the regulations would govern fisheries under the authority of a Regional Fishery Management Council, be developed in accordance with the procedures established by the MSA to the extent practicable within the implementation schedule of the WCPFC. Accordingly, the MSA process could potentially serve to implement certain provisions of CMM 2008-01 that apply to the U.S. longline fisheries. This process involves the development of management recommendations by the WPFMC and PFMC, which are then subject to the approval of, and implementation by, NMFS. The process also involves formal time periods for

[7] See Chapter 2, Section 2.1.1.1 for an explanation of the United States' use of landings of bigeye tuna as a proxy for catches.

[8] The limits in CMM 2008-01 are prescribed relative to catches made during specified baseline periods, which for the United States is 2004. For fleets of WCPFC Members with bigeye tuna catch baselines of less than 5,000 mt and that land exclusively fresh fish, the specified limit is the baseline level less 10%, and is the same for each of the years 2009, 2010, and 2011.

[9] During the course of a normal year, these fleets also operate in the eastern tropical Pacific Ocean.

deliberation by the WPFMC and PFMC and subsequent review, approval, and implementation by the Secretary of Commerce through NMFS.

To comply with the international obligations of the United States, NMFS is issuing a proposed rule under the WCPFCIA pertaining to the U.S. longline fleets for the discrete and limited purpose of implementing the catch limit. Based on the longline fleet's fishing patterns in recent years, the limit could be reached or exceeded in the third quarter of 2009. By letter dated February 18, 2009, NMFS notified the WPFMC of its intent to implement the catch limit under the WCPFCIA, and has suggested that the WPFMC may wish to evaluate and recommend additional management measures under the MSA process, to the extent deemed necessary to efficiently carry out the established catch limit.

### 1.3.1 Purpose and Need

The purpose of the proposed rule for the U.S. longline fleets operating in the Convention Area is for NMFS to ensure the timely implementation of the United States of the bigeye tuna catch limit established by the WCPFC in 2008-01. The need for the rule is to satisfy the international obligations of the United States as a Contracting Party to the Convention, pursuant to the WCPFCIA, and to make effective a CMM provision that requires immediate implementation.

## *1.4 Organization of This Document*

The following is a brief description of the remaining chapters of this EA:

Chapter 2 provides detailed discussion of the Proposed Action, with separate discussions of the U.S. Purse Seine Rule, and the U.S. Longline Rule, and the alternative methods of implementing each of the proposed rules studied in depth in this EA. The chapter also discusses the No-Action Alternative baseline for each rule and the alternatives initially considered but excluded from detailed analysis.

Chapter 3 describes the U.S. purse seine and U.S. longline fisheries and the physical environment and biological resources that could be affected by the implementation of each of the proposed rules under any of the alternatives assessed in depth.

Chapter 4 analyzes the direct and indirect environmental consequences that could be caused by the implementation of each of the proposed rules under any of the alternatives assessed in depth, as well as the No-Action Alternative baseline for each rule.

Chapter 5 analyzes the potential cumulative impacts that could result from the implementation of the two proposed rules under any of the alternatives assessed in depth.

Chapter 6 compares the alternatives assessed for the implementation of each rule.

# Chapter 2

# Chapter 2 Proposed Action and Alternatives

In an environmental review document, agencies must assess the environmental impacts of a proposal and the reasonable and feasible alternatives to the proposal in comparative form. The purpose of this comparison of alternatives is to provide the decisionmaker and the public with a clear basis for choosing among the alternatives.[10]

Section 2.1 of this chapter provides a description of the Proposed Action analyzed in this EA, which includes two distinct proposed rules. This section describes the alternatives for each rule considered in detail, including the No-Action Alternative, which represents the baseline, or existing conditions. Section 2.2 discusses the alternatives initially considered but eliminated from detailed analysis for each rule. Chapter 3 presents detailed information about the affected environment that could be affected by any of the alternatives analyzed in depth, and Chapters 4 and 5 discuss the potential environmental impacts that could result from implementation of the proposed rules under any of the alternatives; Chapter 4 provides an analysis of potential direct and indirect impacts and Chapter 5 presents the cumulative impacts analysis. Chapter 6 compares the alternatives for each rule, as well as the No-Action Alternative for each rule, and summarizes the conclusions of NMFS regarding environmental impacts to provide the decisionmaker and the public a clear basis for choosing among the alternatives.

## *2.1 Proposed Action*

The Proposed Action includes the implementation of two proposed rules. One of the rules applies to the management of the U.S. purse seine fleet in the WCPO. The rule for the U.S. WCPO purse seine fishery includes six specific provisions that are described in Section 2.1.1 (hereafter, “U.S. Purse Seine Rule”). The alternatives considered in detail for this rule are described in Section 2.1.1.2.

The other rule would ensure the timely implementation of the WCPO bigeye tuna catch limit established by the WCPFC. The rule that would implement this bigeye tuna catch limit would apply to the U.S. longline fleets operating in the Convention Area (hereafter, “U.S. Longline Rule”). The U.S. Longline Rule is described in Section 2.1.2.

### 2.1.1 U.S. Purse Seine Rule

The U.S. Purse Seine Rule would include six provisions: (1) limits on fishing effort, measured in terms of fishing days, on the high seas and the U.S. EEZ for the years 2009-2011; (2) periods during which fishing on schools in association with FADs would be prohibited on the high seas and in the U.S. EEZ (August and September in 2009 and July through September in 2010 and 2011) (FAD prohibition period); (3) specific areas of high seas in which fishing would be prohibited during 2010-2011; (4) effective in 2010 and until the end of 2011, a requirement to retain 100% of the catch of skipjack tuna,

[10] See the CEQ’s Regulations for Implementing the Procedural Provisions of NEPA at 40 CFR §1502.14.

yellowfin tuna, and bigeye tuna, up to the first point of landing or transshipment; (5) a requirement to carry observers during the FAD prohibition period in 2009, and starting in 2010 until the end of 2011, on all trips; and (6) a requirement to implement sea turtle interaction mitigation requirements to be effective indefinitely.

Section 2.1.1.2 of this EA describes the reasonable and feasible alternatives, which are analyzed in depth in this EA, for implementing the provisions of the U.S. Purse Seine Rule. Alternative A is the No-Action Alternative. Alternative B sets forth the middle ground variation to the fishing effort limit provision (i.e., neither the most restrictive nor the least restrictive) and the manner in which the other five provisions would be implemented under the proposed rule. Alternatives C, D, and E are variations to the fishing effort limit provision; NMFS has not identified reasonable and feasible alternatives for the other five provisions. Below is a description of NMFS' development of the fishing effort limit alternatives.

#### 2.1.1.1 Fishing Effort Limit Alternatives

As explained in Chapter 1 of this EA, the U.S. Purse Seine Rule would be promulgated under the authority of the WCPFCIA, which enables NMFS to implement decisions made by the WCPFC. The fishing activities of U.S. WCPO purse seine vessels are also governed by the Treaty on Fisheries between the Governments of certain Pacific Islands States and the Government of the United States of America (South Pacific Tuna Treaty or SPTT). The SPTT manages access of U.S. purse seine vessels to the EEZs of Pacific Island Countries (PIC) and provides for technical assistance in the area of fisheries development. The SPTT is implemented domestically by regulations (50 CFR §§ 300.30-300.46) issued under authority of the South Pacific Tuna Act of 1988 (SPTA; 16 U.S.C. §§ 973-973r).

Although not directly applicable to the U.S. purse seine fleet, there are other regional agreements in place that are relevant to this action because they either govern the activities of purse seine vessels of other nations in the Convention Area or set what are referred to as harmonized terms and conditions for access into the areas under national jurisdiction of the PIC. Key among these is the 1992 Palau Arrangement for the Management of the Western Pacific Purse Seine Fishery (Palau Arrangement).[11] This agreement exists within the framework of the Nauru Agreement Concerning Cooperation in the Management of Fisheries of Common Interest (Nauru Agreement), the members of which are collectively known as the Parties to the Nauru Agreement, or the PNA. The United States is not a party to the Nauru Agreement nor has it been a party to any of the decisions or negotiations of this sub-regional body.[12]

[11] Other regional agreements include the Niue Treaty and the PNA FSM Arrangement (another sub-regional instrument that allows reciprocal access by PIC-based purse seine vessels). These agreements as well as the actions of the Pacific Islands Forum Fisheries Agency's (FFA) Forum Fisheries Committee do at times have impacts on the actions of U.S. purse seine vessels operating in the EEZs of the PIC.

[12] The PNA has to date been administratively backstopped by the Pacific Islands Forum Fisheries Agency, located in Honiara, Solomon Islands.

CMM 2008-01 refers to certain actions being taken by the PNA, and directs other non-CCMs to implement measures that are "compatible" with the PNA measures. For that reason, the Palau Arrangement and the Vessel Day Scheme (VDS)[13] are discussed at some length here.

The Palau Arrangement originally limited the number of purse seiners that can be licensed to fish in the EEZs of the parties to the Arrangement—the fundamental metric for effort under that agreement was vessel numbers or licenses. Licenses which were typically granted under bi-lateral access arrangements with PNA members were allocated (essentially on a first come first served basis) and until the end of the 1990s there were never more requests than the agreed upon cap (at that time 205 vessels). Although there was no direct nexus between the Palau Arrangement and the SPTT, the PNAs always accounted for the number of licenses allowed and used by U.S. vessels wishing to operate under the SPTT.

For reasons beyond the scope of this analysis, circa 2005 the PNA decided to move off the vessel license (effort) metric and move to a vessel or fishing day scheme (ergo VDS). The PNA established the VDS to cap the number of fishing days in the EEZs of the PNA and to provide for the allocation of the cap among the PNA (for specifics see Attachment C to CMM 2008-01). The PNA VDS specifies rolling three-year management periods. The rolling three-year management periods function by having the limit on the number of fishing days[14] set for each of the years in the initial three-year management period. In theory, before the end of the first year, the fishing limit is then to be set for the fourth year, before the end of the second year, the fishing limit is set for the fifth year, etc., so that the maximum allowable fishing days are always established for three years in advance. According to the arrangement, the set number of total fishing days available is partitioned among the PNA. Like the Palau Arrangement's limit on vessel numbers, the U.S. purse seine fleet is not in any way limited or governed by the VDS. However, the total number of fishing days allocated to the PNA and managed under VDS includes pools reserved for the purse seine fleets governed under the SPTT, as well as the FSM Arrangement.[15] To date the portion allocated to the U.S. Treaty have been taken off the top of the PNA's VDS pool and country allocations have occurred thereafter. Transfer of a set number of fishing days between management years by individual PNA members is allowed (up to 100% of the days from another year in the same three-year management

[13] Technically the Vessel Day Scheme – which can be found as Attachment C to WCPFC CMM 2008-01 is an amendment to the Palau Arrangement, one of the instruments agreed to by the PNA.

[14] The VDS defines fishing day as any calendar day, or part of calendar day, during which a purse seine vessel is outside of a port, except when the vessel is not undertaking fishing activities (i.e., when all fishing gear is stowed) (see Attachment C to CMM 2008-01).

[15] The FFA has requested that the United States engage in discussions with those subset of nations that are both FFA members and PNA members to determine if the U.S. purse seine fishery could be included in the VDS. Those discussions, which include the U.S. Department of State, are on-going as of this writing.

period; up to 30% of the days from the final year of the preceding management period).[16] Allocated fishing days may also be transferred, within specified limits, among PNA. In theory, this approach provides the flexibility to take into consideration variations in fishing effort and fishing patterns that occur in different years, while meeting the objective of implementing definite limits on the number of allowable fishing days.

The U.S. Purse Seine Rule would establish limits on the number of fishing days[17] that may be spent on the high seas and in the U.S. EEZ. Under Alternative B, the fishing effort limit provision has been designed to be especially similar to the PNA VDS.

Paragraph 10 of the WCPFC's CMM 2008-01 gives the United States the choice of using the 2004 level or the average 2001-2004 level as the baseline for the fishing effort limit on the high seas. Paragraphs 12 and 18 of CMM 2008-01 require the United States to take measures to reduce purse seine fishing mortality on bigeye tuna in the U.S. EEZ, in a way that is compatible with certain measures that the PNA adopt within their respective areas of national jurisdiction (as prescribed in Paragraphs 11 and 17 of the CMM), including the VDS, which establishes fishing effort in 2004 as the limit.

Paragraph 7 of CMM 2008-01 provides that determinations of effort levels for the purpose of implementing the CMM shall include fishing rights under existing regional fisheries arrangements or agreements that were registered with the WCPFC by December 2006 in accordance with CMM 2005-01, Conservation and Management Measure for Bigeye and Yellowfin Tuna in the Western and Central Pacific Ocean, provided that the number of licenses authorized under such arrangements does not increase. The SPTT is such an agreement, and the United States has registered the SPTT with the WCPFC in accordance with CMM 2005-01. As stated above, the number of licenses allowed under the SPTT is 45, five of which are reserved for vessels engaged in joint ventures with Pacific Island Parties to the SPTT, and these numbers have not increased. The licensing requirements of the SPTT do not apply to the U.S. EEZ, but the area of application of the SPTT does include portions of the U.S. EEZ. Since the inception of the SPTT, all U.S. purse seine vessels that have been used to fish in the U.S. EEZ in the WCPO have been licensed under the SPTT. In other words, the set of vessels used to fish in the U.S. EEZ in the WCPO has been identical to the set of vessels used to fish on the high seas and in foreign EEZs in the WCPO under the terms of the SPTT, and consequently, all such vessels have been effectively managed as part of the SPTT-governed U.S. purse seine fleet. For these reasons, the number of non-joint venture licenses authorized under the SPTT, 40, is used as the basis for the proposed fishing effort limits for both the high seas and the U.S. EEZ within the Convention Area.

[16] Because the total number of allowable fishing days is divided among the PNA, the percentages regarding the transfer of fishing days refer to the transfer allowed for each PNA (e.g., one party can transfer 100% of its fishing days between years in a management period) (see Attachment C to CMM 2008-01).

[17] A fishing day would be defined to mean any day in which a fishing vessel of the United States that is equipped with purse seine gear searches for fish, deploys a FAD, services a FAD, or sets a purse seine, with the exception of setting a purse seine solely for the purpose of testing or cleaning the gear and resulting in no catch.

This baseline of 40 vessels is used to derive the proposed fishing effort limits, expressed in terms of fishing days, by determining the average number of fishing days spent per vessel in the appropriate baseline period, and multiplying that number by 40 vessels. The numbers of days fished during the baseline periods were determined from the best available historical operational data from the U.S. purse seine fleet, as reported on regional purse seine logsheets. For both the high seas and the U.S. EEZ within the Convention Area, average fishing effort per vessel was greater in 2004 than during 2001-2004, so the 2004 levels are used for both areas. For the high seas in the Convention Area, the estimated average number of fishing days spent per vessel during 2004 (when 21 vessels were active in that area) was 50.76. For the U.S. EEZ in the Convention Area, the estimated average number of fishing days spent per vessel during 2004 (when 20 vessels were active in that area) was 13.95. Therefore, the proposed limit would be 2,030 fishing days per year (but not necessarily applied on an annual basis) for the high seas and 558 fishing days per year for the U.S. EEZ, or a total of 2,588 fishing days per year. If any vessels enter the fishery with any of the five licenses reserved for vessels engaged in joint ventures with the Pacific Island Parties to the SPTT, the limit may be adjusted accordingly.

NMFS identified various methods for implementing the fishing day effort limits. First, the effort limits could be distributed by: (1) allocating the effort limits among vessels (i.e., each vessel would be allocated a specific portion of the overall effort limit based on some established criteria); or (2) having no allocation of the effort limits, so all vessels would effectively compete for the available fishing days under a single fleet-wide – Olympic style – limit. Second, the effort limits could be applied by: (1) having a single combined effort limit that applies to both of the applicable areas (high seas and U.S. EEZ); or (2) separate effort limits for the high seas and U.S. EEZ. Third, the effort limits also could be set in several alternative temporal terms: (1) on an annual basis, or (2) a multiple-year basis. In either case, but particularly the former, they could be set for the calendar year or be put on some other "limit-year" schedule – given the SPTT is managed on licensing periods that run from June 15$^{th}$ to June 14$^{th}$ of the following year. The effort limits also could be implemented so that days could be borrowed from the limits of past and future years or licensing periods, or they could be fixed so that no borrowing could take place. NMFS has analyzed four different variations of the fishing effort limits in this EA that represent a reasonable range of alternatives for the purposes of a NEPA analysis.

### 2.1.1.2 Alternatives for the U.S. Purse Seine Rule Considered in Detail

The alternatives for the purse seine fishery rule are designated by letter (see Table 1) and are described in detail below.

**Table 1 Alternatives for the U.S. Purse Seine Rule**

| Purse Seine | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Alternatives | | | | |
| Provisions | | | | A | B | C | D | E |
| Effort limits (EL) for 2009-2011 | a. EL distributed by: | 1. Allocate EL among vessels | | | | X | | |
| | | 2. No allocation of EL | | | X | | X | X |
| | b. EL applied by: | 1. Single combined EL applied to both areas (HS and U.S. EEZ) | | | X | X | | X |
| | | 2. Separate EL for the HS and U.S. EEZ | | | | | X | |
| | c. EL temporal terms: | 1. Annual basis Start dates: | - January 1 | | X | X | | |
| | | | - Beginning of license year (June 15) | | | | X | |
| | | | -Multi-year | | | | | X |
| FAD prohibition for 2009-2011 | | | | | X | X | X | X |
| High seas area closures for 2010-2011 | | | | | X | X | X | X |
| Catch retention for 2010-2011 | | | | | X | X | X | X |
| Observer coverage for 2009-2011 | | | | | X | X | X | X |
| Sea turtle interaction mitigation requirements (indefinite) | | | | | X | X | X | X |

### *2.1.1.2.1 Alternative A: The No-Action Alternative to the U.S. Purse Seine Rule*

Alternative A, the No-Action Alternative to the U.S. Purse Seine Rule, would cause no changes to "the status quo" and would result in conditions that are treated as the baseline for the purposes of assessing the impacts of the other alternatives. The inclusion of the No-Action Alternative serves the important function of facilitating comparison of the effects of the action alternatives and is a required part of a NEPA document.[18]

[18] It is important that analysis of a no-action alternative not be interpreted as a lack of commitment on the part of the United States to fulfill its obligations. In this case, where the United States has an international obligation to implement the decisions of the WCPFC, the no-action alternative might not be realistic or reasonable as it would fail to meet the purpose and need for the action. However, NEPA regulations require the analysis of the no-action alternative, and the analysis provides a baseline even where an agency is under a legislative command to act (40 CFR § 1502.14(d)).

Under Alternative A, the U.S. WCPO purse seine fishery would continue to be managed under the existing laws and regulations, which are described in Chapter 3, Section 3.2.2. In effect up to 40 vessels licensed by the FFA under the SPTT would continue to fish in the manner in which operations have occurred for the past 21 years. The United States would continue to manage the fishery under a license metric as opposed to the fishing days metric now called for under the fishing effort limit provision in CMM 2008-01.

### *2.1.1.2.2 Alternative B: Action Alternative for the U.S. Purse Seine Rule*

Under Alternative B, the U.S. WCPO purse seine fishery would be subject to six new management provisions, as detailed below.

#### 2.1.1.2.2.1 Fishing Effort Limit

Under Alternative B, for the fishing effort limit to be applied to the years 2009-2011, there would be one combined effort limit for the high seas and the U.S. EEZ[19] and the effort limit would be allocated on a competitive basis, meaning an "Olympic" style allocation whereby fishing days are available until the cap is reached. To accommodate the need for operational flexibility in the event of inter-annual variability in the spatial and temporal distribution of optimal fishing grounds and times, Alternative B would implement the fishing effort limit on three different time scales: First, there would be a limit of 7,764 fishing days (3 times the base of 2,588) for the entire three-year 2009-2011 period. Second, there would be a limit of 6,470 fishing days (2.5 times the base of 2,588) for each of the two-year periods 2009-2010 and 2010-2011. Third, there would be a limit of 3,882 fishing days (1.5 times the base of 2,588) for each of the one-year periods 2009, 2010, and 2011. Once NMFS determines during any of those time periods that, based on information collected in vessel logbooks and other sources, the limit is expected to be reached on a specific future date, NMFS would issue a notice in the Federal Register announcing the closure of the purse seine fishery in the Convention Area on the high seas and in areas of U.S. jurisdiction starting on that date. NMFS would publish the notice at least seven calendar days before the effective date of the restrictions to provide fishermen with advance notice. Upon closure of the fishery, it would be prohibited to use a U.S. purse seine vessel to fish in the Convention Area on the high seas or in areas of U.S. jurisdiction through the end of the calendar year. This approach would allow greater fishing effort in any given year than would be allowed under a strictly annual limit, yet ensure that total fishing effort over the three-year period does not exceed the WCPFC-mandated limit for that period.

[19] In accordance with CMM 2008-01, the area of application of the effort limit would be the Convention Area between 20° N and 20° S.

#### 2.1.1.2.2.2 Use of Fish Aggregating Devices

Under Alternative B, there would be established periods in each of the years 2009 through 2011 during which it would be prohibited to fish on schools in association with FADs or to deploy, service, or otherwise use FADs in association with purse seine fishing. In 2009, the FAD prohibition period would be August 1 through September 30. In 2010 and 2011, it would be July 1 through September 30.

#### 2.1.1.2.2.3 Closed Areas

Under Alternative B, two areas would be closed to fishing by U.S. purse seine vessels, effective January 1, 2010 through 2011. The areas would be the two areas of high seas within the Convention Area that are depicted on the map in Figure 2 in Chapter 1 of this EA. In CMM 2008-01, the WCPFC has reserved the option of reversing its adoption of the closed areas at its regular annual session in December 2009. If such a decision occurs, NMFS will take appropriate action to rescind any closed areas that are established by regulation.

#### 2.1.1.2.2.4 Catch Retention

Under Alternative B, the proposed rule would prohibit discarding bigeye tuna, yellowfin tuna, or skipjack tuna from a U.S. purse seine vessel at sea within the Convention Area. Exceptions would be provided for fish that are unfit for human consumption (including but not limited to fish that are spoiled, pulverized, severed, or partially consumed at the time they are brought on board), for the last set of the trip if there is insufficient well space to accommodate the entire catch, and for cases of serious malfunction of equipment. This element of the proposed rule would become effective only upon NMFS' determination that an adequate number of WCPFC-approved observers are available for the purse seine vessels of all WCPFC CCMs as necessary to ensure compliance by such vessels with the catch retention requirement, and in any case no earlier than January 1, 2010. Once it makes that determination, NMFS would announce the effective date of the requirement in a notice published in the Federal Register. The requirement would then remain in effect through December 31, 2011.

#### 2.1.1.2.2.5 Observer Coverage

Under Alternative B, the proposed rule would require that U.S. purse seine vessels carry observers deployed as part of the WCPFC's ROP or deployed by NMFS on all trips in the Convention Area during August 1 through September 30, 2009 (the FAD prohibition period). It also would require, effective January 1, 2010, that U.S. purse seine vessels carry WCPFC-approved observers on all trips in the Convention Area until the end of 2011. These observer requirements would not apply to trips that take place exclusively within areas under the jurisdiction of the United States, including the U.S. EEZ and U.S. territorial sea, or any other single nation.[20]

[20] If the Regional Administrator has determined that an observer is not available for the fishing trip and a written copy of the Regional Administrator's determination, which must include the approximate start date

#### 2.1.1.2.2.6 Sea Turtle Take Mitigation Requirements

Under Alternative B, the proposed rule would require that owners and operators of U.S. purse seine vessels operating in the Convention Area carry specific equipment and use specific measures to disentangle, handle, and release sea turtles that are encountered in fishing gear, including purse seines and FADs. The required equipment would be a dip net with specified minimum design standards. The required measures would include: immediately releasing sea turtles that are observed enclosed in purse seines; disentangling sea turtles that are observed entangled in purse seines or FADs; stopping net roll until a sea turtle is disentangled from a purse seine; resuscitating sea turtles that appear dead or comatose; and releasing sea turtles back to the ocean in a specified manner. These measures would be effective indefinitely.

### *2.1.1.2.3 Alternative C: Allocation of Fishing Effort Limit*

Under Alternative C, for the U.S. purse seine vessels fishing in the U.S. EEZ and high seas in the Convention Area, the effort limit would be allocated among different individual vessels in some manner.[21] All other provisions would be identical to Alternative B.

### *2.1.1.2.4 Alternative D: Most Restrictive Variation for Fishing Effort Limit Provision*

Under Alternative D, for the U.S. purse seine vessels fishing in the Convention Area, the effort limit would be implemented on a single year basis, coinciding with the license year, no fishing days could be transferred from other years, and there would be separate non-allocated effort limits for the high seas and U.S. EEZ. All other provisions would be identical to Alternative B.

### *2.1.1.2.5 Alternative E: Least Restrictive Variation for Fishing Effort Limit Provision*

Under Alternative E, for the U.S. purse seine vessels fishing in the Convention Area, the effort limit would be implemented on a three-year combined basis, with one limit set for the high seas and U.S. EEZ for the entire three-year period that the effort limit would be in effect. All other provisions would be identical to Alternative B.

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of the fishing trip and the port of departure, is carried on board the fishing vessel during the entirety of the fishing trip, the vessel may conduct fishing activities without an observer on board.

[21] Analysis of specific methods of allocating the fixed number of available fishing days is not part of this EA. The specific method of individual vessel allocation would not change the analysis or conclusions regarding potential environmental impacts set forth in Chapters 4 and 5.

### 2.1.2 U.S. Longline Rule

The U.S. Longline Rule would ensure the compliance of the United States with the established bigeye tuna catch limit for the relevant U.S. longline fleets. Section 2.1.2.1 describes the alternatives considered in depth for this rule. The alternatives have been designated by number.

#### 2.1.2.1 Alternatives for the U.S. Longline Rule Considered in Detail

This section describes the alternatives for promulgating the U.S. Longline Rule considered in detail in this EA. The alternatives for the U.S. Longline Rule are designated by number (see Table 2).

**Table 2 Alternatives for the U.S. Longline Rule**

| Longline | | | | | | |
|---|---|---|---|---|---|---|
| | | Alternatives | | | | |
| Provisions | | 1 | 2 | 3 | 4 |
| Catch limit (CL) | a. Prohibit deep-set longlining and prohibit retention, landing, and transshipping of bigeye tuna on and by all longline vessels after reaching CL in any of the calendar years 2009-2011. | | X | | |
| | b. Prohibit retaining, landing, and transshipping bigeye tuna after reaching CL in any of the calendar years 2009-2011 (both deep-setting and shallow-setting would be allowed to continue). | | | X | |
| | b. Prohibit deep-set and shallow-set longlining and prohibit retention, landing, and transshipping of bigeye tuna on and by all longline vessels after reaching CL in any of the calendar years 2009-2011. | | | | X |

#### 2.1.2.2 Alternative 1: The No-Action Alternative to the U.S. Longline Bigeye Tuna Catch Limit Rule

Under Alternative 1, the catch limit for WCPO bigeye tuna established by the WCPFC for the U.S. longline fishery would not be implemented immediately and U.S. longline fleets operating in the Convention Area could continue targeting and landing bigeye tuna after the amount specified in CMM 2008-01 has been landed in any of the years 2009-2011. The fleet would continue to operate under the FMPs with limited entry and a variety of other regulatory measures currently in place (observers, reporting, Vessel Monitoring System (VMS), endangered species mitigation, etc.).

### 2.1.2.3 Alternative 2: Closure of the Deep-Set Sector

Under Alternative 2, the rule to ensure NMFS' timely implementation of the bigeye tuna catch limit established by the WCPFC for applicable U.S. longline fleets would prohibit deep-set fishing operations (which target tunas) after a landings limit of 3,763 metric tons has been reached in any of the calendar years 2009 through 2011, as well as prohibit the retention on board and landing of bigeye tuna by longline vessels (e.g., by vessels engaged in shallow-setting).[22]

The bigeye tuna limits established in CMM 2008-01 are termed "catch" limits. However, the baseline amount of bigeye tuna specified for the United States in the CMM, from which the limit is derived, is from information provided to the WCPFC by the United States. That information, as for other CCMs, is expressed in terms of landings of bigeye tuna, not catch. Accordingly, the proposed rule would establish a limit on landings (as a proxy for catches) of bigeye tuna. The limit would have the purpose of reducing fishing mortality of WCPO bigeye tuna.

Once NMFS determines in any of the years 2009, 2010, or 2011 that the limit is expected to be reached by a specific future date in that year, NMFS would publish a notice in the Federal Register announcing that the fishery will be closed on that specific date and will remain closed until the end of the calendar year. NMFS would publish the notice at least seven calendar days before the effective date of the restrictions to provide fishermen advance notice of the restrictions. NMFS would also endeavor to make publicly available, such as on a web site, regularly updated estimates and/or projections of bigeye tuna landings in order to help fishermen plan for a possible fishery closure.

Starting on the closure date and extending through the last day of that calendar year, it would be prohibited to use a U.S. fishing vessel to deploy longline gear in the Convention Area, to retain on board bigeye tuna or yellowfin tuna captured by longline gear in the Convention Area, or to land or transship bigeye tuna or yellowfin tuna captured by longline gear in the Convention Area, with the following exceptions:

First, any bigeye tuna or yellowfin tuna already on board a fishing vessel upon the start of the closure may be retained on board, transshipped, and/or landed, provided that it is landed within 14 days after the start of the closure. In the case of a vessel that has declared to NMFS pursuant to 50 CFR 665.23(a) that the current trip type is shallow-setting, the 14-day limit would be waived, but the number of bigeye tuna or yellowfin tuna retained on board, transshipped, or landed could not exceed the number on board the vessel upon the start of the closure, as recorded by the NMFS observer on board the vessel.

[22] As discussed in more detail in Chapter 3, Section 3.3, the deep-set component of the longline fishery targets tuna species at depths ranging from 100 to 300 meters; the shallow-set component targets swordfish at depths less than 100 meters.

Second, any bigeye tuna or yellowfin tuna captured by longline gear could be retained on board, transshipped, or landed, if it is landed in the Territory of American Samoa, the Territory of Guam, or the CNMI, provided that it was not caught in the portion of the U.S. EEZ surrounding the Hawaiian Archipelago and that it is landed by a U.S. fishing vessel operated in compliance with a valid permit issued under the FMP for the Pelagic Fisheries of the Western Pacific Region (Pelagics FMP) or the FMP for U.S. West Coast Fisheries for HMS (West Coast HMS FMP).

Third, vessels could continue to deploy longline gear in a shallow-set manner to target swordfish, provided that no bigeye tuna are landed or retained on board.

The purpose of the prohibitions with respect to yellowfin tuna would be to prevent vessels from targeting yellowfin tuna during the closure, which could potentially result in a large number of unutilized bigeye tuna mortalities, which would undermine the objective of the closure.

These restrictions would not apply to bigeye tuna caught by longline gear outside the Convention Area, such as in the eastern Pacific Ocean (EPO). However, to ensure compliance with the restrictions in the Convention Area, NMFS would prohibit vessels from fishing with longline gear in areas both within and outside the Convention Area during the same fishing trip.

#### 2.1.2.4 Alternative 3: Prohibition on Retention, Landing, or Transshipping of Bigeye Tuna

Under Alternative 3, in order to ensure the timely implementation of the United States with the WCPO bigeye tuna catch limit for the U.S. longline fleets established by the WCPFC, vessels would be prohibited from retaining on board, landing or transshipping any catch of bigeye tuna in the limit's area of application, once the limit has been reached for the calendar year. However, any bigeye tuna already on board a vessel at the time of the closure may be retained on board and landed and any bigeye tuna could be retained on board, transshipped, or landed in the Territory of American Samoa, the Territory of Guam, or the CNMI, provided that it was not caught in the portion of the U.S. EEZ surrounding the Hawaiian Archipelago and that it is landed by a U.S. fishing vessel operated in compliance with a valid permit issued under the Pelagics FMP or West Coast HMS FMP. In other words, it would differ from Alternative 2 only in that fishing vessels would be allowed to continue deep-set longlining in the affected area after the limit is reached, provided that no bigeye tuna are retained or landed. As for Alternative 2, these restrictions would not apply to bigeye tuna caught by longline gear outside the Convention Area, such as in the EPO. However, to ensure compliance with the restrictions in the Convention Area, NMFS would prohibit vessels from fishing with longline gear in areas both within and outside the Convention Area during the same fishing trip.

#### 2.1.2.5 Alternative 4: Closure of the Deep-Set and Shallow-Set Sectors

Under Alternative 4, in order to ensure the timely implementation of the WCPO bigeye tuna catch limit for the U.S. longline fishery established by the WCPFC, both the shallow-set and deep-set components would be closed once the limit has been reached for the calendar year (i.e., no U.S. vessels would be allowed to conduct longline fishing operations in the Convention Area). However, any bigeye tuna already on board a vessel at the time of the closure may be retained on board and landed and any bigeye tuna could be retained on board, transshipped, or landed in the Territory of American Samoa, the Territory of Guam, or the CNMI, provided that it was not caught in the portion of the U.S. EEZ surrounding the Hawaiian Archipelago and that it is landed by a U.S. fishing vessel operated in compliance with a valid permit issued under the Pelagics FMP or West Coast HMS FMP. As for Alternatives 2 and 3, these restrictions would not apply to bigeye tuna caught by longline gear outside the Convention Area, such as in the EPO. However, to ensure compliance with the restrictions in the Convention Area, NMFS would prohibit vessels from fishing with longline gear in areas both within and outside the Convention Area during the same fishing trip.

## *2.2 Alternatives Initially Considered But Excluded From Detailed Analysis*

NMFS initially considered two alternatives to the FAD prohibition period provision for the U.S. Purse Seine Rule that have been excluded from detailed analysis. These alternatives are described in Sections 2.2.1 and 2.2.2 below.

NMFS also initially considered alternative methods of implementing the WCPO bigeye tuna catch limit for the U.S. longline fleets. These alternatives are discussed in Section 2.2.3 below.

### 2.2.1 U.S. Purse Seine Rule: Purse Seine Catch Limit Alternative

Paragraphs 15 and 16 of CMM 2008-01 set forth an alternative to the high seas FAD prohibition period described above that CCMs may use, provided that they meet certain conditions. Under this alternative, instead of the FAD prohibition period on the high seas, the United States would take measures to reduce the catch of WCPO bigeye tuna by the U.S. purse seine fishery by a minimum of 10% relative to the average amount caught in the period between 2001-2004. In order to qualify for this alternative, the WCPFC would have had to have identified the United States in advance as having demonstrated a functioning capacity to implement such measures in an effective and transparent manner. Once identified as having met the requirements for implementing this alternative, the United States would have had to submit the details of implementing this alternative to the WCPFC by January 31, 2009. The United States was not identified in advance by the WCPFC as meeting the requirements, and the January 31, 2009 deadline has passed. As a result, this alternative is no longer feasible for NMFS to implement, and is being excluded from detailed consideration in this EA.

### 2.2.2 U.S. Purse Seine Rule: Different FAD Prohibition Periods for the High Seas and U.S. EEZ

Paragraphs 13 and 19 of CMM 2008-01, specify particular FAD prohibition periods during which members' purse seine vessels only would be able to fish on the high seas with an approved observer on board. Paragraphs 11 and 17 specify the same for the EEZs of PNA members. Paragraphs 12 and 18 of CMM 2008-01 require the United States to take measures to reduce purse seine fishing mortality on bigeye tuna in the U.S. EEZ in a way that is compatible with the measures that PNA members adopt within their respective areas of national jurisdiction, but they do not specify particular FAD prohibition periods or requirements. Accordingly, NMFS initially considered implementing different requirements for the U.S. EEZ than the FAD prohibition periods that are mandated for the U.S. purse seine vessels on the high seas. For example, the prohibition periods could be different in the U.S. EEZ than on the high seas, or alternative management tools could be adopted, provided that they serve to reduce fishing mortality on bigeye tuna in a manner compatible with the tools used in the PNA members' EEZs. However, because vessels may typically fish in the high seas, U.S. EEZ and PIC EEZs during each trip, NMFS concluded that implementing and enforcing different requirements for the two areas would not be reasonable or feasible (e.g., vessels fishing in the U.S. EEZ without an observer would have to return to port to bring on board an observer before returning to fish on the high seas). Consequently, this alternative was not considered in detail.

### 2.2.3 U.S. Longline Rule: Excluded Alternatives

NMFS considered alternative methods of implementing the WCPO bigeye tuna catch limit, such as time and/or area closures, other limitations on fishing effort, allocation of the catch limit among vessels, and non-calendar-year catch limits. These alternatives would require detailed consideration of many factors, ideally including the national standards established under the MSA and the objectives set forth in the relevant FMPs. Thus, they would be more appropriately considered and developed through the MSA process, such as through amendments to the FMP for the Pelagic Fisheries of the Western Pacific Region and/or the FMP for U.S. West Coast Fisheries for HMS and were not considered in detail in this document.

# Chapter 3

# Chapter 3 Affected Environment

This chapter describes the physical and biological environment affected by the U.S. purse seine and longline fisheries in the WCPO, focusing on the resources that would be affected by the implementation of the two proposed rules described in Chapter 2. The chapter is divided as follows: (1) physical environment; (2) description of the U.S. WCPO purse seine fleet; (3) description of the Hawaii and west coast longline fleets that would be affected by the implementation of the bigeye catch limit; (4) bigeye and yellowfin tuna and the principal target stocks associated with the purse seine and longline fisheries; (5) other biological resources; and (6) protected resources.

Specific sections of this chapter (Sections 3.1, 3.2, 3.3, 3.3.2, 3.4, 3.5.3, 3.5.4, and 3.6) build upon the information presented in the 2001 Western Pacific Pelagics Final Environmental Impact Statement (FEIS) (NMFS 2001b), 2004 Western Pacific Pelagics Supplemental Environmental Impact Statement (SEIS) (WPRFMC 2005), 2005 Western Pacific Seabird – Squid FEIS (NMFS 2005a), 2004 South Pacific Albacore Troll EA (NMFS 2004a), 2004 SPTT Extension EA (NMFS 2004b) and the 2003 West Coast HMS Environmental Impact Statement (EIS) (PFMC 2003).

## *3.1 Physical Environment of the WCPO*

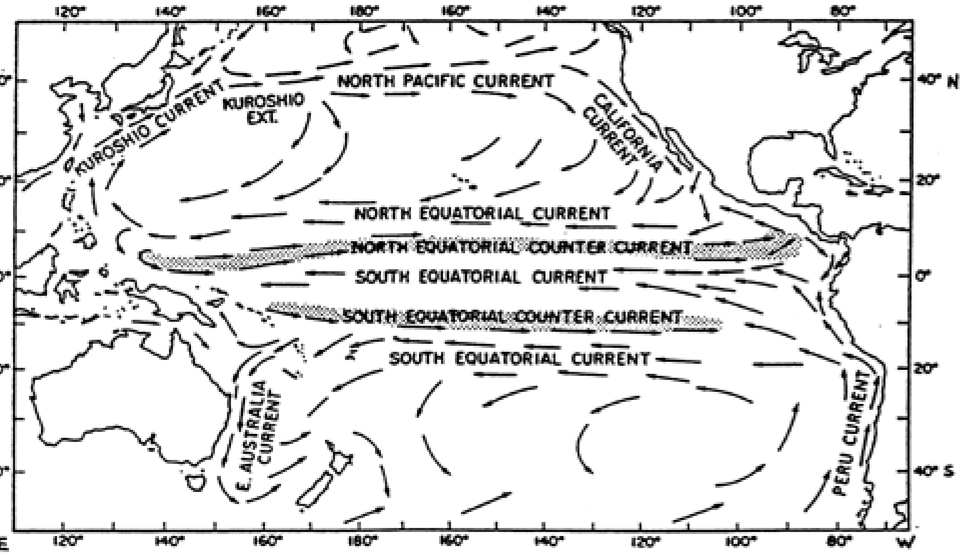
The physical reach of the Western and Central Pacific Fisheries Convention, or the Convention Area of application (as shown in Figure 1 in Chapter 1), comprises all waters of the Pacific Ocean bounded to the south and to the east by the following line: from the south coast of Australia due south along the 141° meridian of east longitude to its intersection with the 55° parallel of south latitude; thence due east along the 55° parallel of south latitude to its intersection with the 150° meridian of east longitude; thence due south along the 150° meridian of east longitude to its intersection with the 60° parallel of south latitude; thence due east along the 60° parallel of south latitude to its intersection with the 130° meridian of west longitude; thence due north along the 130° meridian of west longitude to its intersection with the 4° parallel of south latitude; thence due west along the 4° parallel of south latitude to its intersection with the 150° meridian of west longitude; thence due north along the 150° meridian of west longitude.

Below is a description of the specific physical environment in which the WCPO purse seine and longline fisheries occur and how physical features of the pelagic environment, as well as the distribution of HMS, influence the fisheries.

### 3.1.1 Oceanography

Figure 3 illustrates the two main subtropical gyres (the North Pacific subtropical gyre in the northern hemisphere and the South Pacific subtropical gyre in the southern hemisphere) and the other major Pacific Ocean currents.

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




Source: http://www.fao.org/DOCREP/005/T1817E/T1817E01.htm

Subtropical gyres rotate clockwise in the northern hemisphere and counter clockwise in the southern hemisphere in response to trade and westerly wind forces. Due to this, the central Pacific Ocean (~20° N latitude-20° S latitude) 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. Embedded in the mean flow are numerous mesoscale eddies ("Mesoscale eddies are turbulent or spinning flows on scales of a few hundred kilometers" (Stewart 2005)) created from wind and current interactions with the ocean's bathymetry. These eddies, which can rotate either clockwise or counter clockwise, typically have important biological impacts.

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

The subtropical frontal zones, consisting of several convergent fronts, lie between latitudes 25°- 40° N and S, and are often referred to as the Transition Zones. Transition zones are areas of ocean water bounded to the north and south by large-scale surface currents originating from subartic and subtropical locations (Polovina, Howell, Kobayashi et al. 2001). These zones also provide important habitat for pelagic fish and thus, are targeted by fishers.

Variability within the ocean–atmosphere system results in changes in winds, rainfall, currents, water column mixing, and sea-level heights, which can have profound effects on regional climates as well as on the abundance and distribution of marine organisms. In the tropical Pacific there is a limited seasonal variation, yet there is a strong interannual variability which in turn affects the entire Pacific Ocean (Langley, Williams, Lehodey et al. 2004).

The scientific community has become increasingly aware of the occurrence and importance of long-term (decadal-scale) oceanographic cycles and of their relationship to cycles in the population sizes of some species of fish (Chavez, Ryan, Lluch-Cota et al. 2003). These naturally occurring cycles can either mitigate or accentuate the impact of fishing mortality on all species, especially those targeted in HMS fisheries. El Niño Southern Oscillation (ENSO)[23] events, including meso-scale events, such as El Niño and La Niña, and shorter term phenomena such as cyclonic eddies near the Hawaiian Islands (Seki, Lumpkin, and Flament 2002), impact the recruitment and fishing vulnerability of highly migratory species. ENSO events can cause considerable interannual physical and biological variation. During an El Niño, the normal easterly trade winds weaken, resulting in a weakening of the westward equatorial surface current and a deepening of the thermocline in the central and eastern equatorial Pacific. In turn, the eastward-flowing countercurrent tends to dominate circulation, bringing warm, low-salinity, and low-nutrient water to the eastern margins of the Pacific Ocean. As the easterly trade winds are reduced, the normal nutrient-rich upwelling system does not occur, leaving warm surface water pooled in the EPO.

El Niño affects the ecosystem dynamics in the equatorial and subtropical Pacific by considerable warming of the upper ocean layer, rising of the thermocline in the western Pacific and lowering in the east, strong variations in the intensity of ocean currents, low trade winds with frequent westerlies, high precipitation at the dateline, and drought in the western Pacific (Sturman and McGowan 1999). El Niño events have the ability to exercise a strong influence on the abundance and distribution of organisms within marine ecosystems. The deepening of the mixed layer depth that occurs with an El Niño may typically be manifested by a discernable increase in purse seine catch per unit of effort (CPUE) of yellowfin tuna in the central/western regions of the Pacific. This is normally seen after a 2-3 month delay and occurs in the eastern portion of the WCPO in the vicinity of Kiribati and the U.S. EEZ of the central Pacific (Howland, Baker, Jarvis etc.). During a strong El Niño, the purse seine fishery for skipjack tuna shifts over 1,000 kilometers from the western to the central equatorial Pacific in response to physical and biological impacts (Lehodey, Bertignac, Hampton et al. 1997). The major change is a

[23] ENSO events include the full range of variation observed between El Niño and La Niña events. El Niño is characterized by a large-scale weakening of the tradewinds and warming of the surface layers in the eastern and central equatorial Pacific. El Niño events occur irregularly at intervals of 2–7 years, although the average is about once every 3–4 years. These events typically last 12–18 months, and are accompanied by swings in the Southern Oscillation, an interannual "see-saw" in tropical sea level pressure between the eastern and western hemispheres. During El Niño, unusually high atmospheric sea level pressures develop in the western tropical Pacific and Indian Ocean regions, and unusually low sea level pressures develop in the southeastern tropical Pacific. Southern Oscillation tendencies for unusually low pressures west of the dateline and high pressures east of the dateline have also been linked to periods of anomalously cold equatorial Pacific sea surface temperatures sometimes referred to as La Niña (NMFS 2004b).

horizontal extension or contraction of the skipjack tuna habitat during El Niño and La Niña phases respectively. Strong El Niño events also may show a positive effect on bigeye tuna CPUE in these regions for the longline fleets.

A La Niña event exhibits the opposite conditions: cooler than normal sea-surface temperatures in the central and eastern tropical Pacific Ocean. These may have larger impacts on global weather patterns. For the purse seine fishery the contraction of the warm pool tends to shift fishing to the western portion of the WCPO in the vicinity of Papua New Guinea (PNG) and FSM, or away from the U.S. EEZ and those areas to the north of American Samoa.

Physical and biological oceanographic changes have also been observed on decadal time scales. These low frequency changes, termed regime shifts, can impact the entire ocean basin. Recent regime shifts in the North Pacific have occurred in 1976 and 1989, with both physical and biological (including fishery) impacts (Polovina, Mitchum, and Evans 1995; Polovina 1996). These impacts can lead to potential impacts on the tropical Pacific fisheries for tunas such as the extension of present fisheries to higher latitudes, a decrease in productivity, mainly in the eastern Pacific, increasing variability in the catches, changes in species composition of the catch, and increasing fishing pressure, particularly on bigeye and yellowfin tuna (The World Bank 2000).

### 3.1.2 Climate Change

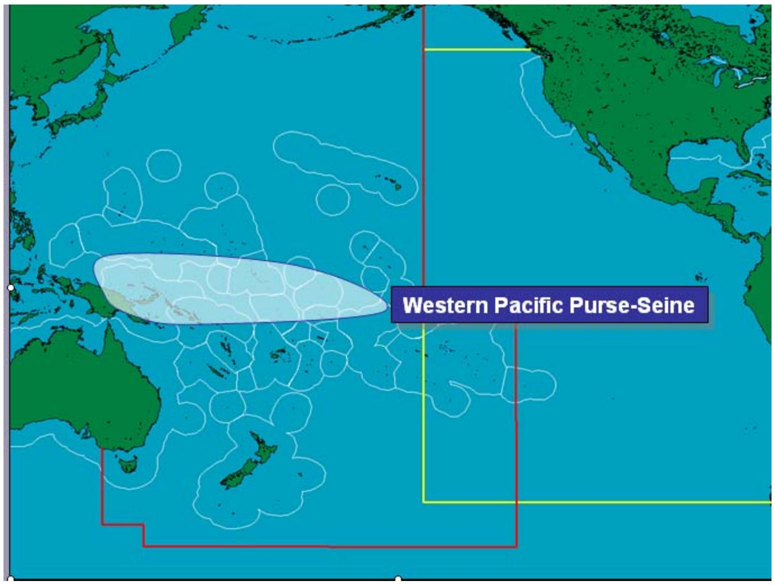
Climate change can affect the marine environment by impacting the established hydrologic cycle (a change in precipitation and evaporation rates) (Roessig, Woodley, Cech et al. 2004). Climate change has been associated with other effects to the marine environment, including rising water temperatures, as well as related changes in ice cover, salinity, oxygen levels, and circulation (Intergovernmental Panel on Climate Change 2007). These effects are leading to shifts in the range of species, changes in algal, plankton, and fish abundance (Solomon, Quin, Manning et al. 2007), and causing damage to coral reefs (Scavia, Field, Boesch et al. 2002). Climate change is also increasing the incidence of disease in aquatic organisms (Roessig, Woodley, Cech et al. 2004). Studies on plankton ecosystems, demonstrate that climate change is affecting phytoplankton, copepod herbivores, and zooplankton carnivores, which cause affects to ecosystem services, such as oxygen production, carbon sequestration, and biogeochemical cycling (Richardson, Jackson, Ducklow et al. 2004). These studies concluded that fish, seabirds, and marine mammals will need to adapt to a changing spatial distribution of primary and secondary production within pelagic marine ecosystems (Richardson, Jackson, Ducklow et al. 2004).

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

## 3.2 U.S. WCPO Purse Seine Fishery

Vessels of the U.S. purse seine fishery engage in targeting skipjack and to a lesser extent yellowfin tuna throughout the equatorial regions of the Convention Area. The U.S. WCPO purse seine fleet operates mostly in the EEZs of PIC between 10° north and 10° south latitude within the Convention Area (Figure 4).

**Figure 4 The general operational area of the U.S. WCPO purse seine fishery (indicative only, in light blue). The red line demarks the Convention Area with the yellow line depicting the as yet to be implemented Antigua Convention. (The Antigua Convention would modify the existing agreement that establishes the Inter-American Tropical Tuna Commission, which generally exercises competence over HMS Fisheries in the Eastern Pacific Ocean).**




Source: NMFS unpublished data.

### 3.2.1 Fleet Characteristics

Gillett, McCoy, and Itano (2002) provide a detailed description of the development and expansion of the U.S. WCPO purse seine fleet. The U.S. fleet developed a year-round fishery along the equator, generally within a rectangular area bounded by 10° N-10° S and 135° E-170° E, and encompassing the EEZs of Palau, FSM, PNG, Solomon Islands, Nauru, Marshall Islands, and the Gilbert Islands group of Kiribati. Fishing grounds continued to expand eastward throughout the 1980s, eventually encompassing the Phoenix and Line Islands (Kiribati); the U.S. possessions of Howland, Baker, and Jarvis; Tokelau; and the high seas between these EEZ areas. U.S. purse seiners typically target skipjack and yellowfin tuna found in association with drifting logs/flotsam or FADs and also unassociated free-swimming schools of tuna ("school sets"). The relative proportion of the different set types has varied considerably over time as oceanographic conditions and technology have changed.

Purse seiners are one of the most complex fishing vessels in terms of both technology and machinery. Hydraulic systems on large "super seiners," require more than 1,600 meters of piping, and are equipped with at least four auxiliary engines in addition to the main propulsion engine (or engines). The purse seine technique for catching tuna involves employing a net that is set vertically in the water, with floats attached to the upper edge and chains for weight on the lower edge. A series of rings is attached to the lower edge of the net, and a pursing cable passes through the rings, enabling a winch on board the vessel to draw the net closed on the bottom. Purse seine nets can be up to 1,600 meters or more in length and 150 meters in depth. When the net is deployed from the purse seine vessel, a large skiff carrying the end of the net is released from the stern of the fishing vessel. The purse seine vessel encloses the school of tuna, keeping it in visual contact if on the surface, or using sonar if below the surface, and then retrieves most of the net onto the vessel. The fish are confined in the "sack" portion of the net, which consists of finer mesh webbing that prohibits their escape. The catch is removed from the sack onto the vessel with large "scoops" holding one metric ton or more, and then is placed in brine tanks for freezing and later storage. Joseph (2002) and NMFS (2004b) provide a detailed description of tuna purse seining and the fleets involved in the Pacific Ocean fisheries.

### 3.2.2 Management of the U.S. Purse Seine Fleet in the WCPO

The fishing activities of U.S. WCPO purse seine vessels are governed by the SPTT. The SPTT manages access of U.S. purse seine vessels to the EEZs of PIC and provides for technical assistance in the area of fisheries development. The SPTT is implemented domestically by regulations (50 CFR §§ 300.30-300.46) issued under authority of the SPTA. The High Seas Fishing and Compliance Act of 1995 (HSFCA; 16 U.S.C. § 5501, et seq.) also regulates this fishery. The main fishery management regulations established under the SPTA and HSFCA are:

- All U.S. vessels that fish (as defined under 50 CFR § 300.2) on the high seas are required to have a permit in accordance with the HSFCA;

- A U.S. purse seine vessels operating in the WCPO must have a license issued by the Pacific Islands FFA as Treaty Administrator on behalf of the Pacific Island Parties to the SPTT. The SPTT and implementing regulations provide for the availability of 45 licenses, five of which are only available to fishing vessels engaged in joint venture arrangements with the Pacific Islands Parties. No joint venture licenses have ever been issued.

- Within the SPTT Area there are several types of designated geographical areas, as described below:

    1. The **Treaty Area** which is about 10 million square miles in size.

    2. The **Licensing Area** where a license is required in order to fish.

    3. **Closed Areas** are those in which U.S. purse seine vessels are not allowed to fish.

    4. **Limited Areas** are areas in which fishing effort by U.S. purse seine vessels is limited.

- U.S. purse seine vessels are prohibited from transshipping fish at sea unless a PIC specifically authorizes this activity;

- A U.S. purse seine vessel cannot be used for directed fishing for southern bluefin tuna *(Thunnus maccoyii)* or for fishing for any kinds of fish other than tunas, except fish that may be caught incidentally;

- Holders of vessel licenses are required to submit both written and electronic reports on their fishing activities in the Treaty Area to NMFS;

- Vessels must carry observers with the SPTT providing for a target coverage of 20% (in terms of trips);

- U.S. purse seine vessels are required to carry and operate mobile transmitting units to provide position information to the VMS administrator by the FFA and by NMFS;

- Vessels are required to be identified in accordance with the 1989 United Nations Food and Agriculture Organization standard specifications for the marking and identification of fishing vessels, which requires that the vessel's international radio call sign be marked on the hull and deck.

Pursuant to the terms of the SPTT, typically at least twenty percent of trips by the U.S. WCPO purse seine fleet currently carry observers (see SPTT, Annex I, Part 7). Observers can provide useful information that is independent of vessel operators and is obtained during actual fishing operations. Data typically collected by observers include catch composition by species, effort, location, environmental conditions, gear type, and information on bycatch. FFA-deployed observers on U.S. WCPO purse seine vessels collect detailed information on bycatch and discards in the WCPO purse seine fishery and these data are routinely used to provide estimates of total bycatch and discards and the extent of interaction with species of special interest (e.g., marine mammals and turtles) (Secretariat of the Pacific Community (SPC) 2009b).

As discussed in Chapter 1 of this EA, the U.S. WCPO purse seine fishery is also governed by the Convention, pursuant to the authority of the WCPFCIA.

### 3.2.3 Participation, Effort, and Catch

The U.S. purse seine fleet spends about 30% of its effort in the U.S. EEZ and on the high seas and the remainder in the EEZs of PIC (unpublished NMFS data). The U.S. WCPO purse seine fleet spent, from 1997 through 2007, about 8% of its effort in the U.S. EEZ, 23% on the high seas, and the remainder in the EEZs of PIC (unpublished NMFS data). The percentages for any given year during that period ranged from 5% to 21% for the U.S. EEZ, 18% to 30% for the high seas, and 60% to 78% for the EEZs of PIC. Figure 5 shows approximate effort data from 1997 through 2007 for the U.S. WCPO purse seine fleet (unpublished NMFS data) and Table 3 shows the effort data for the high seas, U.S. EEZ, and PIC EEZ regions for each of those years (unpublished NMFS data).

**Figure 5 U.S. WCPO purse seine fleet fishing effort, 1997-2007**

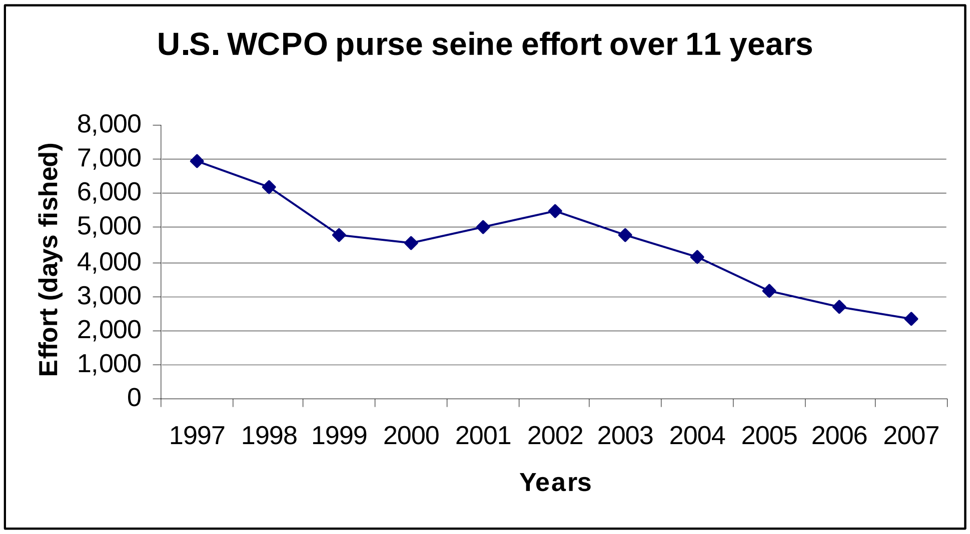


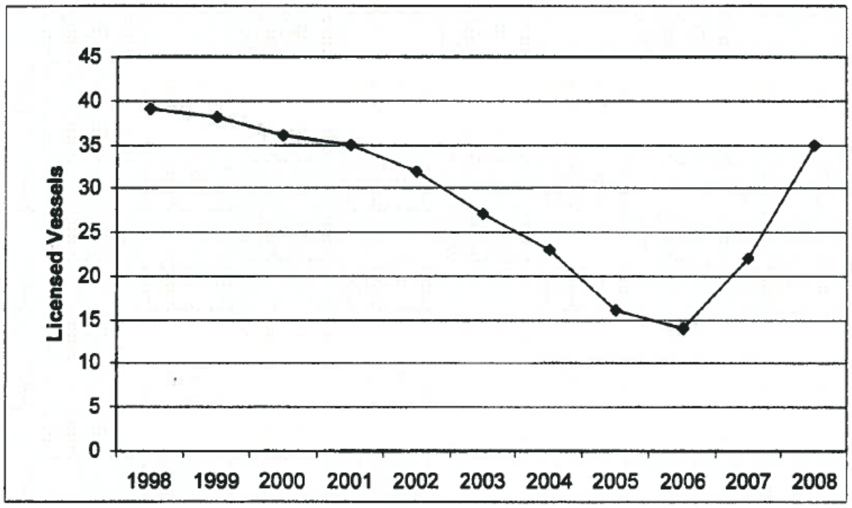

**Table 3 U.S. WCPO purse seine fleet fishing effort (1997-2007)**

| Year | U.S. EEZ Effort | U.S. % days | High seas Effort | High Seas % days | PIC Effort | PIC % days | Total Effort |
|---|---|---|---|---|---|---|---|
| 1997 | 1448.18 | 20.79 | 1350.96 | 19.4 | 4165.64 | 59.80 | 6964.79 |
| 1998 | 465.89 | 7.55 | 1604.35 | 25.99 | 4102.58 | 66.46 | 6172.82 |
| 1999 | 225.00 | 4.7 | 1214.67 | 25.37 | 3348.33 | 69.94 | 4787.99 |
| 2000 | 122.00 | 2.67 | 894.58 | 19.57 | 3553.32 | 77.75 | 4569.91 |
| 2001 | 343.49 | 6.87 | 956.99 | 19.15 | 3697.34 | 74.00 | 4997.82 |
| 2002 | 433.73 | 7.88 | 1326.02 | 24.11 | 3741.02 | 68.01 | 5500.77 |
| 2003 | 219.83 | 4.62 | 874.91 | 18.38 | 3667.15 | 77.02 | 4761.88 |
| 2004 | 278.50 | 6.76 | 1065.75 | 25.87 | 2776.72 | 67.37 | 4120.97 |
| 2005 | 129.33 | 4.09 | 859.07 | 27.2 | 2170.52 | 68.71 | 3158.92 |
| 2006 | 180.49 | 6.76 | 568.66 | 21.29 | 1921.81 | 71.95 | 2670.97 |
| 2007 | 88.50 | 3.76 | 705.41 | 30.01 | 1557.08 | 66.24 | 2350.98 |
| Total | | | | | | | 50057.82 |
| AVG. | 357.72 | 6.95 | 1038.31 | 23.30363636 | 3154.68 | 69.75 | 4550.71 |

Source: NMFS unpublished data.

The number of vessels in the U.S. WCPO purse seine fishery gradually decreased from the late 1990s until 2006, and then began to increase. By the end of 2008 the U.S. WCPO purse seine fleet included 36 vessels, and as of April 2009, it included 39. Figure 6 below shows the number of licensed vessels in the fleet from 1998 to 2008.

**Figure 6 Number of U.S.-flagged purse seine vessels licensed under the SPTT from 1998 to 2008**




Source: United States Coast Guard and NMFS 2009.

Based on preliminary estimates, the fleet landed approximately 204,019 metric tons of tuna in 2008 (SPC 2009a). Skipjack tuna generally account for 70–85% of the purse seine catch, yellowfin tuna generally account for 15–30%, and bigeye tuna account for only a small proportion (SPC 2009a). Since 2000, most fleets reduced the use of drifting FADs showing a decrease in bigeye tuna catches (SPC 2009a). Table 4 shows the 2007 and 2008 tuna landings of the fleet by species and port.

**Table 4 Tuna landings by U.S. WCPO purse seine vessels by species and port, 2007-2008**

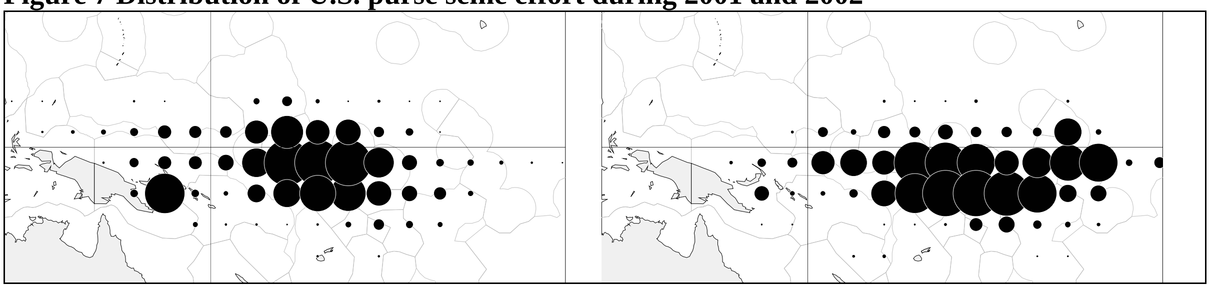
| **2008** | **Tuna Landings* (metric tons)** | | | |
|---|---|---|---|---|
| **Landing Port** | **Skipjack** | **YF and BE** | **Total** | **%** |
| *U.S. Ports* | | | | |
| Pago Pago, American Samoa | 63,585 | 10,495 | 74,080 | 42% |
| *Foreign Ports* | **Skipjack** | **YF and BE** | **Total** | **%** |
| Honiara, Solomon Islands | 62,02 | 1,128 | 7,330 | 4% |
| Pohnpei, Federated States of Micronesia | 18,125 | 5,898 | 24,023 | 14% |
| Majuro, Republic of the Marshall Islands | 28,904 | 12,833 | 43,089 | 24% |
| Rabaul, Papua New Guinea | 15,050 | 1,787 | 16,837 | 10% |
| Noro, Solomon Islands | 310 | 130 | 440 | 0.3% |
| Tarawa, Republic of Kiribati | 3,440 | 1,155 | 4,595 | 3% |
| Wewak, Papua New Guinea | 3,400 | 845 | 4,245 | 2% |
| Bangkok, Thailand | - | - | 1,675[1] | 1% |
| Total | 139,016 | 34,271 | 176,313 | |
| **2007** | **Tuna Landings* (metric tons)** | | | |
| **Landing Port** | **Skipjack** | **YF and BE** | **Total** | **%** |
| *U.S. Ports* | | | | |
| Pago Pago, American Samoa | 43,335 | 8,821 | 52,156 | 75% |
| *Foreign Ports* | **Skipjack** | **YF and BE** | **Total** | **%** |
| Honiara, Solomon Islands | 2,875 | 546 | 3,421 | 5% |
| Pohnpei, Federated States of Micronesia | 3,836 | 641 | 4,477 | 6% |
| Majuro, Republic of the Marshall Islands | 7,659 | 347 | 8,006 | 12% |
| Rabaul, Papua New Guinea | 626 | 161 | 787 | 1% |
| Noro, Solomon Islands | 337 | 74 | 411 | 1% |
| Total | 58,668 | 10,590 | 69,258 | |

Source: United States Coast Guard and NMFS 2009.
*2008 landings based on reports received as of 12 December 2008.
[1] Reported as a mix of yellowfin and skipjack tuna.

Purse seine fishing effort in the WCPO is not characterized by any marked or documented seasonal patterns (vessel operators may view this otherwise). The spatial distribution of fishing effort is, however, strongly influenced by the (irregular) cycles associated with ENSO events, revealing strong temporal variation on the scale of years and decades. The distribution of catch by the WCPO purse seine fishery is strongly influenced by ENSO events, traditionally shifting east of 160° E during El Niño events and west of 160° E during La Niña periods. El Niño–related eastward shifts of nearly 4,000 kilometers have been noted during periods of only six months. Lehodey, Bertignac, Hampton et al. (1997) and Lehodey, Andre, Bertignac et al. (1998) suggests that skipjack abundance is linked to east–west movements of warm water and an associated frontal region of high productivity and tuna forage. El Niño conditions also produce unusual westerly winds and surface drift in the WCPO that transport drifting debris further eastward than usual. The result is that during these El Niño events log-associated purse seining also increases purse seine effort in the eastern portion of the fishery (Williams 2003).

Figure 7 indicates U.S. purse seine effort during a transitional year between an El Niño and La Niña period (2001) and an El Niño period (2002). Effort in strong La Niña conditions normally shifts west of the vertical line indicating 160° E longitude.

**Figure 7 Distribution of U.S. purse seine effort during 2001 and 2002**



(The largest circle size indicates ≥ 360 days fishing or searching.)

Source: Williams 2003.

## 3.2.4 FADs

Fish aggregating devices, or FADs, are man-made devices or natural floating objects, anchored or not, capable of aggregating fish. FAD sets tend to catch higher proportions of skipjack and juvenile bigeye tuna respective to the total catch of each species (Hampton, Kleiber, and Langley 2006). Fishing on drifting FADs has also shown decreases in average size of target catch, increases in catches of bigeye, and increases in bycatch (Gillet, McCoy, and Itano 2002) when compared to unassociated sets. FAD sets also show a more varied composition of catch.

As shown in Table 5, the WCPO purse seine fleet catches mostly skipjack and yellowfin tuna. Based on data compiled by SPC (SPC 2009a), associated (log and drifting FAD) sets generally yield higher catch rates (mt/day) for skipjack tuna than unassociated sets. Data from SPC also indicates that unassociated sets generally yield a higher catch rate for yellowfin tuna than associated sets. This may be explained from the occurrence of unassociated sets in the more eastern areas of the Convention Area containing “pure” schools of large, adult yellowfin, which account for a larger catch (by weight) than the (mostly) juvenile yellowfin encountered in associated sets (SPC 2009a). Table 5 shows the breakdown of catch by set type for the U.S. purse seine fleet between the years 2003-2008.

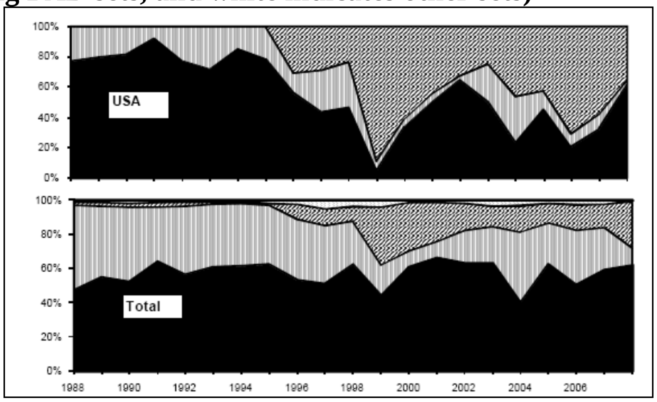
**Table 5 Annual U.S. WCPO purse seine catch estimates in metric tons by set type (unassociated and associated), 2003-2008 (data for 2008 are preliminary)**

| Year | Skipjack | | Yellowfin | | Bigeye | | Totals |
|---|---|---|---|---|---|---|---|
| | Unass. | Ass. | Unass. | Ass. | Unass. | Ass. | |
| 2003 | 24,848 | 39,248 | 12,773 | 8,331 | 143 | 2,166 | 87,509 |
| 2004 | 8,660 | 44,843 | 1,943 | 10,404 | 89 | 3,538 | 69,477 |
| 2005 | 24,619 | 36,968 | 8,483 | 11,650 | 481 | 3,969 | 86,170 |
| 2006 | 4,825 | 52,949 | 1,927 | 6,213 | 118 | 2,413 | 68,445 |
| 2007 | 13,195 | 58,174 | 2,272 | 5,767 | 103 | 1,926 | 81,437 |
| 2008 | 44,535 | 69,994 | 16,032 | 7,083 | 16 | 2,037 | 139,697 |
| Total | 120,682 | 302,176 | 43,430 | 49,448 | 950 | 16,049 | 532,735 |
| 6 year average | 20,114 | 50,362 | 7,2380 | 8,241 | 158 | 2,674 | 88,790 |

Source: SPC 2009a.

As indicated in Figure 8, over the last ten years, FADs, or associated sets, have been responsible for more than 90% of all sets made by the fleet in some years, and less than 40% in other years. There are many factors that cause this variability, not all of which are fully understood (i.e., other than by the purse seine vessel operators themselves). However, some general determinates can be postulated: FADs provide a guaranteed location of fish (assuming they are marked with the appropriate electronic equipment) although the magnitude (metric tons) of the schools associated with FADs can vary considerably. Therefore in times of high relative fuel prices FADs provide a risk-adverse option for vessel operators. FADs provide a source of fish that may or may not be economic to operators – especially those that offload to canneries. Small skipjack along with juvenile yellowfin and bigeye tuna are very often associated with FADs or floating objects – however, not all fleets or operators can find markets for “small fish”. But in times of high fish demand when canneries are not rejecting fish based on size, FAD fishing presents an attractive scenario for many operators. Although skipjack is the main target of the WCPO fishery, yellowfin tuna can provide an important component to vessel profitability given there is typically a premium paid for larger yellowfin—these large yellowfin are typically found in unassociated schools. Operators may be willing to search for these unassociated schools if fuel price is reasonable and fish can be found. However, if no school fish are available operators will fall back to the less risky or more assured FAD fishing. FADs provide some degree or certainty for an activity steeped in guesswork, risk, and probability.

**Figure 8 Time series showing the percentages of total sets by school type for the U.S. purse seine fleet and for the major purse seine fleets operating in the WCPO from 1988 to 2008 (2008 data provisional) (black indicates unassociated sets, striped indicates log sets, dark gray indicate drifting FAD sets, and white indicates other sets)**




Source: SPC 2009a.

## 3.2.5 Economics

The fish caught by the U.S. WCPO purse seine fleet are frozen on board and either delivered directly to canneries or transshipped to carriers that deliver them to canneries. Deliveries are made to canneries in both the United States (Pago Pago, American Samoa) and other nations, and those canneries take deliveries from both U.S. vessels and vessels of other nations. The canned product then enters global markets.

Costs and revenue estimates on a per vessel basis for the U.S. WCPO purse seine fleet in 1998 based out of American Samoa are summarized in Table 6. The 1998 gross revenue per vessel of $4.7 million given in that table is equal to about $6.1 million in 2009 dollars (Consumer Price Index, http://www.bls.gov/CPI/). Detailed cost and revenue data for the years since 1998 are not available.

**Table 6 Per vessel economics of the U.S. purse seine fleet based in American Samoa in 1998 (1998 dollars)**

| Component | Annual Value (1000 $U.S.) | % of Total Costs |
|---|---|---|
| Gross Revenue | $4,700 | — |
| Fixed Costs | $2,557 | 57 |
| Variable Costs | $1,921 | 43 |
| Labor Costs | $1,055 | 24 |
| Fuel | $700 | 16 |
| Total Costs | $4,478 | 100 |
| Net Revenue / Income | $222 | — |

Source: McCoy and Gillet 1998.

In 2008, average gross registered tonnage among the vessels in the fleet was 1,518 and average vessel length was 71 meters (U.S. Coast Guard vessel documentation data). Vessels in the U.S. fleet can carry approximately 1,000-2000 mt (U.S. Coast Guard Vessel Documentation Database), depending on the mix and sizes of species in the catch.

The U.S. WCPO purse seine fleet generally operates out of Pago Pago, American Samoa. Table 4 shows the landings of the purse seine fleet by port. Currently, there is another operational business model emerging. Rather than landing most catch at Pago Pago, some vessels that have recently entered the fleet are transshipping most of their catch at various ports in the region.

### 3.3 U.S. Western Pacific Longline Fisheries

The U.S. longline fishery in the Pacific Ocean includes three distinct fleets (Hawaii, American Samoa, and the west coast longline fleets), which are differentiated by their geographic location. During the last few years, there has been a small number of vessels with permits for longline fishing based out of Guam or the CNMI. Below is a detailed description of the Hawaii and west coast longline fleets, which would be impacted by the proposed rule.[24]

Longline fishing gear consists of a main line strung horizontally across 1-100 kilometers (< 1-62 miles) of ocean, supported at regular intervals by vertical float lines connected to surface floats. Descending from the main line are branch lines, each ending in a single, baited hook. The main line droops in a curve from one float line to the next and bears some number (2-25) of branch lines between floats. Fishing depth is determined by the length of the floatlines and branchlines, and the amount of sag in the main line between floats. The depth of hooks affects their efficiency at catching different species (Boggs 1992; Hanamoto 1987; Suzuki, Warashina, and Kishida 1977). Retrieval requires seven to ten hours. Generally, longline gear targeting tuna is set in the morning at approximate depths ranging between 100-300 meters, and hauled in the evening. Longline gear targeting swordfish is set at sunset at depths less than 100 meters and hauled at sunrise.

[24] There have been very few active west coast-based longline vessels and no activity by such vessels in the Convention Area during the last few years. Based on that history, the proposed rule is expected to have virtually no impacts on west coast-based vessels.

## 3.3.1 Hawaii Longline Fleet

### 3.3.1.1 Fleet Characteristics

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

### 3.3.1.2 Management

The Hawaii-based longline fishery is managed through the FMP for the Pelagic Fisheries of the Western Pacific Region developed by the WPFMC pursuant to the MSA. The primary regulations implementing the FMP, as set forth at 50 CFR Part 665, are summarized in Table 7. The HSFCA and the WCPFCIA also regulate this fishery.

The regulations limiting sea turtle interactions (the numbers of physical interactions that occur each calendar year between leatherback and loggerhead sea turtles and vessels registered for use under Hawaii longline limited access permits while shallow-setting) with the longline fishery set the annual limit for leatherback sea turtles (*Dermochelys coriacea*) at sixteen and the annual limit for loggerhead sea turtles (*Caretta caretta*) at seventeen. Once the limit is reached, the shallow-set component of the longline fishery is closed (50 CFR §665.33).

**Table 7 Requirements for the Hawaii-based longline fleet**

<table>
<tr><th colspan="2">Both Shallow-Set and Deep-Set Longline Requirements</th></tr>
<tr><td colspan="2">• Carry on board a Hawaii Longline Limited Access Permit established under 50 CFR § 665.21 for Pelagic Fisheries of the Western Pacific Region. There are 164 transferable permits;<br>• A maximum vessel length of 101 feet is permitted;<br>• All U.S. vessels that fish on the high seas are required to have a permit issued by NMFS in accordance with the HSFCA. Permits are valid for five years and require that vessels fish on the high seas in accordance with international conservation and management measures recognized by the United States;<br>• Complete a NMFS Daily Longline Fishing Log sheet for each set after each fishing day;<br>• Carry NMFS-owned and operated VMS units;<br>• If engaging in shallow-setting, possess a valid shallow-set certificate (of which no more than 2,120 are issued each year) for each shallow-set made;<br>• Carry a NMFS observer, if requested by the Pacific Islands Regional Office;<br>• Follow sea turtle mitigation techniques and requirements;<br>• Cease fishing if fishery is closed as a result of reaching sea turtle interaction limit (17 per year for loggerhead and 16 per year for leatherback); and<br>• Seabird mitigation techniques: When deep-setting or shallow-setting north of 23° N latitude or shallow-setting south of 23° N latitude, owners and operators of vessels registered for use under a Hawaii Longline Limited Access Permit, must either:<br>1. side-set according to 50 CFR § 665.35 (a)(1);<br>2. or fish in accordance with 50 CFR § 665.35 (a)(2).</td></tr>
<tr><th>(a)(1). Side setting</th><th>(a)(2). Alternative to side setting</th></tr>
<tr><td>• Mainline must be at least 1 meter forward from the stern of the vessel;<br>• Mainline and branch lines must be set from the port or the starboard side of the vessel;<br>• If a shooter is used it must be mounted at least 1 meter forward from the stern of the vessel;<br>• Branch lines must have weights with a minimum of 45 grams;<br>• 1 weight must be connected to each branch line within 1 meter of each hook;<br>• If seabirds are present, gear must be deployed so that baited hooks remain submerged; and<br>• A bird curtain must be deployed.</td><td>• Discharge fish and offal on the opposite side of the vessel where the longline gear is being set or hauled when seabirds are present;<br>• Retain sufficient fish, offal, and bait for the purpose of strategically discharging it;<br>• Remove all hooks from fish, offal, or spent bait;<br>• Remove the bill and liver of any swordfish that is caught, sever its head, and cut it down the middle;<br>• Use completely thawed bait, dyed blue;<br>• Maintain a minimum of 2 cans of blue dye on board the vessel; and<br>• Follow the requirements for deep-setting and shallow-setting below (a and b).</td></tr>
<tr><th>a. Deep-Setting North of 23°</th><th>b. Shallow-Setting</th></tr>
<tr><td>• Employ a line shooter; and<br>• Attach a weight of at least 45 grams to each branch line within 1meter of the hook.</td><td>• Deploy gear at least 1 hour after local sunset and complete deployment no later than local sunrise, using the minimum vessel lights; and<br>• Follow short-tailed albatross handling techniques.</td></tr>
</table>

### 3.3.1.3 Catch and Effort

The recent characteristics and performance of the Hawaii-based longline fleet are summarized in Table 8.

The rapid growth of the fishery in the 1990s and the effects of the closure of the shallow-set component of the fishery from 2001-2004 are clearly seen. Also evident is the reduction in shark bycatch brought about by the combined effects of the prohibition of shallow-setting in 2001 and passage of the Shark Finning Prohibition Act of 2000 (SFPA) (Pub. L. No. 106-557).

In April 2004, NMFS reopened the swordfish-targeting segment (shallow-set) of the Hawaii longline fishery under new federal rules. In 2005, 2007, and 2008, 76%, 76%, and 77%, respectively, of the available shallow-set certificates were used.

**Table 8 Performance of the Hawaii longline fishery, 1996-2007**

| Year | Active vessels | Trips | Tuna-directed trips | Swordfish-directed trips | Hooks set (million) | Total catch (mt) | Bigeye tuna catch (mt) | Sword-fish catch (mt) | Yellow-fin tuna catch (mt) | Ex-vessel revenue ($ mill., inf-adj to 2007 dollars) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1996 | 103 | 1,100 | 657 | 92 | 14.4 | 9,781 | 1,787 | 2,502 | 630 | 54.9 |
| 1997 | 105 | 1,125 | 745 | 78 | 15.6 | 12,320 | 2,449 | 2,881 | 1,141 | 64.0 |
| 1998 | 114 | 1,140 | 760 | 84 | 17.4 | 12,998 | 3,226 | 3,263 | 722 | 59.6 |
| 1999 | 119 | 1,137 | 776 | 65 | 19.1 | 12,872 | 2,719 | 3,100 | 473 | 60.0 |
| 2000 | 125 | 1,103 | 814 | 37 | 20.3 | 10,789 | 2,647 | 2,815 | 1,205 | 61.3 |
| 2001 | 101 | 1,034 | 987 | 4 | 22.4 | 7,167 | 2,356 | 235 | 1,033 | 40.0 |
| 2002 | 100 | 1,163 | 1,163 | 0 | 27.0 | 7,888 | 4,388 | 309 | 560 | 45.7 |
| 2003 | 110 | 1,215 | 1,215 | 0 | 29.9 | 8,008 | 3,593 | 137 | 823 | 45.9 |
| 2004 | 125 | 1,338 | 1,332 | 6 | 32.0 | 8,380 | 4,325 | 249 | 707 | 47.7 |
| 2005 | 124 | 1,496 | 1,397 | 99 | 35.0 | 10,578 | 4,979 | 1,600 | 735 | 64.4 |
| 2006 | 127 | 1,401 | 1,341 | 60 | 35.3 | 9,762 | 4,429 | 1,167 | 962 | 57.0 |
| 2007 | 129 | 1,462 | 1,381 | 81 | 40.2 | 11,208 | 5,779 | 1,715 | 846 | 62.7 |
| 5 year average | 123 | 1,382 | 1,333 | 49 | 34.5 | 9,587 | 4,621 | 974 | 815 | 55.5 |

Source: WPRFMC 2009.

### 3.3.1.4 Economics

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

[25] Data as of April 2009.

In recent years, Hawaii's commercial pelagic fisheries have been greatly affected by a series of court decisions that led to the adoption of certain federal regulatory measures. In 2001, the total catch and ex-vessel value decreased by about 3,747 mt and $20.1 million, respectively, primarily as a result of the implementation of court-ordered measures that eliminated the swordfish portion of the Hawaii longline fishery (Table 8). Swordfish, the largest component of the landings by volume in 2000, was a negligible component of the fishery from 2001 until the reopening of the swordfish shallow-set fishery in 2004. For these reasons, the period prior to 2005 is probably not a good indication of future fishing activity. Consequently, the analysis in Chapter 4 focuses on fishing patterns and performance from 2005 through 2008.

In 2006 the ex-vessel value for the landings (9,775 metric tons) of the entire Hawaii-based longline fleet was approximately $54 million, for an average gross revenue per vessel of about $403,000, 2005-2007 average $444,000 (Table 8).

### 3.3.2 West Coast Longline Fishery

#### 3.3.2.1 Fleet Characteristics

Longline vessels based on the U.S. west coast fish primarily in the EPO, but they could conceivably also fish in the Convention Area. There have been very few active west coast-based longline vessels and no activity by such vessels in the Convention Area during the last few years. Given the distance from their home ports, however, such trips would be uncommon.

#### 3.3.2.2 Management

Longline vessels based on the U.S. west coast are managed under the FMP for U.S. West Coast Fisheries for HMS developed by the PFMC pursuant to the MSA. The FMP prohibits all pelagic longline fishing inside the west coast U.S. EEZ as well as shallow-set longline fishing in the adjacent high seas areas, including west of 150° W. Longline vessels operating on the high seas outside the EEZ are subject to the following controls set forth at 50 CFR Part 660:

1. Line clippers, dip nets, and bolt cutters meeting NMFS' specifications must be carried aboard each vessel for releasing turtles (specifications vary by vessel size);

2. A vessel may not use longline gear to fish for or target swordfish north of the equator; landing or possession of more than ten swordfish per trip is prohibited;

3. The length of each float line possessed and used to suspend the main longline beneath a float must be longer than 20 meters (65.6 feet or 10.9 fathoms);

4 From April 1 through May 31, a vessel may not use longline gear in waters bounded by 0° latitude and 15° N latitude, and 145° W longitude and 180° W longitude;

5 No light stick may be possessed on board a vessel;

6 When a longline is deployed, no fewer than 15 branch lines may be set between any two floats;

7 Longline gear must be deployed such that the deepest point of the main longline between any two floats is at a depth greater than 100 meters below the sea surface;

8 While fishing for management unit species north of 23° N latitude, a vessel must:

1. Maintain a minimum of two cans containing blue dye on board the vessel during a fishing trip;
2. Use completely thawed bait to fish for Pacific pelagic management unit species (PMUS);
3. Use only bait that is dyed blue of an intensity level specified by a color quality control card issued by NMFS;
4. Retain sufficient quantities of offal for the purpose of discharging the offal strategically in an appropriate manner;
5. Remove all hooks from offal prior to discharging the offal;
6. Discharge fish, fish parts, or spent bait while setting or hauling longline gear on the opposite side of the vessel from where the longline is being set or hauled;
7. Use a line-setting machine or line-shooter to set the main longline;
8. Attach a weight of at least 45 grams to each branch line within one meter of the hook; and
9. Remove the bill and liver of any swordfish that is incidentally caught, sever its head from the trunk and cut it in half vertically, and periodically discharge the butchered heads and livers overboard on the opposite side of the vessel from which the longline is being set or hauled.

- All U.S. vessels that fish on the high seas are required to have a permit issued by NMFS in accordance with the HSFCA. Permits are valid for five years and require that vessels fish on the high seas in accordance with international conservation and management measures recognized by the United States.

- Other management measures include requirements for the proper release and handling of turtles and seabirds, the requirement for vessel operators to attend a protected species workshop each year, and the requirement for VMS.

### 3.3.2.3 Catch and Effort

In 2002, 21 longline vessels actively fished, deploying nearly one million hooks. According to D. Peterson, (NMFS, oral communication; December 2003), effort for 2003 was similar, with 21 vessels actively fishing, based on high seas logbook data, Pacific Coast Fisheries Information Network (PacFin) landings, and observer contractor fishing effort determinations. Table 9 and Table 10 provide information on the status of the fishery from 2000 to 2004.

**Table 9 Western Pacific longline logbook summary for 2000 through 2002**

| Year | 2000 | 2001 | 2002 |
|---|---|---|---|
| # vessels | 44 | 39 | 21 |
| # trips | 137 | 128 | 91 |
| # sets | 2,104 | 1,937 | 1,294 |
| # hooks | 1,608,593 | 1,443,029 | 948,657 |

Source: http://www.NOAA Fisheries.hawaii.edu/fmpi/fmep/hilong/westcoast.html.

**Table 10 Vessels, landings (round metric tons), and ex-vessel revenue for swordfish in California by the pelagic longline fishery, 1999-2004**

| Year[26] | Vessels (number) | Landings (metric tons) | Ex-vessel* (U.S. dollar) |
|---|---|---|---|
| 1999 | 42 | 1,335 | 7,214,730 |
| 2000 | 54 | 1,916 | 11,929,721 |
| 2001 | 40 | 1,767 | 9,520,343 |
| 2002 | 23 | 1,322 | 6,051,277 |
| 2003 | 30 | 1,812 | 8,548,125 |
| 2004 | 24 | 935 | 4,671,000 |

*Ex-vessel revenues are nominal values (not adjusted for inflation). Additional processing information: landings data reported without an accompanying gear code was excluded from the analysis if a correction could not be made.
Source: PFMC 2005.

[26] As of 2005, due to the low numbers in fleet size, data (landings and ex-vessel numbers) collected are confidential.

#### 3.3.2.4 Economics

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

## 3.4 Bigeye, Yellowfin Tuna, and Principal Target Species

Table 11 summarizes the current status of the main fish stocks targeted by the U.S. purse seine and longline vessels fishing in the Convention Area. The table expresses overfishing and overfished status in terms of the status determination criteria specified in the relevant FMPs, as required by the MSA; they are as reported in the Report on the Status of U.S. Fisheries for 2008 (NMFS 2009; quarterly updates for certain stocks are available at www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm). Under MSA, NMFS and the regional fishery management councils are required to set overfished and overfishing thresholds for individual stocks.

**Table 11 Stock status summary of select highly migratory fish stocks in the Pacific Ocean for 2008** [27]

| Species | Stock | Overfishing? | Overfished? |
|---|---|---|---|
| Bigeye tuna (*Thunnus obesus)* | Pacific | **Yes** | No |
| Skipjack tuna *(Katsuwonus pelamis)* | western central Pacific | No | No |
| | eastern tropical Pacific | No | No |
| Yellowfin tuna (*Thunnus albacares)* | western central Pacific | No | No |
| | eastern Pacific | **Yes** | No |
| Swordfish *(Xiphias gladius)* | North Pacific | No | No |

Source: NMFS 2009.

As shown in Table 11 above, using the MSA stock status determination criteria, overfishing is occurring on bigeye tuna throughout the Pacific but the bigeye tuna stock is not overfished. Langley, Hampton, Kleiber et al., (2008) conclude that biomass has been sustained due to above-average recruitment since about 1990, with exceptionally high recruitment during 1995−2005 and with peak in recruitment in 2000. In recent years,

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

bigeye tuna recruitment is estimated to have declined to approximately the long-term average. As shown in Table 14, the WCPO yellowfin stock in the WCPO is not in an overfished state. Overfishing is taking place to the yellowfin tuna stock (Table 14) in the EPO. It is estimated to be near or at full exploitation.

The following description and sections 3.4.1, 3.4.3, and 3.5.3 include information described at the NMFS Fish Watch database (http://www.nmfs.noaa.gov/fishwatch/). Bigeye and yellowfin tuna are highly migratory pelagic species, of or pertaining to the open seas or oceans, and are closely associated with their physical and chemical environment. Suitable physical environment for these species depends on gradients in temperature, oxygen, or salinity, all of which are influenced by oceanic conditions on various scales.

Geographic distribution varies with seasonal changes in ocean temperature. Yellowfin tuna prefer warm surface layers, where the water is well mixed by surface winds and is relatively uniform in temperature and salinity. The surface layer generally occurs from the surface of the ocean to a depth of around 50-200 meters or less, depending on location (e.g., 0 to 150 meters in the central Pacific). Bigeye tuna prefer cooler, more temperate waters, often meaning higher latitudes or greater depths. Preferred water temperature often varies with the size and maturity of pelagic fish. Adults usually have a wider temperature tolerance than sub-adults. Thus, during spawning, adults usually move to warmer waters, the preferred habitat of their larval and juvenile stages.

Large-scale oceanographic events, such as El Niño, change the characteristics of water temperature and productivity. These events have effects on the habitat range and movements of pelagic species. Tuna are commonly most concentrated near islands and seamounts that create divergences and convergences that concentrate forage species, also near upwelling zones along ocean current boundaries, and along gradients in temperature, oxygen, and salinity.

Migration patterns of both bigeye and yellowfin stocks in the Pacific Ocean are slowly being better understood and categorized, due in part to extensive tag-and-release projects for many of the species. These species appear to roam extensively within a broad expanse of the Pacific centered on the equator. Although tagging and genetic studies have shown that some interchange does occur, it appears that short life spans and rapid growth rates restrict large-scale interchange and genetic mixing of eastern, central, and far-western Pacific stocks of yellowfin tuna. Yellowfin tuna have large population sizes. Ely, Vinas, Alvarado Bremer et al. (2005) concluded that the genetic drift for both bigeye tuna and yellowfin tuna should be slower than for other tuna species. Morphometric studies of yellowfin tuna also support the hypothesis that populations from the eastern and western Pacific derive from relatively distinct sub-stocks in the Pacific. The stock structure of bigeye tuna in the Pacific is poorly understood, but a single Pacific-wide population is assumed. The movement of bigeye, cooler-water tuna, is more predictable and defined, with tagging studies documenting regular and well-defined seasonal movement patterns relating to specific feeding and spawning grounds.

In the ocean, light and temperature diminish rapidly with increasing depth, especially in the region of the thermocline. Many pelagic fish make vertical migrations through the water column. They tend to inhabit surface waters at night and deeper waters during the day, but several species make extensive vertical migrations between surface and deeper waters throughout the day. Certain species, such as bigeye tuna, are more vulnerable to fishing when they are concentrated near the surface at night. Bigeye tuna may visit the surface during the night, but generally, longline catches of this fish are highest when hooks are set in deeper, cooler waters just above the thermocline (275-550 meters). Bigeye tuna appear to prey on deep sound scattering layer organisms thus following the diel vertical movements of these organisms.

The following sections provide more detailed information on bigeye and yellowfin tuna and their relationships with other marine species.

### 3.4.1 Bigeye Tuna (*Thunnus obesus*)

Several studies on the taxonomy, biology, population dynamics, and exploitation of bigeye tuna have been carried out, including comprehensive reviews by Collette and Nauen (1983), and Whitelaw and Unnithan (1997). Miyabe (1994) and Miyabe and Bayliff (1998) reviewed the biology and fisheries for bigeye tuna in the Pacific Ocean.

The species is a mixture between a tropical and temperate water tuna, characterized by equatorial spawning, high fecundity, and rapid growth during the juvenile stage with movements between temperate and tropical waters during its life cycle.

Bigeye tuna are trans-Pacific in distribution, occupying epipelagic and mesopelagic waters of the Indian, Pacific, and Atlantic Oceans. The distribution of the species within the Pacific stretches between northern Japan and the north island of New Zealand in the western Pacific and from 40° N to 30° S in the eastern Pacific (Calkins 1980). Molecular analyses indicate that a single stock exists for Pacific bigeye tuna (Grewe and Hampton 1998). Large, mature-sized bigeye tuna are sought by sub-surface fisheries, primarily longline fleets. Smaller, juvenile fish are taken in many surface fisheries, either as a targeted catch or as a bycatch with other tuna species (Miyabe and Bayliff 1998). Large numbers are taken by purse seiners fishing on drifting objects in equatorial waters. The known depth (and therefore, temperature) range of bigeye tuna is expanding as more data are acquired from sonic tracking and electronic (archival) tagging experiments. Bigeye tuna generally inhabit greater depths, cooler waters, and areas of lower dissolved oxygen, occupying depth strata at or below the “thermocline” at water temperatures of 15° C or lower. Basic environmental conditions favorable for survival include clean, clear oceanic waters between 13° C and 29° C. Hanamoto (1987) estimated optimum bigeye habitat to exist in water temperatures between 10° to 15° C at salinities ranging between 34.5‰ to 35.5‰ where dissolved oxygen concentrations remain above 1 ml/l. He further suggested that bigeye range from the surface layers to depths of 600 meters. However, evidence from archival tagging studies indicates that greater depths and much lower ambient temperatures can be tolerated by the species. Juvenile bigeye occupy an ecological niche similar to juvenile yellowfin of a similar size.

There have been far fewer bigeye tuna tagged in the Pacific in comparison to skipjack and yellowfin tunas. Miyabe and Bayliff (1998) present summary information of some long distance movements of tagged bigeye tuna in the Pacific. Hampton, Bigelow, and Labelle (1998) describe 8,000 bigeye tuna releases made in the western Pacific during 1990-1992. Most of the fish were recaptured close to the point of release; approximately 25% had moved more than 200 nautical miles, and more than 5% had moved more than 1,000 nautical miles. SPC has been tagging tuna on and off since the 1970s. Currently they are in Phase II of a tagging program focusing on tagging tuna from more western Pacific waters, such as PNG where Phase I took place, to more eastern Pacific waters (http://www.spc.int/oceanfish/Html/TAG/index.htm, April 2009). Their goal is to target 100,000 tuna for this project. Bigeye tuna are clearly capable of large-scale movements.

Feeding is opportunistic at all life stages, with prey items consisting primarily of crustaceans, cephalopods, and fish (Calkins 1980). There is significant evidence that bigeye feed at greater depths than yellowfin tuna, utilizing higher proportions of cephalopods and mesopelagic fishes in their diet thus reducing niche competition (Whitelaw and Unnithan 1997). Spawning spans broad areas of the Pacific and occurs throughout the year in tropical waters and seasonally at higher latitudes at water temperatures above 23° or 24° C (Kume 1967). Bigeye are serial spawners, capable of repeated spawning at near daily intervals with batch fecundities of millions of ova per spawning event (Nikaido, Miyabe, and Ueyanagi 1991). Sex ratio is commonly accepted to be essentially 1:1 until a length greater than 150 centimeters after which the proportion of males increases. Alverson and Peterson (1963) state that juvenile bigeye less than 100 centimeters generally feed at the surface during daylight, usually near continental land masses, islands, seamounts, banks, or floating objects.

Bigeye tuna, especially during the juvenile stages, aggregate strongly to drifting or anchored objects, large marine animals, and regions of elevated productivity, such as near seamounts and areas of upwelling (Calkins 1980; Hampton and Bailey 1993; Holland, Kleiber, and Kajiura 1999). Major fisheries for bigeye tuna exploit aggregation effects either by targeting biologically productive areas (deep and shallow seamount and ridge features) or by utilizing artificial fish aggregation devices to aggregate commercial concentrations of bigeye tuna. Juvenile and pre-adult bigeye of 35 centimeters to approximately 99 centimeters are regularly taken as a bycatch in the eastern and western Pacific purse-seine fisheries, usually on sets made in association with floating objects (Hampton and Bailey 1993). Juvenile bigeye tuna form mono-specific schools at or near the surface with similar-sized fish or may be mixed with skipjack and/or juvenile yellowfin tuna (Calkins 1980; Holland, Kleiber, and Kajiura 1999). Juvenile and adult bigeye tuna are also known to aggregate near seamounts and submarine ridge features where they are exploited by pole-and-line, handline, and purse seine fisheries (Fonteneau 1991; Holland, Kleiber, and Kajiura 1999).

Small bigeye are caught on the surface by purse seines, while larger fish are caught deeper using longline gear (Gillet and Langley 2007). In the western Pacific, the fishery is diverse, occurring in the waters of a number of island nations as well as the high seas and carried out by both small domestic fleets and distant water fleets from developed nations.

### 3.4.2 Yellowfin Tuna (*Thunnus albacares*)

Several studies on the taxonomy, biology, population dynamics, and exploitation of yellowfin tuna exist, including comprehensive reviews by Collette and Nauen (1983) and Suzuki (1994).

This is a tropical tuna characterized by a rapid growth rate and fast development to maturity. Estimates of length at maturity for central and western Pacific yellowfin tuna vary widely with some studies supporting an advanced maturity schedule for yellowfin tuna in coastal or archipelagic waters (Cole 1980). However, most estimates suggest that the majority of yellowfin tuna reach maturity between two and three years of age on the basis of length-age estimates for the species. Longevity for the species may not be explicitly defined, but a maximum age of six to seven years is commonly used in stock assessment. Itano (2000) notes from a large data set from the western tropical Pacific that 50% of yellowfin tuna sampled from purse seine and longline gear at 105 centimeters were histologically classified as mature and predicts a length at 50% maturity of 104.6 centimeters. Under appropriate conditions, yellowfin tuna exhibit high spawning frequency and fecundity (Cole 1980). Spawning occurs in broad areas of the Pacific. Spawning fish require surface salinity and temperature that remain above 24° C (Itano 2000). This means that spawning can occur throughout the year in tropical waters and seasonally at higher latitudes in areas such as Hawaii (Suzuki 1994).

Yellowfin tuna are trans-Pacific in distribution, occupying the surface waters of all warm oceans, and form the basis of large surface and sub-surface fisheries. The adult distribution in the Pacific lies roughly within latitudes 40° N to 40° S as indicated by catch records of the Japanese purse seine and longline fishery (Suzuki, Tomlinson, and Honma 1978). Blackburn (1965) suggests the range of yellowfin tuna distribution is bounded by water temperatures between 18° C and 31° C with commercial concentrations occurring between 20° C and 30° C. Although the species preferentially occupies the surface mixed layer above the thermocline, archival tagging has revealed dives to depths in excess of 1,000 meters with water temperature of 5.8° C (Dagorn, Holland, and Hallier 2006).

Although tag and recapture programs have documented that yellowfin tuna are clearly capable of large-scale movements, most recaptures occur within a short distance of release. Sibert and Hampton (2003) applied an advection-diffusion model to yellowfin tuna tagging data and determined a median lifetime displacement of 375 miles. Yellowfin tuna are known to aggregate around drifting flotsam, anchored buoys, and large marine animals (Hampton and Bailey 1993). Adult yellowfin tuna also aggregate in regions of elevated productivity, high zooplankton density (e.g., seamounts), and regions of upwelling and convergence. This association has presumably evolved to capitalize on the elevated forage available (Cole 1980; Suzuki 1994). Major fisheries for yellowfin tuna exploit aggregation effects either by utilizing artificial FADs or by targeting areas with vulnerable concentrations of tuna.

Some genetic analyses suggest that there may be several semi-independent yellowfin tuna stocks in the Pacific Ocean including possible eastern and western stocks, which may diverge around 150° EW (Grewe and Hampton 1998; Itano 2000). Other analyses have failed to distinguish the presence of geographically distinct populations (Appleyard, Grewe, Innes et al. 2001). Tagging studies have shown individual animals are capable of large east west movements that would suggest considerable pan-Pacific mixing of the stock.

Purse seining and longlining are the main gear employed in catching yellowfin tuna. Small yellowfin tuna may be caught on the surface by purse seine vessels, while larger fish are typically caught deeper using longline gear (Gillet and Langley 2007). In the western Pacific, the fishery is diverse, occurring in the waters of a number of island nations and on the high seas and carried out by both small domestic fleets and distant water fleets from developed nations.

### 3.4.3 Other Principal Target Stocks

#### 3.4.3.1 Skipjack Tuna (*Katsuwonus pelamis*)

Skipjack tuna are concentrated mostly in tropical waters; though they also seasonally expand into subtropical waters in both the north and south Pacific. The main characteristics of skipjack tuna are fast growth, early maturity, high fecundity, year-round spawning over broad tropical regions, a relatively short life span compared to bigeye, albacore, and bluefin tunas, high and variable recruitment and few age classes on which the fishery depends. In describing the attributes of the species, Joseph (2002) states:

> These characteristics, together with their wide distribution, results in a huge biomass of fish, and very high levels of potential production. Ever since the beginning of heavy commercial exploitation in the early 1970s, the consensus among scientists had been that the populations of skipjack in all oceans of the world were lightly exploited and capable of sustaining much higher catches. This has been borne out by the fact that annual (global) catches increased from approximately 400,000 tons in 1970 to approximately 1.9 million tons in 1998. They remained near that level during 1999 and 2000.

In 2002, the estimated skipjack catch in the WCPO exceeded 1.3 million metric tons, the highest catch on record. The bulk of the skipjack catch in the WCPO is taken in equatorial waters and accounted for 67% of total landings of the four major market species in the region (Williams 2003). The high 2002 catch follows high catch levels of around 1.2 million metric tons for the period 1997-2001. During 2002, purse seine gear accounted for 73% of landings.

Nominal purse seine CPUE trends are generally upward, reaching a record mean rate of 30 mt per day in 2002 (Williams 2003). Increased efficiency associated with the use of FAD technology and increases in vessel efficiency are believed to be contributing factors (Coan and Itano 2003; Itano 2003). CPUE (standardized) trends for the Japanese high seas pole-and-line fleet show no change. The bulk of the catch consists of 50–60 centimeter fork length fish taken by purse seine gear.

Genetic studies of the Pacific population of skipjack suggest that some mixing of fish occurs across the Pacific Ocean, but for management purposes, the stocks in the western Pacific have been considered by most scientists to be independent of those in the eastern Pacific. Tagging data showing limited movement of skipjack from the eastern Pacific to the western Pacific support the same conclusion (Joseph 2002). Recent research suggests that fast-growing, short-lived species like skipjack and yellowfin may have median lifetime displacements on the order of 644–805 kilometers, supporting the idea of "regional fidelity" (Sibert and Hampton 2003). The possibility of restricted movements of skipjack in the WCPO suggests the possibility for local depletion despite the large total biomass.

Historically, bait boats (pole-and-line) were the main gear used in catching skipjack tuna but since the 1950s, purse seiners have come to dominate the fishery. Some skipjack tuna are also caught incidentally by longliners, particularly those using shallow gear. In the WCPO, fishing for skipjack tuna occurs in the waters of a number of island nations and is carried out by both small domestic fleets and distant water fleets from developed nations. Fishing effort is concentrated in the waters around Micronesia and northern Melanesia.

#### 3.4.3.2 Swordfish (*Xiphias gladius*)

The biology of swordfish is covered in some detail by prior analysis by NMFS (2005a). Ward and Elscot (2000) also authored an extensive review of the biology of swordfish and status of swordfish fisheries around the world.

Information on the age and growth of swordfish is the subject of intense study, and findings have been somewhat contradictory. Age studies based on otolith analysis and other methods (length, frequency, vertebrae, fin rays, inter alia) are reviewed by Ehrhardt, Robbins, and Arocha (1996). Wilson and Dean (1983) estimated a maximum age of nine years for males and 15 years for females from otolith analysis. Larvae and juveniles occur in warmer tropical and subtropical regions where spawning also occurs. Swordfish have separate sexes with no apparent sexual dimorphism, although females attain a larger size. Fertilization is external and the fish are believed to spawn close to the surface. Maturity is thought to occur at about five years of age, a size of 140-180 centimeters (eye to fork length) and there is some evidence for the pairing of spawning adults as the fish apparently do not school (Palko, Beardsley, and Richards 1981).

Swordfish are worldwide in distribution in all tropical, subtropical, and temperate seas, ranging from around 50° N to 50° S (Nakamura 1985). Swordfish are found in waters with a wide range of Sea Surface Temperatures (SSTs), from 5°-27° C, but are normally found in areas with SSTs above 13° C (Nakamura 1985). Archival tagging experiments indicate that they spend prolonged periods in deep, cooler water and can therefore tolerate water temperatures that are considerably cooler than at the surface (Takahashi, Okamura, Yokawa et al. 2003). Studies have noted a general pattern of remaining at depth, sometimes near the bottom, during the day and rising near the surface during the night in what is believed to be a foraging strategy. Oceanographic features such as frontal boundaries that tend to concentrate forage species (especially cephalopods) apparently have a significant influence on adult swordfish distributions in the North Pacific. Swordfish are relatively abundant near boundary zones where sharp gradients of temperature and salinity exist (Palko, Beardsley, and Richards 1981).

## 3.5 Biological Environment

This section describes the other primary biological resources in the Convention Area. The discussion of trophic levels and trophic dynamics provides more detail on bigeye and yellowfin tuna than other species, since they are the focus of the two proposed rules being assessed in this EA.

### 3.5.1 Trophic Levels

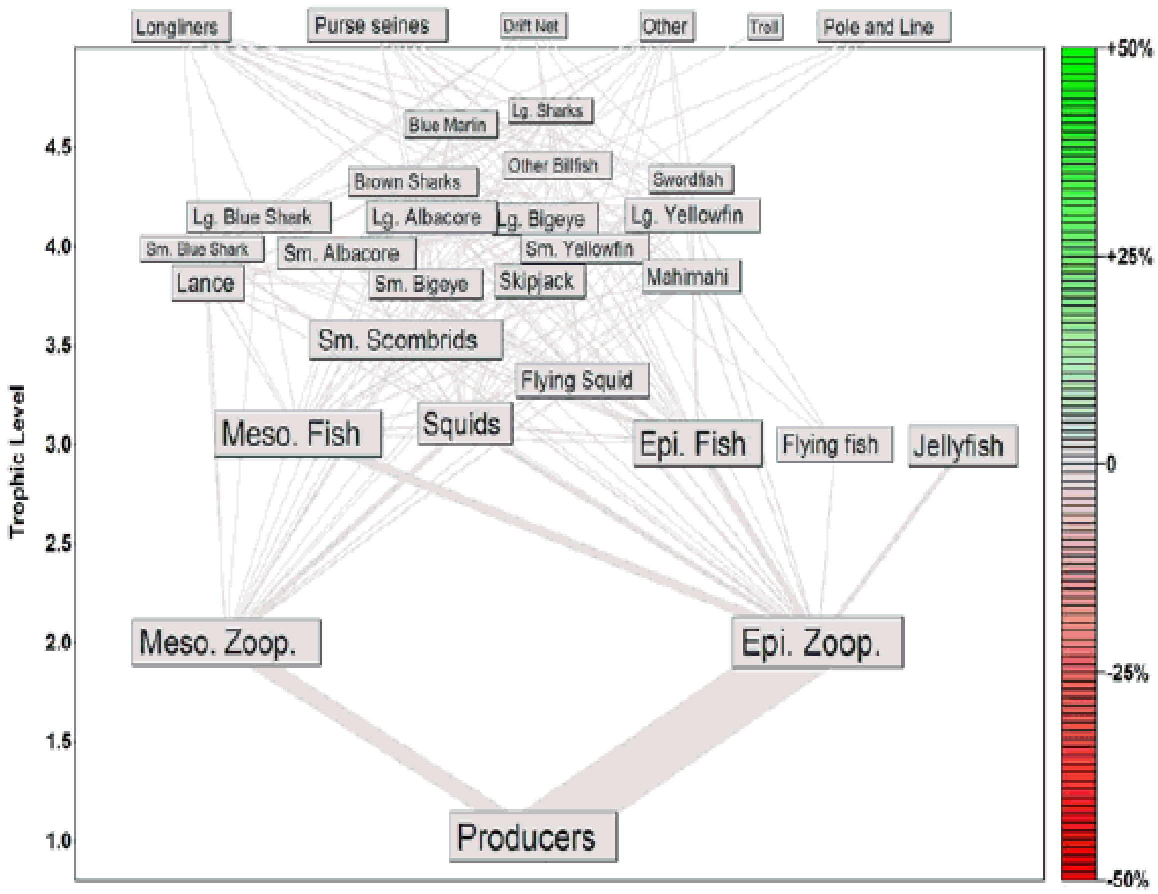
The following description of a marine fisheries food web is taken from Begon, Townsend, and Harper 2006, and Nybakken 1997. Primary producers such as diatoms, dinoflagellates, coccolithophores, and cyanobacteria, are organisms that utilize solar energy to convert carbon dioxide into oxygen. Primary producers are considered the first trophic (or eating) level. The next trophic level includes the zooplankton; animal planktonic forms such as copepods and larval stages of fish. These microorganisms drift through the water column grazing on phytoplankton (plant planktonic forms) and are referred to as “grazers”. Copepods are the most abundant zooplankton and make up most of the animal biomass in the ocean. The third trophic level is made up of the molluscan bivalves, amphipods, and larval forms of fish and crustaceans. Small bait fish make up the next trophic level. These include small fish such as sardines which in turn are eaten by big fish, the next trophic level. This level is made up of dominant predators, species that tend to migrate from coastal to deep ocean waters. They are also prey to the apex predators, species at the top trophic level. Species at this trophic level include tunas, billfish, and sharks. Dominant predators as well as apex predators are opportunistic feeders eating anything they encounter. All organic matter falls back to the bottom of the ocean where bottom feeders utilize the dead matter (energy) making the entire food web a cycle. Both biotic and abiotic factors interplay amongst each other to create this cycle. Figure 9 depicts two food chains from the central North Pacific Ocean.

Organisms at the top of the food web tend to be larger and less abundant. This is mainly due to the amount of energy it takes to get to the top of a food web. Marine food webs are highly connected because of the openness of marine ecosystems, lack of specialists, long life-spans, and large size changes across the life histories of many marine species (Link 2002). Few examples of marine food webs exist. Those that exist show limitations such as low numbers of species, high level of species aggregation, a limited spatiotemporal extent of study, and a low probability of detecting species richness and the number of species interactions or links (Link 2002).

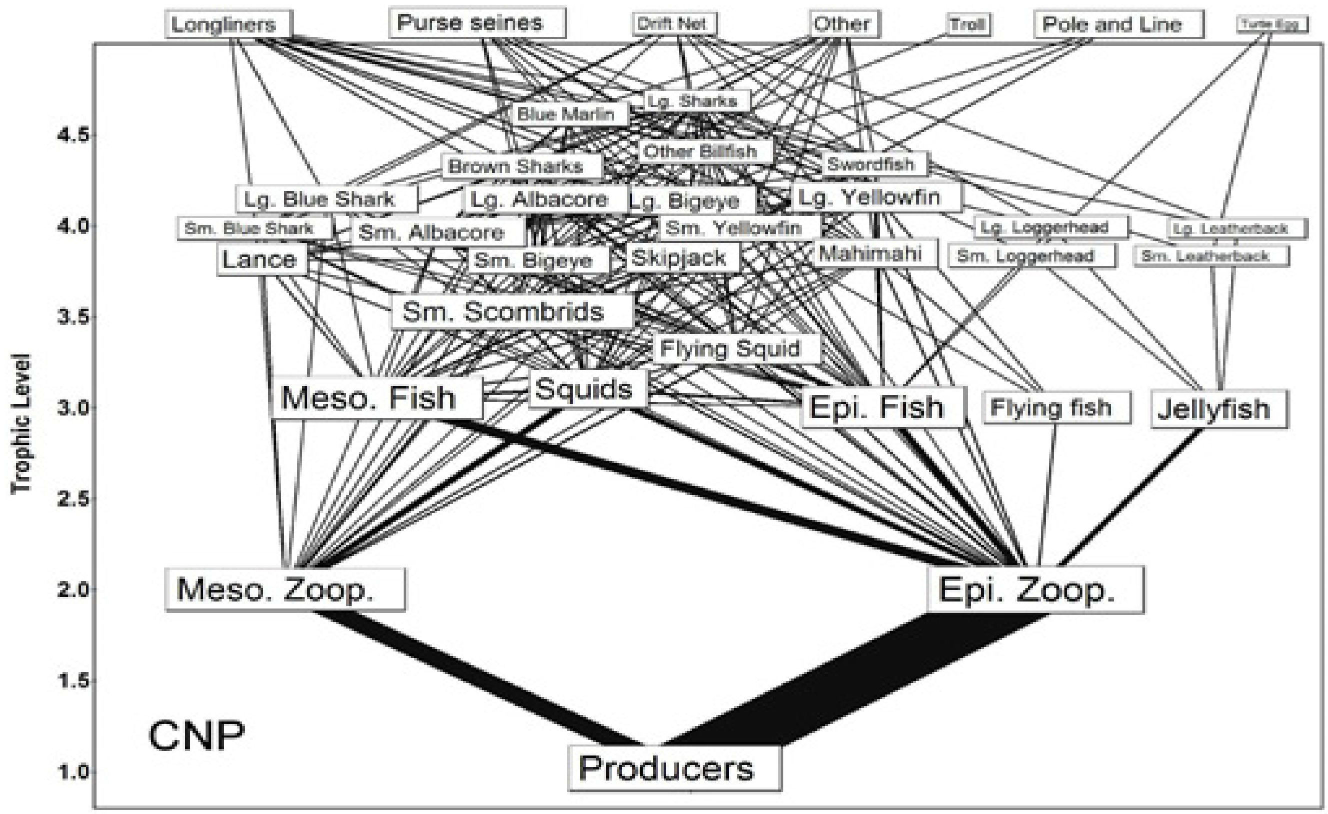
Being top predators, tuna begin at the bottom of the food chain and make their way up. Although thousands of eggs are released by adult tunas only a few make it to the top trophic level. During spawning, bigeye tunas' buoyant eggs are released and float at the surface where they become part of the zooplankton and food for the many organisms and small fish feeding in the equatorial surface waters. Larval bigeye tuna begin feeding on the same zooplankton that they are a part of. Fully formed juveniles begin eating small fish, crustaceans, and squid. These juveniles also begin to move north and south of equatorial waters and are often preyed upon by larger tunas and billfish. Larval and juvenile bigeye tuna are also eaten by other fish, seabirds, porpoises, and other animals. After about one year, the adult bigeye tuna is an opportunistic predator with a highly varied diet of fish, crustaceans, and squid. It is also now prey to larger tunas and billfish. The main predators of bigeye tuna are large billfish and toothed whales.

Trophic level ascension through the food chain for yellowfin tuna is practically the same as for bigeye tuna. Yellowfin tuna feed opportunistically at all life stages. Larval and juvenile yellowfin tuna are eaten by other fish, seabirds, porpoises, and other animals such as marine mammals and sharks that eat adult tunas. Large yellowfin tunas prey on crustaceans, large squid, and fish species. There is a high degree of cannibalism on juvenile yellowfin tunas among large yellowfin tuna in certain parts of the oceans.

**Figure 9 Trophic levels in the central North Pacific Ocean**




Source: Hinke, Kaplan, Aydin et al., 2004.




Source: Hinke, Kaplan, Aydin et al., 2004.

### 3.5.2 Trophic Dynamics

Understanding an ecosystem implies understanding its food web and the exchanges between the different trophic levels in the food chain. Food webs show the dynamics of biomass production and partitioning in an ecosystem. Even minor changes in abiotic factors can cause changes in the spatial distribution of primary and secondary pelagic production (Richardson, Jackson, Ducklow et al. 2004). These changes can be increases in sea surface temperatures which may lead to increases in phytoplankton abundance or decreases in phytoplankton abundance in cooler regions (Richardson, Jackson, Ducklow et al. 2004). Removing tuna by commercial fisheries or other changes in biotic factors implies possible positive effects on mid-trophic level species because competition by top predators is eliminated so more mid-trophic level species will survive (Halpern, Cottenie, and Broitman et al. 2006).

Bigeye and yellowfin tuna make up the predator trophic level; both are top-level predator stocks. Distinct energy pathways support different tuna species (Hinke, Kaplan, Aydin et al. 2004). Based on this theory models show that removing top predators such as tunas lower the biomass at the upper trophic levels and that indirectly this increases the biomass of intermediate and lower trophic level animals (Hinke, Kaplan, Aydin et al. 2004). Bigeye and yellowfin tuna are opportunistic feeders and may pose a problem when analyzing significant trophic impacts (Cox, Essington, Kitchell et al. 2002). Trophic status studies show that biomass of both bigeye and yellowfin stocks have declined to MSY-associated levels. Ecosystem impacts from these declines are unknown, yet fishing all species in an ecosystem at mortality rates yielding single-species MSY may lead to the erosion of trophic structure and have negative effects on recruitment (Sibert, Hampton, Kleiber et al. 2006). Disturbing the balance of any ecosystem leads to potential shifts in the ecosystem. For example, an increase in water temperature can cause shifts in vertical and horizontal distributions, which in turn depend greatly on trophic and hydrologic conditions (Perry, Low, Ellis et al. 2005).

The effects of fisheries on entire food webs remain uncertain. Figure 9 shows fishery-specific food webs. When there is an overlap in the primary forage trophic level, such as when multiple fisheries act on specific top predator tunas, this causes a concentration of indirect effects on the same set of forage groups (Hinke**,** Kaplan, Aydin et al. 2004). Hinke**,** Kaplan, Aydin et al., (2004) concluded that the primary food webs for individual fisheries were relatively simple. Ecosystem analysis is difficult because the ecological interactions among a broad group of species are not always known. Because each stock has a unique recruitment history, the variability in biomass over time and among stocks is not all attributed entirely to fishing (Sibert, Hampton, Kleiber et al. 2006). Cox, Essington, Kitchell et al., (2002) also found that it was possible that declines in top predators could result in an increase in smaller tunas that constitute prey for the larger tunas. Predation as a component of natural mortality is still unclear, as are the effects of fishing mortality on predation rates and abundance (Cox, Essington, Kitchell et al. 2002).

Understanding the relative importance of top-down (consumer-driven) versus bottom-up (resource-driven) control of food webs and whether ecosystem trophic dynamics are driven more by predation or primary production is another focus of ecological studies (Richardson, Jackson, Ducklow et al. 2004; Ware and Thomson 2005; Halpern, Cottenie, and Broitman 2006). The form and strength of the linkages between trophic levels is important (Richardson, Jackson, Ducklow et al. 2004). Fishing alters community structure at all trophic levels as well as the links to other community members (Katz, Zabel, Harvey et al. 2003). Although overfished stocks may recover communities that have changed may take a long time or may never recover (Katz, Zabel, Harvey et al. 2003). Halpern, Cottenie, and Broitman (2006) concluded that if anthropogenic sources continue as they are, removing top predators may cause large ecosystems to become controlled by bottom-up rather than top-down factors.

Reducing population biomass may lead to the collapse of oceanic food chains (Sibert, Hampton, Kleiber et al. 2006). Purse seine gear has been more strongly felt at the higher trophic levels than at the lower ones, yet the purse seine fleet may also affect the lower trophic levels (Hinke, Kaplan, Aydin et al. 2004). Hinke, Kaplan, Aydin et al., (2004) found that the aggregate effect of purse seine fishing in the central North Pacific Ocean (CNP) showed a shift in the distribution of biomass from upper level predators to their prey. Their models of the effects of purse seining in the CNP show primarily indirect effects on lower trophic levels. Similar changes in the overall structure of the food webs can be seen from pelagic tuna fisheries in the eastern tropical Pacific Ocean by the purse seine fleets as compared to the CNP findings analyzed by Hinke, Kaplan, Aydin et al. (2004).

Hinke, Kaplan, Aydin et al. (2004) found that the aggregate effect of longline fishing in the CNP showed a shift in the distribution of biomass from upper level predators to their prey. Their models of the effects of longlining in the CNP indicated that the effects of longlining were direct and strongest at the upper trophic levels. Similar changes in the overall structure of the food webs can be seen from pelagic tuna fisheries in the eastern tropical Pacific Ocean as compared to the CNP findings analyzed by Hinke, Kaplan, Aydin et al. (2004).

Currently the SPC is conducting a food web study of the WCPO tuna ecosystem. The study aims to provide an initial characterization of the western Pacific, warm pool, large marine ecosystem, focusing primarily on the trophic relationship among major components (http://www.spc.int/oceanfish/Html/TEB/EcoSystem/foodweb.htm).

### 3.5.3 Secondary Target Stocks

Secondary stock species composition in purse-seine and longline fisheries depends on the structure, behavior, and spatial organization of surface multispecies aggregations (Romanov 2002). The main species of secondary stocks caught in these two fisheries are described below.

**Albacore Tuna (*Thunnus alalunga*)**

Although not targeted by the U.S. longline fleets operating in the WCPO, it should be noted that longlining is one of the main fishing methods that target albacore tuna. Longliners catch larger fish at lower latitudes (Gillet and Langley 2007). Table 12 shows the current stock status of albacore.

**Table 12 Stock status summary for 2008**[28]

| | | | |
|---|---|---|---|
| Albacore (*Thunnus alalunga)* | North Pacific | Unknown | Unknown |
| | South Pacific | No | No |

Source: NMFS 2009.

The primary source used in the following description of the species is Collette and Nauen (1983). Other reviews include Bartoo and Foreman (1994) and Murray (1994).

Information suggests that separate northern and southern stocks of albacore, with separate spawning areas and seasons exist in the Pacific. Temperature plays a large role in the distribution of the species. In the North Pacific, albacore are distributed in a swath centered on 35° N and range as far as 50° N at the western end of their range. In the central South Pacific (150° E to 120° W) they are concentrated between 10° S and 30° S; in the west they may be found as far south as 50º S. They are absent from the equatorial eastern Pacific. Albacore are both surface-dwelling and deep-swimming. Deep-swimming albacore tuna are generally more concentrated in the western Pacific but with eastward extensions along 30° N and 10° S (Foreman 1980). The 15.6° to 19.4° C SST isotherms mark the limits of abundant distribution although deep-swimming albacore tuna have been found in waters between 13.5° and 25.2° C (Saito 1973). Laurs and Lynn (1991) describe North Pacific albacore tuna distribution in terms of the North Pacific Transition Zone, which lies between the cold, low salinity waters north of the sub-arctic front and the warm, high salinity waters south of the sub-tropical front. This band of water, roughly between 40° and 30-35° N (the zone is not a stable feature) also helps to determine migration routes. Albacore are found to a depth of at least 38 meters and will move into water as cold as 9° C at depths of 200 meters.

Albacore follow complex migration patterns that differ between the North and South Pacific stocks. Most migration is undertaken by pre-adults, two to five years old. A further sub-division of the northern stock, each with separate migration, is also suggested. Generally speaking, a given year class migrates east to west and then east again in a band between 30° N and 45° N, leaving the northeast Pacific in September-October, reaching waters off Japan the following summer and returning to the east in the summer of the following year. In the South Pacific Ocean, mature albacore spawn in tropical and sub-tropical waters between about 10° S and 25° S during the austral summer. Spawning success appears to be related to the prevailing oceanographic conditions with stronger recruitment occurring during La Niña conditions (i.e., positive Southern Oscillation Index) (Langley 2006). Juvenile albacore recruit to surface fisheries in New Zealand coastal waters and in the vicinity of the sub-tropical convergence zone (about 40° S) in the central Pacific about one year later, at a size of 45-50 centimeters (Fork Length).

Albacore are noted for their tendency to concentrate along thermal fronts, particularly the Kuroshio front east of Japan and the North Pacific Transition Zone. Laurs and Lynn (1991) note that they tend to aggregate on the warm side of upwelling fronts. Near continental areas they prefer warm, clear oceanic waters adjacent to fronts with cool turbid coastal water masses. Further offshore, fishing success correlates with biological productivity.

**Pacific blue marlin** (*Makaira mazara*). As shown in the most recent analysis of the Pacific-wide stock using a MULTIFAN-CL model are close to fully exploited (e.g. biomass is at the MSY level) and that this has been the case for the past 30 years, even in the face of increasing longline effort (Kleiber and Yokawa 2002). Several previous analyses had made similar determination of a stable stock at or close to MSY.

**Pacific striped marlin** (*Tetrapturus audax*). Results from an assessment were presented by the Marlin Working Group (MARWG) to the 2007 International Scientific Committee for Tunas and Tuna-like Species in the North Pacific Ocean (ISC) plenary meeting. Three biomass dynamics models were used. Difficulties in obtaining the necessary fishery data were highlighted. Substantial uncertainties in the results of the various model runs were noted. The MARWG noted that if fishing mortality (*F*) 20-40% were an appropriate reference point, then the stock is experiencing excessive fishing mortality; and if the recent (2001-2003) fishing mortality (*F*9%) rate were to continue, projections indicate that both the spawning population and yield would decline below the initial (2004) levels over the next three years. If harvest rates correspond to *F*20% or *F*40%, then both biomass and yield would increase over the next three years to levels above the beginning levels. The ISC offered the following conservation advice (ISC 2007):

> While further guidance from the management authority is necessary, including guidance on reference points and the desirable degree of reduction, the fishing mortality rate of striped marlin (which can be converted into effort or catch in management) should be reduced from the current level (2003 or before), taking into consideration various factors associated with this species and its fishery. Until appropriate measures in this regard are taken, the fishing mortality rate should not be increased.

No Pacific-wide assessment has been completed; however analysis of the EPO data suggests that the stock(s) in that region are in good condition (Inter-American Tropical Tuna Commission (IATTC) 2005).

**Dolphinfish** (*Coryphaena hippurus*) population is considered to be healthy. There are no current reliable estimates of biomass, but life history studies suggest the species may be able to withstand a relatively high rate of exploitation.

**Pacific wahoo** (*Acanthocybium solanderi*) population levels are estimated to be high, but no information is available as to whether overfishing is occurring or not.

### 3.5.4 Other Secondary Species

Other secondary species caught in the purse seine fishery include rainbow runner, manta rays, wahoo, barracuda, mackerel scad, and oceanic triggerfish (SPC 2009b).

Table 13 identifies the amounts of fish, by species, discarded by the U.S. WCPO purse seine fleet as reported by observers from 1997 to 2001.

**Table 13 Amount and composition of discards by the U.S. purse seine fishery as reported by observer data, 2007-2008 (2008 data is preliminary)**

| Species | 2007 | | | 2008 | | |
|---|---|---|---|---|---|---|
| | Metric Tons | MT/set | % Discarded | Metric Tons | MT/set | % Discarded |
| **Skipjack** | 16,112.3 | 38.6 | 8.8 | 18,594.3 | 22.3 | 1.2 |
| **Yellowfin** | 2,238.2 | 5.4 | 6.4 | 2,410.2 | 2.9 | 0.9 |
| **Bigeye** | 889.1 | 2.1 | 10.2 | 496.4 | 0.6 | 4.4 |
| **Other Species** | 143.8 | 0.3 | 93.7 | 102.6 | 0.1 | 62.4 |
| **Breakdown of other species by species type** | | | | | | |
| | **Metric Tons** | | **% Discarded** | **Metric Tons** | | **% Discarded** |
| -Black marlin | 3.01 | | 70.9 | 2.93 | | 80.3 |
| -Blue marlin | 3.22 | | 40.2 | 6.27 | | 86.3 |
| -Sailfish (Indo-Pacific) | 0.07 | | 0 | 0.12 | | 24.2 |
| -Short-billed spearfish | 0.08 | | 100.0 | 0.03 | | 0 |
| -Striped marlin | 1.12 | | 95.5 | 0.47 | | 99.8 |
| -Blue shark | 0.54 | | 100.0 | 0.01 | | 100.0 |
| -Galapagos shark | 0 | | 100.0 | - | | - |
| -Hammerhead sharks | - | | - | - | | - |
| -Manta rays (unidentified) | 0.54 | | 100.0 | 1.05 | | 90.2 |
| -Oceanic whitetip shark | 0.21 | | 100.0 | 1.62 | | 99.8 |
| -Pelagic sting-ray | 0.21 | | 100.0 | 6.19 | | 98.5 |
| -Silky shark | 8.73 | | 100.0 | 6.19 | | 98.5 |
| -Thresher sharks NEI* | - | | - | 0.36 | | 100.0 |
| -Albacore | 0.04 | | 0 | 0.50 | | 0 |
| -Bullet tuna | - | | - | 0.11 | | 100.0 |
| -Frigate and bullet tunas | 0.21 | | 100.0 | - | | - |
| -Frigate tuna | 0.05 | | 2.0 | 0.10 | | 0 |
| -Kawakawa | 0.09 | | 100.0 | - | | - |
| -Slender tuna | 0 | | 0 | - | | - |
| -Wahoo | 3.06 | | 42.8 | 3.01 | | 34.5 |
| Amberjack/giant yellowtail | 0.01 | | 0 | - | | - |
| -Barracudas (unidentified) | 0.29 | | 28.1 | 0.28 | | 16.8 |
| -Batfishes | 3.08 | | 96.5 | 0 | | 100.0 |
| -Bigeye trevally | 0.03 | | 0 | - | | - |
| -Black triggerfish | - | | - | - | | - |
| -Drummer (blue chub) | 0.10 | | 16.8 | 0.01 | | 100.0 |
| -Filefish (scribbled leatherjacket) | 0.13 | | 100.0 | - | | - |
| -Filefish (unicorn leatherjacket) | 0.18 | | 100.0 | - | | - |
| -Filefishes | 0.02 | | 47.1 | 0.01 | | 100.0 |
| -Golden trevally | - | | - | - | | - |
| -Great barracuda | 0.20 | | 67.5 | 0.35 | | 66.3 |

| Species | Metric Tons | % Discarded | Metric Tons | % Discarded |
|---|---|---|---|---|
| -Greater Amberjack | 0.16 | 12.5 | - | - |
| -Mackerel scad/saba | 19.35 | 99.0 | 2.39 | 59.6 |
| -Mahi mahi | 2.96 | 61.0 | 12.79 | 31.6 |
| -Ocean sunfish | - | - | 0.07 | 100.0 |
| -Ocean triggerfish (spotted) | 0.36 | 100.0 | 0.44 | 96.6 |
| -Ocean triggerfish (unidentified) | 15.57 | 98.1 | 1.46 | 68.7 |
| -Pomfrets and ocean breams | 0.05 | 2.0 | - | - |
| -Rainbow runner | 78.63 | 97.8 | 36.65 | 35.8 |
| -Atlantic pomfret | - | - | 0 | 100.0 |
| -Rays | 0.36 | 100.0 | - | - |
| -Squids | - | - | 0 | 100.0 |
| -Trevallies | 0.09 | 16.9 | 0 | 100.0 |
| -Triple-tail | 0 | 100.0 | - | - |
| -Unspecified | 1.33 | 85.2 | 2.41 | 93.6 |

*NEI stands for not elsewhere indicated.
Source: SPC 2009b.

Observer data from 1994-2001 indicated that the Hawaii longline fleet discarded about 40% of its total catch. The percentage of the secondary species that were discarded were as follows: approximately 13% for tunas, 15% for billfish, 63% for sharks, 32% for other Pelagic Management Unit Species (MUS), and 97% for non-MUS (1994-2001 data from the NMFS Hawaii longline observer program) (NMFS 2004d).

## 3.6 Protected Resources

The following sections include information regarding threatened and endangered species, Essential Fish Habitat (EFH) established pursuant to the MSA, National Wildlife Refuges (NWRs) and Monuments. Table 14 includes all species listed under the U.S. Endangered Species Act (ESA) in the Convention Area also indicating their status assigned by the International Union for the Conservation of Nature (IUCN). NMFS has jurisdiction over all the species listed except for the Dugong (*Dugong dugon),* Short-tailed albatross (*Phoebastria albatrus*), and Newell's shearwater (*Puffinus auricularis newelli*). The U.S. Fish and Wildlife Service (USFWS) has jurisdiction over these three species.

**Table 14 Listing status of species in the WCPO listed as endangered or threatened under the U.S. Endangered Species Act and their listing status under The IUCN Red List**

| Scientific name | Common name | ESA[1] | IUCN[2] |
|---|---|---|---|
| *Balaenoptera musculus* | Blue whale | Endangered | Endangered |
| *Balaena mysticetus* | Bowhead whale | Endangered | Least concern |
| *Balaenoptera physalus* | Fin whale | Endangered | Endangered |
| *Megaptera novaeangliae* | Humpback whale | Endangered | Least concern |
| *Eubalaena japonica* | North Pacific right whale | Endangered | Endangered |
| *Balaenoptera borealis* | Sei whale | Endangered | Endangered |
| *Physeter macrocephalus* | Sperm whale | Endangered | Vulnerable |
| *Eubalaena australis* | Southern right whale | Endangered | Least concern |
| *Monachus schauinslandi* | Hawaiian monk seal | Endangered | Critically endangered |
| *Eumetopias jubatus* | Steller sea lion | | |
| | western stock | Endangered | |
| *Dugong dugon* | Dugong | Endangered | Vulnerable |
| *Phoebastria albatrus* | Short-tailed albatross | Endangered | Vulnerable |
| *Puffinus auricularis newelli* | Newell's shearwater | Threatened | Endangered |
| *Dermochelys coriacea* | Leatherback turtle | Endangered | Critically Endangered |
| *Caretta caretta* | Loggerhead turtle | Threatened | Endangered |
| *Chelonia mydas* | Green turtle | Threatened | Endangered |
| *Lepidochelys olivacea* | Olive Ridley turtle | Threatened | Vulnerable |
| *Eretmochelys imbricata* | Hawksbill turtle | Endangered | Critically Endangered |

1. Codes for the U.S. ESA - http://www.nmfs.noaa.gov/pr/species/esa.htm, 2008.
2. Codes for the IUCN http://www.iucnredlist.org/search, 2008.

## 3.6.1 Threatened and Endangered Species

### 3.6.1.1 Sea Turtles

There are five species of endangered or threatened sea turtles found in the WCPO, the leatherback turtle (*Dermochelys coriacea),* the loggerhead turtle (*Caretta caretta*), the green turtle (*Chelonia mydas*), the olive ridley turtle (*Lepidochelys olivacea*), and the hawksbill turtle (*Eretmochelys imbricata)*. This section summarizes the biology and population status of the listed species. Sea turtle interactions with fisheries are covered from a regional perspective.

**Table 15 Listing status of sea turtles in the WCPO and their listing status under The IUCN Red List**

| Species | ESA[1] | IUCN[2] |
|---|---|---|
| Leatherback turtle (*Dermochelys coriacea*) | Endangered | Critically Endangered |
| Loggerhead turtle (*Caretta caretta*) | Threatened | Endangered |
| Green turtle (*Chelonia mydas*) | Threatened | Endangered |
| Olive Ridley turtle (*Lepidochelys olivacea*) | Threatened | Vulnerable |
| Hawksbill turtle (*Eretmochelys imbricata*) | Endangered | Critically Endangered |

1. Codes for the U.S. ESA- http://www.nmfs.noaa.gov/pr/species/esa.htm, 2009.
2. Codes for the IUCN- http://www.iucnredlist.org/search, 2009.

### 3.6.1.1.1 *Leatherback Turtle (Dermochelys coriacea)*

Leatherback turtles are widely distributed throughout the oceans of the world; however, populations have been severely reduced. In 2004, the total Pacific population was estimated at approximately 160,000 leatherbacks (Lewison, Freeman, and Crowder 2004). A 1996 publication estimated the global population of nesting female leatherbacks at 26,200 to 42,900 (Spotila, Dunham, Leslie et al. 1996). The Red List 2000 of the IUCN has classified the leatherback as “critically endangered” due to “an observed, estimated, inferred or suspected reduction of at least 80% over three generations” based on direct observation, an index of abundance appropriate for the taxon, and actual or potential levels of exploitation.

Primary threats to the species are the incidental killing of turtles by coastal and high seas fishing and to a lesser extent the killing of nesting females, collection of eggs at the nesting beaches, and degradation of habitat (Eckert and Sarti 1997; NMFS 1998a; Wetherall, Balazs, Tokunaga et al. 1993).

There are no nesting populations of the leatherback turtle in areas under U.S. jurisdiction in the Pacific Ocean; however, there are important foraging areas off the west coast of the continental United States and on the high seas near the Hawaiian Islands. In other leatherback nesting areas, such as PNG, Indonesia, and the Solomon Islands, there have been no systematic, consistent nesting surveys, so it is difficult to assess the status and trends of leatherback turtles at these beaches. In all areas where leatherback nesting has been documented, current nesting populations are reported by scientists, government officials, and local observers to be well below abundance levels of several decades ago.

Leatherbacks are highly migratory, exploiting convergence zones and upwelling areas in the open ocean, along continental margins, and in archipelagic waters (Eckert and Sarti 1997). In a single year, a leatherback may swim more than 10,000 kilometers (Eckert and Sarti 1997). Satellite telemetry studies indicate that adult leatherback turtles follow bathymetric contours over their long pelagic migrations and typically feed on cnidarians (jellyfish and siphonophores) and tunicates (pyrosomas and salps) (NMFS 1998a). Females are believed to migrate long distances between foraging and breeding grounds, at intervals of typically two to four years (Spotila, Reina, Steyermark et al. 2000). The mean renesting interval of females on Playa Grande, Costa Rica, is 3.7 years, while in

Mexico, three years was the typical reported interval (WPFMC, NMFS, and WorldFish Center 2004).

#### 3.6.1.1.2 *Loggerhead Turtle (Caretta caretta)*

Loggerhead turtles are a cosmopolitan species inhabiting continental shelves, bays, estuaries, and lagoons in temperate, subtropical, and tropical waters. Primary threats to the species include direct take, incidental capture in various fisheries, and the alteration and destruction of its habitat. In general, during the last 50 years, North Pacific loggerhead nesting populations have declined 50-90% (Kamezaki, Matsuzawa, Abe et al. 2003). From nesting data collected by the Sea Turtle Association of Japan since 1990, the latest estimates of the number of nesting females in almost all of the rookeries are as follows: 1998-2,479 nests; 1999-2,255 nests; 2000-2,589 nests.[28] In 2005 a total of 5,167 loggerhead nests were recorded on 252 Japanese beaches (Matsuzawa 2005).

For their first years of life, loggerheads forage in open ocean pelagic habitats. Both juvenile and sub-adult loggerheads feed on pelagic crustaceans, mollusks, fish, and algae. Other common components include fish eggs, amphipods, and plastics (Parker, Cooke, and Balazs 2002). There are very few records of loggerheads nesting on any of the many islands of the central Pacific Ocean; the species is considered rare or vagrant on islands in this region (NMFS 1998a). Pacific populations of loggerhead turtles found in U.S. jurisdictions are thought to originate from Japanese nesting areas (NMFS 1998a).

The most significant population of loggerhead sea turtles in the southern Pacific Ocean is found nesting off eastern Australia. Approximately 300 females nest annually in Queensland, mainly on offshore islands; Capricorn-Bunker Islands, Sandy Cape, and Swains Head (Dobbs 2001). Wreck Rock Beach supports one of the top five breeding sites for the loggerhead for eastern Australia (Limpus and Limpus 2003). Results from the Wreck Rock Turtle Monitoring Project for 2005-2006 indicated the nesting population of loggerhead turtles to have stabilized since the 1970s (McLachlan, McLachlan, McLachlan et al. 2006). During the monitoring period of the project for the nesting season 62 loggerhead turtles were recorded (McLachlan, McLachlan, McLachlan et al. 2006).

In southern Great Barrier Reef waters, nesting loggerheads have declined approximately 8% per year since the mid-1980s (Heron Island), while the foraging ground population has declined 3% and comprised less than 40 adults by 1992. Researchers attribute the declines to recruitment failure due to fox predation of eggs in the 1960s and mortality of pelagic juveniles from incidental capture in longline fisheries since the 1970s (Chaloupka and Limpus 2001). The transition from hatchling to young juvenile occurs in the open sea. Evidence is accumulating that this part of the loggerhead life cycle may involve trans-Pacific developmental migration (Bowen, Breu-Grobois, Balazs et al. 1995).

[28] In the 2001, 2002, and 2003 nesting seasons, a total of 3,122, 4,035, and 4,519 loggerhead nests, respectively, were recorded on Japanese beaches (Matsuzawa 2005).

### 3.6.1.1.3 *Green Turtle (Chelonia mydas)*

Green turtles are found throughout the world, occurring primarily in tropical, and to a lesser extent, subtropical waters. In the Pacific, the only major (greater than 2,000 nesting females) populations of green turtles occur in Australia and Malaysia. Smaller colonies occur in the insular Pacific islands of Polynesia, Micronesia, and Melanesia (Wetherall, Balazs, Tokunaga et al. 1993) and on six small sand islands at French Frigate Shoals, a long atoll situated in the middle of the Hawaiian archipelago (Balazs, Pooley, and Murakawa 1995). Green turtles are thought to be declining throughout the Pacific Ocean, with the exception of Hawaii, as a direct consequence of a historical combination of overexploitation and habitat loss (Eckert 1993; Seminoff 2002). Using a conservative approach, Seminoff (2002) estimates that the global green turtle population has declined by 34% to 58% over the last three generations (approximately 150 years). Actual declines may be closer to 70% - 80%. The degree of population change is not consistent among all index nesting beaches or among all regions. Some nesting populations are stable or increasing (Balazs and Chaloupka 2004; Chaloupka and Limpus 2001; Troeng and Rankin 2005). However, other populations or nesting stocks have markedly declined. Because many of the threats that have led to these declines have not yet ceased, it is evident that green turtles face a measurable risk of extinction (Troeng and Rankin 2005). Causes for this decline include harvest of eggs, sub-adults, and adults, incidental capture by fisheries, loss of habitat, and disease. Severe over harvests have resulted in modern times from a number of factors: (1) the loss of traditional restrictions limiting the number of turtles taken by island residents; (2) modernized hunting gear; (3) easier boat access to remote islands; (4) extensive commercial exploitation of turtle products for both domestic and international markets; (5) loss of the spiritual significance of turtles; (6) inadequate regulations; and (7) lack of enforcement (NMFS 1998b).

Most green turtles appear to have a nearly exclusive herbivorous diet, consisting primarily of sea grass and algae (Hirth 1997; Wetherall, Balazs, Tokunaga et al. 1993). Green sea turtles are known to live in pelagic habitats as post hatchlings/juveniles, feeding at or near the ocean surface. The non-breeding range of green turtles is generally tropical, and can extend thousands of miles from shore in certain regions. Hawaiian green turtles monitored through satellite transmitters traveled more than 1,100 kilometers from their nesting beach at French Frigate Shoals, south and southwest against prevailing currents to numerous distant foraging grounds within the 2,400 kilometers span of the archipelago (Balazs 1994; Balazs, Craig, Winton et al. 1994; Balazs, Katahira, and Ellis 1996). Three green turtles outfitted with satellite transmitters on Rose Atoll (the easternmost island of the Samoan Archipelago) traveled on a southwesterly course to Fiji, approximately 1,500 kilometers distance (Balazs, Craig, Winton et al. 1994). In 2007, a number of satellite tracking projects are underway throughout the Pacific Ocean, to learn more on green turtle migratory routes between nesting and feeding areas.

#### 3.6.1.1.4 *Olive Ridley Turtle (Lepidochelys olivacea)*

The olive ridley is one of the smallest living sea turtles and is regarded as the most abundant sea turtle in the world. Olive ridley turtles occur throughout the world, primarily in tropical and sub-tropical waters. In the western Pacific Ocean, olive ridleys are not as well documented as in the EPO, nor do they appear to be recovering as well.

Olive ridley turtles lead a primarily pelagic existence (Plotkin, Bales, and Owens 1993), migrating throughout the Pacific Ocean, from their nesting grounds in Mexico and Central America to the North Pacific Ocean. While olive ridleys generally have a tropical range, with a distribution from Baja California, Mexico to Chile (Silva-Batiz, Godinez-Dominquez, and Trejo-Robles 1995), individuals do occasionally venture north, some as far as the Gulf of Alaska (Hodge and Wing 2000). Surprisingly little is known of their oceanic distribution and critical foraging areas, despite being the most populous of Pacific sea turtles. It is possible that young turtles move offshore and occupy areas of surface-current convergences to find food and shelter among aggregated floating objects until they are large enough to recruit to the nearshore benthic feeding grounds of the adults, similar to the juvenile loggerheads mentioned previously.

#### 3.6.1.1.5 *Hawksbill Turtle (Eretmochelys imbricata)*

Hawksbill turtles are circumtropical in distribution, generally occurring from latitudes 30° N to 30° S within the Atlantic, Pacific, and Indian Oceans, and associated bodies of water (NMFS 1998a). Anecdotal reports from throughout the Pacific Ocean indicate that the current population is well below historical levels. In the Pacific Ocean, this species is rapidly approaching extinction primarily due to the harvesting of the species for its meat, eggs, and shell, as well as the destruction of nesting habitat by human occupation, disruption, and increased tourism (Meylan and Donnelly 1999; NMFS 2001a).

There is limited information on the biology of hawksbills, probably because they are sparsely distributed throughout their range and they nest in very isolated locations (Eckert 1993). Hawksbills have a relatively unique diet of sponges (Meylan 1985; 1988). As a hawksbill turtle grows from a juvenile to an adult, data suggest that the turtle switches foraging behaviors from pelagic surface feeding to benthic reef feeding (Limpus 1992). While data are somewhat limited on diet in the Pacific Ocean, it is well documented in the Caribbean where hawksbill turtles are selective spongivores, preferring particular sponge species over others (Van Dam and Diez 1997). As with other sea turtles, hawksbills will make long reproductive migrations between foraging and nesting areas but otherwise they remain within coastal reef habitats (Meylan and Donnelly 1999).

#### 3.6.1.1.6 *Sea Turtle Fisheries Interactions*

##### 3.6.1.1.6.1 Purse Seine Fishery

Sets associated with logs, anchored FADs, and whales result in higher than expected interaction rates (Molony 2005). In general, sets on floating objects are more likely to catch turtles than sets on unassociated schools of tuna. Unpublished observer data from the FFA held at SPC covering the five year period 1997-2002 for 6,058 sets (25% of all sets during the period) by U.S. purse seine vessels fishing in the WCPO show three interactions with sea turtles. None of the three turtles was identified as to species, and all were released (Molony 2005).

###### 3.6.1.1.6.2 Longline Fishery

Brogan (2002) provides a preliminary estimate of 2,182 marine turtle encounters per year in the western tropical Pacific longline fishery, of which an estimated 500-600 are expected to result in mortality. This estimate is expected to have wide confidence intervals (CIs) since observer coverage is <1%.

Molony estimated the sea turtle annual catch by all WCPO longline fisheries (tropical shallow longline, tropical deep longline, and temperate albacore longline) to be 4,031 in 2004 with an approximate 95% CI. Mortality rates for the three combined longline fisheries were 1,000 sea turtles in 2004.

Table 16 displays the sea turtle interactions for the U.S. Hawaii-based deep-set and shallow-set longline fisheries for 2008. There were a total of five sea turtle interactions in the shallow-set longline fishery (100% observed) and four interactions in the deep-set longline fishery (21.7% observed).

**Table 16 Observed sea turtle interactions with the Hawaii-based deep-set and shallow-set longline fisheries, 2008**

| **Sea turtle** | | **Sector** | **Interactions (all released)** | | |
|---|---|---|---|---|---|
| | | | Injured | Unknown | Dead |
| Green turtle | *Chelonia mydas* | Shallow-set | 1 | | |
| Leatherback turtle | *Dermochelys coriacea* | | 2 | | |
| Olive Ridley turtle | *Lepidochelys olivacea* | | 2 | | |
| Olive Ridley turtle | *Lepidochelys olivacea* | Deep-set | | | 3 |
| Leatherback turtle | *Dermochelys coriacea* | | 1 | | |

Source: http://swr.nmfs.noaa.gov/pir/qreports/qreports.htm.

### 3.6.1.2 Marine Mammals

This section identifies the marine mammals listed as endangered or threatened under the ESA found in the WCPO and summarizes the biology and population status of the species most likely to be affected by the U.S. purse seine and longline fisheries. Interactions with fisheries are covered from a regional perspective. In addition, because all marine mammals are protected pursuant to the Marine Mammal Protection Act (MMPA; 16 U.S.C. § 1361, et seq.), the non-endangered and non-threatened marine mammals found in the WCPO are listed in Table 18.

### 3.6.1.2.1 *Endangered or threatened marine mammals found in the WCPO*

Endangered or threatened marine mammals in the WCPO (Table 17) include eight cetaceans, two pinnipeds, and the dugong (*Dugong dugon*).

**Table 17 Listing status of marine mammals in the WCPO listed as endangered or threatened under the U.S. Endangered Species Act and their listing status under the IUCN Red List**

| Scientific name | Common name | ESA[1] | IUCN[2] |
|---|---|---|---|
| *Balaenoptera musculus* | Blue whale | Endangered | Endangered |
| *Balaena mysticetus* | Bowhead whale | Endangered | Least concern |
| *Balaenoptera physalus* | Fin whale | Endangered | Endangered |
| *Megaptera novaeangliae* | Humpback whale | Endangered | Least concern |
| *Eubalaena japonica* | North Pacific right whale | Endangered | Endangered |
| *Balaenoptera borealis* | Sei whale | Endangered | Endangered |
| *Physeter macrocephalus* | Sperm whale | Endangered | Vulnerable |
| *Eubalaena australis* | Southern right whale | Endangered | Least concern |
| *Monachus schauinslandi* | Hawaiian monk seal | Endangered | Critically endangered |
| *Eumetopias jubatus* | Steller sea lion | | |
| | western stock | Endangered | |
| *Dugong dugon* | Dugong | Endangered | Vulnerable |

1. Codes for the U.S. ESA - http://www.nmfs.noaa.gov/pr/species/esa.htm, 2008.
2. Codes for the IUCN - http://www.iucnredlist.org/search, 2008.

The listed (endangered or threatened) marine mammals most likely to be affected by the U.S. purse seine and longline fleets in the WCPO include the blue whale (*Balaenoptera musculus*), fin whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), sei whale (*Balaenoptera borealis*), and the sperm whale (*Physeter macrocephalus*). The following sections summarize the biology, population status, and fishery interactions of these five species.

#### 3.6.1.2.1.1 Blue Whale (*Balaenoptera musculus*)

Blue whales are found in tropical to polar waters. The population structure of blue whales remains unknown. The distribution of blue whales has been linked to their nutritional requirements. Migration patterns are assumed for blue whales from known summer feeding areas in high latitudes to unknown, speculative winter breeding grounds (Perry, Demaster, and Silber 1999). Data indicate that some summer feeding takes place at low latitudes in upwelling-modified waters (Reilly and Thayer 1990) and that some whales remain year-round at either low or high latitudes (Barlow 1994; Clark, Tasker, Ferguson et al. 1997; Yochem and Leatherwood 1985). Reproductive activities occur primarily in winter (Yochem and Leatherwood 1985).

Uncertainty surrounds estimates of blue whale abundance in the North Pacific Ocean. Barlow (1994) estimated the North Pacific population of blue whales between 1,400 and 1,900. From ship line-transect surveys, Barlow (2003a; 2003b) estimated 1,400 blue whales for the eastern tropical Pacific. No data are available to estimate population size for any other North Pacific blue whale population, including the putative central stock that apparently summered along the Aleutians and wintered north of Hawaii. Therefore, no estimate of population abundance is available for the western Pacific blue whale stock. No data are available on current population trends. Critical habitat has not been designated for this species.

### 3.6.1.2.1.2 Fin Whale (*Balaenoptera physalus*)

Fin whales are found throughout all oceans and seas of the world from tropical to polar latitudes (Forney, Barlow, Muto et al. 2000). The population structure of fin whales remains unknown. The International Whaling Commission (IWC) recognized two management stocks in the North Pacific and six stock areas in the Southern Hemisphere, although the data in this region is insufficient (Barlow 1997; Hill and Demaster 1999). Most migrate seasonally from high latitude feeding areas in summer to low latitude breeding and calving areas in winter.

Although the population in the North Pacific is expected to have grown since receiving protected status in 1976, the possible effects of continued unauthorized take and incidental ship strikes and gillnet mortality make this uncertain (Baretta and Hunt 1994). Based on the available information, it is feasible that the North Pacific population as a whole has failed to increase significantly over the past 20 years. The only contrary evidence comes from investigators conducting seabird surveys around the Pribilof Islands in 1975-1978 and 1987-1989. These investigators observed more fin whales in the second survey and suggested they were more abundant in the survey area (Moore, Waite, Mazzuca et al. 2000). Pauly, Trites, Capuli et al. (1998) conducted surveys for whales in the central Bering Sea in 1999 and tentatively estimated the fin whale population was about 4,951 animals (95% CI: 2,833-8,653). The current status and trend of the fin whale population in the Pacific is largely unknown. Critical habitat has not been designated for fin whales.

### 3.6.1.2.1.3 Humpback Whale (*Megaptera novaeangliae*)

Humpback whales worldwide are divided into northern and southern ocean populations. In the Pacific, genetic analysis studies demonstrate some gene flow (either past or present) between the northern and southern hemispheres (Vang 2002). Humpback whales typically migrate between tropical/sub-tropical and temperate/polar latitudes. The whales occupy tropical areas favoring shallow nearshore waters of usually 200 meters or less during winter months when they are breeding and calving, and polar areas during the spring, summer, and fall, when they are feeding (Balcomb1987; Vang 2002). Recent studies on South Pacific humpback whales confirm migratory links between breeding grounds and feeding areas (Olavarria, Scott Baker, Garrigue et al. 2007). Whales spend the austral summer feeding around five main areas in the Southern Ocean and migrate to low latitude breeding grounds in winter (Olavarria, Scott Baker, Garrigue et al. 2007).

There is no precise estimate of the Pacific humpback whale population. The CNP stock appears to have increased in abundance between the early 1980s and early 1990s; however, the status of this stock relative to its optimum sustainable population size is unknown (Mobley, Spitz, Grotefendt et al. 2001). Mizroch, Herman, Straley et al. (2004) estimated an annual increase of 7% for 1993-2000 using data from aerial surveys that were conducted in a consistent manner for several years across the main Hawaiian Islands and were developed specifically to estimate a trend for the central Pacific stock. The humpback whale population in the North Pacific Ocean basin is estimated to contain at least 10,000 individuals (95% CIs not yet available) (IWC 2007). The Southern Hemisphere population that can be found south of 60° S in the summer feeding season is on the order of 10,000 individuals (Brownell, Kasuya, Perrin et al. 2000). Critical habitat has not been designated for this species, but some protections are afforded by the Humpback Whale National Marine Sanctuary while the whales are in their winter grounds in Hawaii.

No strandings or sightings of entangled humpback whales of the North Pacific stock were reported between 1999 and 2003 (Angliss and Outlaw 2005). The estimated annual mortality rate of the central North Pacific stock, incidental to commercial fisheries is 0.49 whales per year (Angliss and Outlaw 2005). However, this estimate is considered a minimum because there are no data on fishery-related mortalities in Japanese, Russian, or international waters.

### 3.6.1.2.1.4 Sei Whale (*Balaenoptera borealis*)

The IWC's Scientific Committee groups all of the sei whales in the entire North Pacific Ocean into one population (Masaki 1976; 1977). However, some mark-recapture, catch distribution, and morphological research indicated that more than one population exists: one between 175° W and 155° W longitude, and another east of 155° W longitude (Masaki 1976; 1977). During the winter, sei whales are found from 20°-23° N and during the summer from 35°-50° N (Horwood 1987). Horwood (1987) reported that 75-85% of the total North Pacific population of sei whales resides east of 180°. In the southern Pacific most observations have been south of 30° S (Reeves, Clapham, Brownell et al. 1998). Sei whales are distributed far out to sea in temperate regions of the world and do not appear to be associated with coastal features. There is still insufficient information to accurately determine population structure, but from a conservation perspective it may be risky to assume panmixia in the entire North Pacific. Rice (1977) suggested that the diverse diet of sei whales may allow them greater opportunity to take advantage of variable prey resources, but may also increase their potential for competition with commercial fisheries.

Current abundance or trends are not known for sei whales in the North Pacific. There have been no direct estimates of sei whale abundance in the entire North Pacific based on sighting surveys. Whales identified as either Bryde's or sei whales were sighted 12 times in nine 5° × 5° survey blocks in the southwestern portion of the eastern tropical Pacific during 1986-1996 summer and fall research vessel surveys (Rice 1989). Densities were 0.1–1.1/1000 $km^2$. A 2002 shipboard line-transect survey of the entire Hawaiian Islands

EEZ resulted in a summer/fall abundance estimate of 77 (Corrected Value (CV) = 1.06) sei whales (Barlow 2003a). This is currently the best available abundance estimate for this stock, but the majority of sei whales would be expected to be at higher latitudes in their feeding grounds at this time of year. Critical habitat has not been designated for sei whales.

There have been no reported entanglements or other interactions between sei whales and commercial fishing activities.

#### 3.6.1.2.1.5 Sperm Whale (*Physeter macrocephalus*)

Sperm whales are found in tropical to polar waters throughout the world (Whitehead 2002). Their distribution is dependent on their food source and suitable conditions for breeding, and varies with the sex and age composition of the group. Sperm whale migrations are not as predictable or well understood as migrations of most baleen whales. In some mid-latitudes, there seems to be a general trend to migrate north and south depending on the seasons. However, in most areas there appears to be no obvious seasonal migration.

Best estimates for the South Pacific came from Abernathy and Siniff (1998), who used published assessments of sperm whale population sizes and corrected values. In that analysis, sperm whale population size estimates are 12,069 (CV = 0.17) for the Antarctic (south of 60° S), 76 (CV = 0.57) for Hawaii, and 26,053 (CV = 0.24) for the eastern tropical Pacific. There are no abundance estimates available for the remainder of the South Pacific Ocean. Critical habitat has not been designated for sperm whales.

The sperm whale is the only ESA-listed marine mammal species that could be involved in depredation and bait removal. Reports of incidences of depredation and bait removal by all marine mammals have been increasing in the WCPO region (Lawson 2001). The available data is too poor to determine the extent to which sperm whales might be involved.

### 3.6.1.2.2 *Non-listed marine mammals found in the WCPO*

Table 18 identifies the marine mammal species found in the WCPO, but not listed under the ESA (Donoghue, Reeves, and Stone 2003).

**Table 18 Non-ESA listed marine mammals that occur in the WCPO**

| Species name | Common name |
|---|---|
| *Balaenoptera acutorostrata* | Minke whale |
| *Balaenoptera bonaerensis* | Antarctic minke whale |
| *Balaenoptera edeni* | Bryde's whale |
| *Berardius arnuxii* | Arnoux's beaked whale |
| *Caperea marginata* | Pygme right whale |
| *Delphinus delphis* | Short-beaked common dolphin |
| *Eschrichtius robustus* | Gray whale |
| *Feresa attenuata* | Pygme killer whale |
| *Globicephala macrorhynchus* | Short-finned pilot whale |
| *Globicephala melas* | Long-finned pilot whale |
| *Grampus griseus* | Risso's dolphin |
| *Hyperoodon planifrons* | Southern bottlenose whale |
| *Indopacetus pacificus* | Longman's beaked whale |
| *Kogia breviceps* | Pygme sperm whale |
| *Kogia sima* | Dwarf sperm whale |
| *Lagenodelphis hosei* | Fraser's dolphin |
| *Lagenorhynchus cruciger* | Hourglass dolphin |
| *Lagenorhynchus obliquidens* | Pacific white sided dolphin |
| *Lagenorhynchus obscurus* | Dusky dolphin |
| *Lissodelphis peronii* | Southern right whale dolphin |
| *Mesoplodon bowdoini* | Andrew's beaked whale |
| *Mesoplodon ginkgodens* | Ginkgo-toothed whale |
| *Mesoplodon grayi* | Gray's beaked whale |
| *Mesoplodon hectori* | Hector's beaked whale |
| *Mesoplodon layardii* | Strap-toothed whale |
| *Mesoplodon stejnegeri* | Stejneger's beaked whale |
| *Mesoplodon traversii* | Spade-toothed whale |
| *Orcinus orca* | Killer whale |
| *Peponocephala electra* | Melon headed whale |
| *Phocoena dioptrica* | Spectacled porpoise |
| *Phocoena phocoena* | Harbor porpoise |
| *Phocoenoides dalli* | Dall's porpoise |
| *Pseudorca crassidens* | False killer whale |
| *Stenella attenuata* | Pantropical spotted dolphin |
| *Stenella coeruleoalba* | Striped dolphin |
| *Stenella longirostris* | Spinner dolphin |
| *Steno bredanensis* | Rough toothed dolphin |
| *Tursiops truncatus* | Bottlenose dolphin |
| *Ziphius cavirostris* | Cuvier's beaked whale |

### 3.6.1.2.3 *Marine Mammal Fisheries Interactions*

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

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

The Hawaii-based longline fishery is divided into deep-setting and shallow-setting which are classified as Category I for the deep-set portion and Category II for the shallow-set portion of the fishery, the west coast-based longline fisheries and the WCPO purse seine fishery are classified as Category II, (73 Fed. Reg. 72737, December 1, 2008).

When marine mammals interact with fisheries there may be both direct and indirect impacts. Direct impacts result when marine mammals get hooked, entangled, or hurt by human activities. Direct impacts may result from depredation (a marine mammal's removing or damaging fish hooked on fishing gear), removal of bait from fishing gear, or unintentional interactions with gear. Indirect impacts take place either later in time or further away from the physical location where direct impacts occur. An indirect impact to consider between fisheries and marine mammals is competition for prey (SPC 2001) due to increasing scarcity of food resources driven by overfishing (Tudela 2004).

#### 3.6.1.2.3.1 Marine mammal interactions with the U.S. WCPO purse seine fishery

Interactions with the large whales, including listed whales, are uncommon throughout the Pacific Ocean. Of the baleen whales, sei whales are most often encircled in the purse seine net on baitfish associated sets. The most recent data available indicates that during 2005 there were two marine mammals (unidentified) encountered on U.S. purse seine vessels in 293 observed sets, and both were listed as dead when returned to the sea. Based on preliminary data (88 sets) there were no marine mammal observations on U.S. purse seine vessels for 2006 (SPC unpublished data).

#### 3.6.1.2.3.2 Marine mammal interactions with U.S. pelagic longline fisheries

Excluding observations of the Hawaii-based longline fleet and sets made south of 31°, Molony (2005) found that the available WCPO longline observer data for 1980-2004 contained 378 records of marine mammal interactions. Thirty animals were not identified to species. Two were recorded as unidentified toothed whales. Two were recorded as sperm whales and four as short-finned pilot whales. The fate and condition of 19 were recorded: 14 were alive at the time of capture and five were dead. Eleven were in healthy condition at the time of release. After adjusting the observed rates of capture and mortality according to the level of observer coverage, Molony (2005) estimated that up to 2,200 marine mammal captures occurred each year in the WCPO longline fisheries, with mortality rates less than 30% in most years.

The average annual mortality of North Pacific stock fin whales from interactions with the Hawaii longline fishery over the five-year period from 1999-2003 is 0.6 (95% CI = 0.20 - 1.55). Between 1994 and 2002, no interactions with the Hawaiian stock of fin whales were observed in the Hawaii-based longline fishery, with approximately 4-25% of all effort observed (Forney 2004). There have been no reported ship strikes on the North Pacific stock of fin whales.

Table 19 shows the U.S. Hawaii longline deep-set and shallow-set interactions in 2006, 2007, and 2008. In 2008, there were a total of 12 observed interactions by deep-set longliners; one animal was released dead and 11 were released injured. For the shallow-set component of this longline fleet there were nine marine mammal interactions; one was released dead and eight were released injured. It should be noted that the pelagic stock of false killer whale is a “strategic stock” under the 1994 amendments to the MMPA because interactions in the Hawaii-based longline fishery around Hawaii have exceeded the level of potential biological removal (NMFS 2008b).

**Table 19 2006/2007/2008 marine mammal interactions with the U.S. Hawaii-based deep-set and shallow-set longline fisheries**

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

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

### 3.6.1.3 Seabirds

This section identifies the seabird species of concern found in the WCPO and summarizes the biology and population status of the species listed under the ESA, the short-tailed albatross (*Phoebastria albatrus*) and Newell's shearwater (*Puffinus* *auricularis newelli)*. Seabird interactions with fisheries are covered from a regional perspective.

Some 39 species of seabirds are known to breed in the tropical Pacific islands of the region covered by the SPC (which encompasses the SPTT Area), and an additional 17 species visit or pass through the region on annual migration. In describing further the situation in the Southern Hemisphere, Watling (2002) notes that "an analysis of the seabird avifauna of the tropical Pacific in comparison with the seabird avifauna of New Zealand (and higher latitudes Australia) indicates that there is very little overlap in species." Table 20 provides a list of the status of the species of concern in the WCPO.

**Table 20 Listing status of seabird species of concern in the WCPO**

| Species | ESA[1] | IUCN[2] |
|---|---|---|
| Short-tailed albatross (*Phoebastria albatrus*) | Endangered | Vulnerable |
| Black-footed albatross (*Phoebastria nigripes*) | Not listed | Endangered |
| Laysan albatross (*Phoebastria immutabilis*) | Not listed | Vulnerable |
| Newell's shearwater (*Puffinus auricularis newelli*) | Threatened | Endangered |
| Wedge-tailed shearwater (*Puffinus pacificus*) | Not listed | Least Concern |

1. Codes for the U.S. ESA - http://www.nmfs.noaa.gov/pr/species/esa.htm, 2008.
2. Codes for the IUCN - http://www.iucnredlist.org/search, 2008.

#### 3.6.1.3.1 *Seabird Fisheries Interactions with the WCPO Purse Seine Fisheries*

In recent years, seabird interaction with fisheries, such as for albatross in subtropical regions of the Pacific near Hawaii, has been the subject of much research and the subsequent promulgation of regulatory measures designed to minimize adverse impacts of longline fisheries on several species of seabirds. Although these efforts have focused on subtropical fisheries, very little has been written specifically about seabirds and tropical tuna fisheries in the WCPO. The Oceanic Fisheries Program (OFP) of the SPC commissioned a report by Watling (2002) to help address this shortcoming and the report remains one of the few available on the subject.

Seabirds are an important indicator of tuna schools in the WCPO. In fact, advanced types of radar (designated "bird radar" by fishermen and manufacturers alike) have been developed and are commonly employed on purse seiners to detect such birds at great distances. One example of the complexities of potential indirect effects of fisheries on seabirds noted by Montevecchi (2002) is that overfishing large pelagic fishes in tropical oceans can have a negative effect on marine birds that are dependent on large pelagic schools of fishes to drive small fishes to the surface where the birds can access them.

Molony (2005) reports that from 27,644 purse seine sets observed in the WCPO between 1994 and 2004 only a single bird was reported as captured. Previous reports had indicated there were no records of bird catches by purse seiners in the WCPO (MRAG Americas 2002). Purse seine fisheries including the U.S. fishery do not result in measurable bycatch of seabirds;[29] thus the impact on the sustainability of seabird populations from purse seine fisheries in the WCPO is negligible.

### 3.6.1.3.2 *Seabird Interactions with the WCPO Longline Fisheries*

Examination of the observer data held by SPC by Molony (2005) revealed 3,887 records of seabirds captured during longline operations in the WCPO since 1980. Most bird interactions occurred in the New Zealand and southern Australian EEZs and to the north and east of the Hawaiian EEZ. Estimates from the same data set suggest an average of 1,593 (95% CI 8,714) captures and 1,440 (95% CI 7,574) mortalities of seabirds per year, for all WCPO longline fisheries combined.

3.6.1.3.2.1.1 Short-tailed albatross (*Phoebastria albatrus*)

Short-tailed albatross breed primarily on Torishima, Japan, and the Senkaku Islands that are claimed jointly by Japan, China, and Chinese Taipei. In the Convention Area, short-tailed albatross generally range north of 23° N latitude (USFWS 2005).

No short-tailed albatross have been recorded caught or killed by the Hawaii-based longline fishery. However, this fleet could potentially interact with the short-tailed albatross. Specific measures to avoid interaction with seabirds are required for participants in the Hawaii longline fishery, and no take of short-tailed albatross has been reported (USFWS 2005).

3.6.1.3.2.1.2 Newell's shearwater (*Puffinus auricularis newelli*)

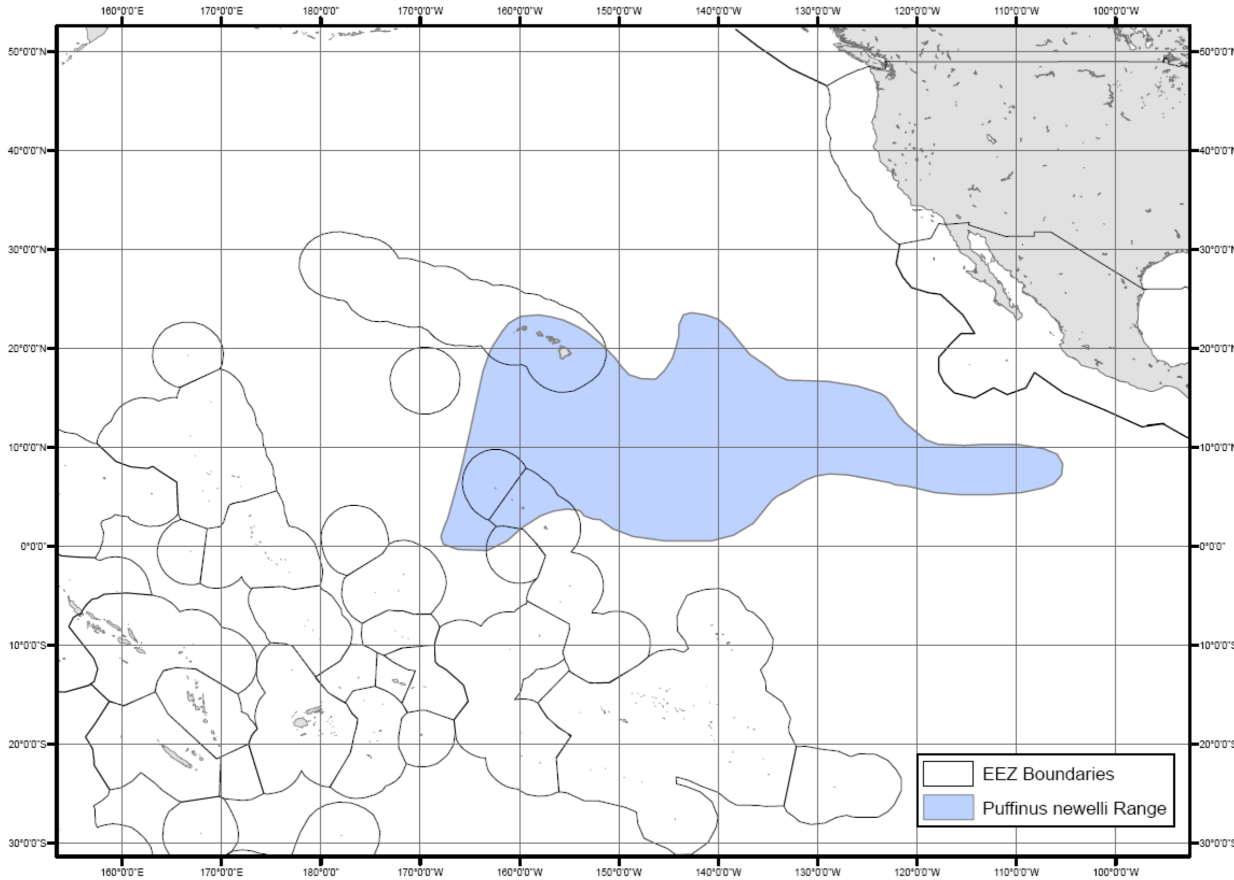
The Newell's shearwater (*Puffinus auricularis newelli*) nests primarily in the Hawaiian Islands and ranges to the south and east of the islands (IUCN 2008). Based on data obtained from BirdLife International, Figure 4 shows the range of the Newell's shearwater. As indicated in Figure 4, the operations of the U.S. WCPO purse seine and the Hawaii longline fisheries could overlap with the range of the Newell's shearwater.

With respect to the U.S. WCPO purse seine fishery, data obtained from the SPC indicate that there have been no recorded interactions between U.S. purse seine vessels and seabirds, based on observer data from August 1994 to January 2007,[30] and the U.S. purse seine fishery has had high levels of observer coverage – at least 20%observer coverage in a given year, sometimes higher. No Newell's shearwaters have been recorded caught or killed by the Hawaii-based longline fishery.

[29] In the 12-and-a-half years during which observers have been deployed on U.S. purse seine vessels in the western and central Pacific Ocean and for which data is available, no interactions with seabirds have been observed (August 1994 to January 2007) (SPC personal communication, December 17, 2008).

[30] SPC personal communication, December 17, 2008.

**Figure 10 Known range of *Puffinus auricularis newelli***




Source: BirdLife International.

### 3.6.2 Essential Fish Habitat

The EFH provisions (50 CFR Part 600 Subpart J) of the MSA are intended to maintain sustainable fisheries. NMFS and the Regional Fishery Management Councils must identify and describe EFH and Habitat Areas of Particular Concern (HAPC) for each managed species using the best available scientific data and must ensure that fishing activities being conducted in such areas do not have adverse effects to the extent practicable. This process consists of identifying specific areas and the habitat features within them that provide essential functions to a particular species for each of its life stages. Both the EFH and the HAPC are documented in the FMPs established under the MSA.[31]

EFH and HAPC have been designated in the WCPO for pelagic, bottomfish, precious corals, crustaceans, and coral reef species. The relevant EFH and HAPC for PMUS in the WCPO were designated in Amendment 8 to the Pelagics FMP. The EFH for PMUS are

[31] The FMPs being the FMP for Pelagic Fisheries of the Western Pacific Region, the West Coast HMS FMP (Pelagics FMP), the Coral Reef Ecosystems FMP, the Precious Corals FMP, and the Crustaceans FMP.

the areas within the U.S. EEZ from the surface to a depth of 1,000 meters below the surface. Eggs and larvae of the PMUS are distributed throughout the tropical epipelagic zone[32] and the subtropical epipelagic zone in the summer. Thus, EFH for these life stages is the epipelagic zone in the U.S. EEZ. The HAPC for PMUS is designated as the water column to a depth of 1,000 meters above all seamounts and banks within the U.S. EEZ that are shallower than 2,000 meters, because topographic features, such as seamounts and banks, influence the overlaying mesopelagic zone (NMFS 2001b). Table 21 lists the EFH and HAPC for species managed under the various western Pacific FMPs.

**Table 21 EFH and HAPC for species managed under the pelagics, crustaceans, bottomfish and seamount groundfish, precious corals, crustaceans, and coral reef ecosystems, western Pacific FMPs[1]**

| Species Group | EFH (juveniles and adults) | EFH (eggs and larvae) | HAPC |
|---|---|---|---|
| Pelagics | Water column down to 1,000 meters | Water column down to 200 meters | Water column down to 1,000 meters that lies above seamounts and banks |
| Bottomfish | Water column and bottom habitat down to 400 meters | Water column down to 400 meters | All escarpments and slopes between 40-280 meters, and three known areas of juvenile opakapaka habitat |
| Seamount Groundfish | (adults only): water column and bottom from 80 to 600 meters, bounded by 29°-35°N and 171°E-179°W | (including juveniles): epipelagic zone (0-200 meters) bounded by 29°-35°N and 171°E-179°W | Not identified |
| Precious Corals | Keahole, Makapuu, Kaena, Wespac, Brooks, and 180 Fathom gold/red coral beds, and Milolii, S. Kauai and Auau Channel black coral beds | Not applicable | Makapuu, Wespac, and Brooks Bank beds, and the Auau Channel |
| Crustaceans | Bottom habitat from shoreline to a depth of 100 meters | Water column down to 150 meters | All banks within the Northwestern Hawaiian Islands with summits less than 30 meters |
| Coral Reef Ecosystems | Water column and benthic substrate to a depth of 100 meters | Water column and benthic substrate to a depth of 100 meters | All Marine Protected Areas identified in FMP, all PRIAs,[2] many specific areas of coral reef habitat |

Source: Management Measures to Implement New Technologies for the Western Pacific Pelagic Longline Fisheries (NMFS 2004c).
[1] All areas bounded by the shoreline and the outward boundary of the U.S. EEZ, unless otherwise indicated.
[2] Pacific Remote Island Areas.

[32] The epipelagic zone extends from the sea surface to a depth of 200 meters below the surface.

### 3.6.3 National Wildlife Refuges (NWRs) and Monuments

Pursuant to the National Wildlife System Administration Act of 1966 (NWSAA; 16 U.S.C. § 668dd, et seq.), USFWS carries out the mission of NWRs, which is "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans." National Monuments are designated by the President using the authority of the Antiquities Act of 1906 (16 U.S.C. 431). This act allows the president to protect areas of "historic or scientific significance". Below is a description of NWRs, and National Monuments in the Convention Area.

#### 3.6.3.1 Guam National Wildlife Refuge

The Guam NWR contains three separate administrative units: the Ritidian Unit; the Anderson Air Force Base Unit; and the Navy Unit. Located in northern Guam, the Ritidian Unit contains 401 acres of marine waters that support habitat for fish and marine invertebrates, as well as the hawksbill and green sea turtles. The other units do not include marine waters. USFWS is currently preparing a Comprehensive Conservation Plan that will specify long-term management objectives for the refuge (72 Fed. Reg. 37037, July 6, 2007).[33]

#### 3.6.3.2 Baker Island National Wildlife Refuge

Located approximately 1,830 nautical miles southwest of Honolulu just north of the equator, the Baker Island NWR includes 531 acres of terrestrial habitat and 31,378 acres of submerged habitat. No humans currently inhabit the island, which is composed of a large extinct volcano overlaid by a steep coral reef cap. The waters surrounding the island are known for increased levels of marine productivity, because the western side of the island deflects the equatorial undercurrent, which acts to push nutrient-rich waters into the sunlit zone.[34]

#### 3.6.3.3 Howland Island National Wildlife Refuge

The Howland Island NWR is located 1,815 nautical miles southwest of Honolulu, and contains 648 acres of terrestrial habitat and 33,671 acres of submerged habitat. Due to conditions similar to those at Baker Island, the waters surrounding Howland Island also experience increased levels of marine productivity.[35]

[33] It should be noted that the boundaries of the NWRs described here and the amount of lands and waters included in each refuge are those asserted by USFWS as included in the National Wildlife Refuge System pursuant to the NWSAA. Other federal and state entities share management authority and/or have jurisdiction over some of the areas described here.

[34] USFWS Baker Island National Wildlife Refuge page at http://www.fws.gov/bakerisland/

[35] USFWS Howland Island National Wildlife Refuge page at http://www.fws.gov/howlandisland/

#### 3.6.3.4 Jarvis Island National Wildlife Refuge

The Jarvis Island NWR contains 1,273 acres of terrestrial habitat and 36,214 acres of submerged habitat. The refuge is located approximately 1,305 nautical miles south of Honolulu and about 50 coral species have been identified in the area to date. The waters in the area are nutrient rich, like the waters surrounding Baker and Howland Islands, and thus, they similarly support increased levels of marine productivity. Large fish, sea turtles, and manta rays frequent the area, and 252 fish species have been identified to date.[36]

#### 3.6.3.5 Johnston Island National Wildlife Refuge

The Johnston Island NWR is an atoll composed of four islands and a marginal emergent reef. This isolated atoll is located in the central Pacific Ocean between Hawaii and the Marshall Islands, and supports a vast array of marine life. Forty coral species have been identified in the area to date, as well as over 300 species of fish. Seabirds also frequent the area.[37]

#### 3.6.3.6 Kingman Reef National Wildlife Refuge

Located 932 miles southwest of Hawaii, the Kingman Reef NWR contains three acres of emergent reef and 483,754 acres of submerged reef. The refuge is a coral reef atoll ecosystem, and supports numerous and varied marine species, including over 225 species of fish, bottlenose dolphins, and giant clams.[38]

#### 3.6.3.7 Palmyra Atoll National Wildlife Refuge

The Palmyra Atoll NWR includes approximately fifty small islands, several lagoons, 15,000 acres of shallow and submerged reefs. Located approximately midway between Hawaii and American Samoa, the area supports diverse marine life, such as pilot whales, white-tip reef sharks, and green sea turtles. Surveys have identified 193 coral species in the area to date, and the area could be a source for dispersing coral larvae to other central Pacific atolls and reef islands, due to its location within the equatorial countercurrent.[39]

[36] USFWS Jarvis Island National Wildlife Refuge page at http://www.fws.gov/jarvisisland/

[37] USFWS Johnston Island National Wildlife Refuge page at http://www.fws.gov/johnstonisland/

[38] USFWS Kingman Reef National Wildlife Refuge page at http://www.fws.gov/kingmanreef/

[39] USFWS Palmyra Atoll National Wildlife Refuge page at http://www.fws.gov/palmyraatoll/

### 3.6.3.8 Rose Atoll National Wildlife Refuge

The Rose Atoll NWR forms a square-like shape and contains two small islands and 39,004 acres of submerged lands and waters. Located about 130 nautical miles east-southeast of Pago Pago Harbor, American Samoa, the atoll is the easternmost Samoan island and the southernmost NWR. The atoll contains about 100 species of coral, and 270 species of fish have been identified in the area to date. The atoll also supports nesting sites for the green turtle and 12 species of migratory seabirds. The majority of American Samoa's seabird population (97%) lives in the atoll.[40]

### 3.6.3.9 Hawaiian Islands National Wildlife Refuge

Part of the Papahanaumokuakea Marine National Monument, the Hawaiian Islands NWR includes the Northwestern Hawaiian Islands (aside from the Midway and Kure Atolls). This chain of islands and atolls extends about 1,200 miles northwest of Kauai, Hawaii. The refuge contains 1,729 acres of emergent land and over 638,360 acres of submerged lands and waters. The refuge contains numerous species that are found nowhere else in the world, including corals, reef fish, and invertebrates. Approximately 240 fish species have been identified in the area to date, and the refuge supports breeding sites for 19 seabird species.[41]

### 3.6.3.10 Midway Atoll National Wildlife Refuge

Also part of the Papahanaumokuakea Marine National Monument, the Midway Atoll NWR contains three islands and is located 1,200 miles northwest of Honolulu.[42] The refuge includes almost 300,000 acres of lagoon and surrounding nearshore waters. The refuge supports 18 seabird species, the green turtle, the Hawaiian monk seal, a resident pod of about 300 spinner dolphins, and coral reef fishes and invertebrates.[43]

[40] USFWS Rose Atoll National Wildlife Refuge page at http://www.fws.gov/roseatoll/

[41] USFWS Hawaiian Islands National Wildlife Refuge page at http://www.fws.gov/Hawaiianislands/

[42] USFWS Midway Atoll National Wildlife Refuge profile page at http://www.fws.gov/refuges/profiles/index.cfm?id=12520

[43] USFWS Midway Atoll National Wildlife Refuge page at http://www.fws.gov/midway/

#### 3.6.3.11 Papahanaumokuakea Marine National Monument [44]

The Papahanaumokuakea Marine National Monument sets apart 139,793 square miles of federal lands and waters to protect the area's significant natural, cultural, and historic resources.

#### 3.6.3.12 The Marianas Trench Marine National Monument, the Pacific Remote Islands Marine National Monument, and the Rose Atoll Marine National Monument

The Marianas Trench Marine National Monument consists of three components: the waters and submerged lands encompassing the coral reef ecosystem of the three northernmost islands of the CNMI; the Marianas Trench, the deepest place on Earth, is approximately 940 nautical miles long and 38 nautical miles wide within the U.S. EEZ; and a series of twenty-one active, hyrdrothermal submarine volcanoes and thermal vents. Many scientists believe extreme conditions like these could have been the first incubators of life on Earth.[45]

The Pacific Remote Islands area consists of Wake, Baker, Howland, and Jarvis Islands, Johnston Atoll, Kingman Reef, and Palmyra Atoll, which lie to the south and west of Hawaii. With the exception of Wake Island, these islands are also NWRs, and are described above.[46]

The Rose Atoll includes about 20 acres of land and 1,600 acres of lagoon.[47]

[44] USFWS Papahanaumokuakea Marine National Monument page at http://www.fws.gov/hawaiianislands/monument.html

[45] USFWS Marianas Trench Marine National Monument page at http://www.fws.gov/pacific/news/2009/Monuments/TrenchMarine.pdf

[46] USFWS Pacific Remote Islands Marine National Monument page at http://www.fws.gov/pacific/news/2009/Monuments/pacificremoteislands.pdf

[47] USFWS Rose Atoll Marine National Monument page at http://www.fws.gov/pacific/news/2009/Monuments/roseatoll.pdf

# Chapter 4

# Chapter 4 Environmental Consequences: Direct and Indirect Effects

This chapter examines the direct and indirect environmental impacts that could be caused by the implementation of each of the two rules under any of the action alternatives, as well as the No-Action Alternative for each rule; cumulative impacts are addressed in Chapter 5.[48] Chapter 6 uses the analyses presented in Chapters 4 and 5 to compare the alternatives for each rule. This chapter follows the organization of Chapter 3. This chapter begins by assessing the potential impacts from the U.S. Purse Seine Rule to the U.S. WCPO purse seine fishery from the implementation of any of the action alternatives for the rule, as well as the No-Action Alternative. This chapter continues by assessing the potential impacts from the U.S. Longline Rule to the U.S. WCPO longline fishery from the implementation of any of the action alternatives for the rule, as well as the No-Action Alternative. The discussion of impacts to the fisheries is presented first to establish the changes that the affected fisheries would experience from implementation of each of the rules. Then Sections 4.3 through 4.6 analyze the environmental impacts the anticipated changes to the fisheries could cause to each of the potentially affected resources in the affected environment.

## *4.1 The U.S. WCPO Purse Seine Fishery*

The direct and indirect effects to the U.S. WCPO purse seine fishery from the proposed rule to implement specific management measures for the fishery or from any of the alternatives to the proposed rule would fall into two categories: (1) economic; and (2) changes to fishing patterns and activities. The Regulatory Impact Review (RIR) for the proposed rule, prepared under Executive Order 12866, provides an in-depth analysis of the potential economic impacts of the proposed rule to the fleet and to the nation and is incorporated here by reference, pursuant to 40 CFR §1502.23. The general information regarding economic impacts in the discussion below is provided to help compare the alternatives assessed and to determine whether the economic impacts are interrelated with environmental impacts. The potential impacts from implementation of any of the alternatives to each of the potentially affected resources are analyzed in Sections 4.3 to 4.6.

### 4.1.1 Alternative A: No-Action Alternative, U.S. Purse Seine Rule

Under Alternative A, the No-Action Alternative, the rule to implement specific management measures for the U.S. WCPO purse seine fishery would not go into effect,

[48] According to the CEQ regulations implementing the Procedural Provisions of NEPA at 40 CFR §1508.7 and §1508.8, direct effects are caused by the action and occur at the same time and place; indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable; and cumulative impacts are the impacts on the environment that result from the incremental impact of the Proposed Action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions.

and the fishery would continue to be managed under existing regulatory and SPTT-related requirements. Thus, under this alternative there would be no direct changes to the fishery's status quo in the near term.

As discussed throughout Chapter 3, additional management measures that lead to a reduction in the mortality of yellowfin and bigeye tuna are needed to sustain WCPO tuna stocks at MSY level. Although skipjack tuna accounts for the majority of the proportion of the fleet's catch, diminished catches of yellowfin tuna could affect the revenue generated by the fleet. Thus, this alternative could lead to negative impacts on the ability of the U.S. WPCO purse seine fleet to maintain catch levels and in turn to generate revenue that would maintain the profitability of the fleet in the long term. However, many other factors affect the stock status of WCPO bigeye and yellowfin tuna and implementation of the proposed rule under any of the alternatives would not substantially change the fishing practices and patterns of the fleet. Thus, the status of the fleet under the No-Action Alternative would be similar to the status of the fleet under any of the action alternatives analyzed in this EA.

### 4.1.2 Alternative B: Action Alternative for the U.S. Purse Seine Rule

Under Alternative B, the U.S. WCPO purse seine fishery would be subject to six new management measures, as detailed in Chapter 2: (1) limits on fishing effort, measured in terms of fishing days, on the high seas and the U.S. EEZ for the years 2009-2011; (2) periods during which fishing on schools in association with FADs would be prohibited on the high seas and in the U.S. EEZ (August and September in 2009 and July through September in 2010 and 2011); (3) specific areas of high seas in which fishing would be prohibited during 2010-2011; (4) effective in 2010 and until the end of 2011, a requirement to retain 100% of the catch of skipjack tuna, yellowfin tuna, and bigeye tuna, up to the first point of landing or transshipment; (5) a requirement to carry observers during the FAD prohibition period in 2009, and starting in 2010 until the end of 2011, on all trips; and (6) a requirement to implement sea turtle interaction mitigation requirements to be effective indefinitely.

#### 4.1.2.1 Fishing Effort Limit

The fishing effort limit could affect the amount of fish captured and revenue earned by vessels in the U.S. WCPO purse seine fleet by reducing fishing opportunities and constraining the historic fishing patterns of the fleet. However, as indicated in Chapter 2, Section 2.1.1.1, the effort limit should take into consideration the maximum number of vessels – 40 – that could operate in the U.S. WCPO purse seine fishery at any one time, pursuant to the provisions of the SPTT. In other words, the limit would be set at approximately the level expected to be exerted by 40 vessels. As indicated in Chapter 3, the current number of licensed vessels is 39, and the expected future number of vessels is approximately 40 (and in no case more than 40). Thus, the limit would be set at approximately the level of effort expected under no action: the effort limit may not represent real change from the status quo – depending on how well the 2001-2004 base period represents the historic activities of the fleet, and the degree to which climatic events such as ENSO occur under unknown conditions such as global climate change/variation. Moreover, in order to take into consideration variations in fishing patterns among years, the high seas and the U.S. EEZ would not be treated separately – there would be no boundary between the two areas for the purpose of the fishing effort limit, and the limit would be implemented on three different time scales: First, there would be a limit of 7,764 fishing days (3 times the base of 2,588) for the entire three-year 2009-2011 period. Second, there would be a limit of 6,470 fishing days (2.5 times the base of 2,588) for each of the two-year periods 2009-2010 and 2010-2011. Third, there would be a limit of 3,882 fishing days (1.5 times the base of 2,588) for each of the one-year periods 2009, 2010, and 2011.

The effort limit could, however, change the temporal patterns of fishing effort. Since the limit is a competitive, "Olympic" style allocation whereby fishing days are available until the cap is reached, vessel operators would have an incentive to fish harder in this zone earlier in the calendar year than they otherwise would in an attempt to obtain as many fishing days as they can (i.e., "the race to fish") before the cap is reached. To the extent such a shift does occur, it would affect the seasonal timing of deliveries to canneries, the implications of which are addressed in the RIR. A race to fish could also bring costs if it causes vessel operators to forego vessel maintenance or to fish in weather or ocean conditions that it otherwise would not. This could bring costs in terms of human safety as well as the performance of the vessel and its fishing gear and crew. This race to fish effect could also be expected in the time period between when a closure of the fishery is announced and when the fishery is closed. However, given that the effort limits may not represent real change from the status quo and that this alternative takes into consideration variations in fishing patterns between different years, it is unlikely that any adverse impacts from the race to fish would be substantial.

The U.S. WCPO purse seine fleet typically spends the majority of its fishing effort in the EEZs of PIC, as indicated in Chapter 3, Section 3.2. Only effort that occurs in the U.S. EEZ and high seas areas would be affected by this provision. Vessels could increase their fishing effort in PIC EEZs in the WCPO or conceivably even shift effort to outside of the WCPO – to the EPO. U.S. vessels have the option of taking up to 32 trips in the IATTC area (see Chapter 3, Figure 4), as defined by the yet-to enter into force Antigua Convention.[49]

Under Alternative B, because the fishing effort limit potentially allows for continuation of historic fishing patterns, it is unlikely that the fleet's total fishing effort would be appreciably affected, and any spatial shift in fishing effort, such as into PIC EEZs, would likely be minor. However, if average per-vessel fishing effort in 2009-2011 is substantially greater than during the baseline period or if climate/ocean conditions are such that the U.S. EEZ or the high seas are unusually attractive fishing grounds in 2009-2011, the likelihood and magnitude of these two potential effects would be greater.

[49] See: http://www.iattc.org/PDFFiles/C-02-03%20Capacity%20resolution%20Jun%202002%20REV.pdf Capacity Resolution C-02-03. Refer to item #12.

#### 4.1.2.2 FAD Prohibition Period

Under the proposed action, the FAD prohibition period for the U.S. WCPO purse seine fleet would be in effect from August 1 to September 30, 2009, or 60 days, and from July 1 to September 30, or for about 90 days, in 2010 and 2011. During these months, no fishing on or near schools associated with FADs, and no deploying or servicing FADs, would be permitted in the Convention Area,[50] and only vessels carrying observers approved by or deployed from the WCPFC's ROP or observers deployed by NMFS would be allowed to fish during those periods (in order to ensure that FAD fishing does not occur).[51] The FAD prohibition period could affect the fleet's fishing patterns and activities.

As described in Chapter 3, Section 3.2.4 the U.S. WCPO purse seine fleet has used FADs, or associated sets, to varying degrees for its fishing operations. Regional landing data suggest that FAD sets tend to yield more skipjack and bigeye tuna than yellowfin tuna. Unassociated sets tend to yield more yellowfin tuna than skipjack tuna and very little bigeye tuna. As indicated in Table 5 in Chapter 3, between 2003 to 2008, approximately 70% of the catch of the U.S. WCPO purse seine fleet was made on associated sets. During this same period, approximately 53% of the U.S. WCPO purse seine fleet's catch of yellowfin tuna was made on associated sets, while approximately 71% of the catch of skipjack tuna and 94% of the catch of bigeye tuna was made on associated sets.

The FAD prohibition periods can be expected to affect the overall composition of the catch made by the fleet. It is expected that there will be some transfer of effort to fishing on unassociated sets during the prohibition period – given that represents the only viable fishing option if vessels continue to operate – so the composition of the catch during those periods is expected to consist of more yellowfin tuna and less bigeye tuna with the overall effect on skipjack tuna difficult to predict. As shown in Table 5 in Chapter 3, bigeye tuna accounts for only very small percentage of the catch of the U.S. WCPO purse seine fleet. FAD sets contribute a substantial percentage of skipjack catches (as indicated in Table 5 in Chapter 3, 71.5% of the total catch of skipjack tuna during the years 2003-2008 was from FAD sets). By prohibiting FAD sets for 17% of the year in 2009 and 25% of the year in 2010 and 2011, skipjack tuna catches would expect to be impacted accordingly. According to a study conducted to evaluate (for all national fleets, not just the U.S. fleet) the potential impacts of a FAD prohibition period in the third quarter, a FAD prohibition for a 3 month period was predicted to reduce long term average catches

[50] Although the proposed rule would implement the FAD prohibition periods only for the U.S. EEZ and high seas, identical FAD prohibition periods would be in effect in the EEZs of the Parties to the Nauru Agreement pursuant to the Third Arrangement Implementing the Nauru Agreement.

[51] As discussed in Chapter 2, Section 2.1.1.2.2.5, the requirement to carry an observer from the WCPFC ROP would apply at all times starting January 1, 2010 to the end of 2011, not simply during the FAD prohibition periods.

of skipjack tuna in the Convention Area by 6.5% (Hampton and Harley 2008).[52] Although this represents a considerable volume of fish – uncertainties associated with this prediction suggest it could be much more or much less. The expected shift in composition of the catch during the FAD prohibition periods would be expected to affect gross revenues generated by the fleet, but the magnitude of the impact would depend on market conditions (i.e., the price of bigeye tuna and skipjack tuna compared to the price of yellowfin tuna and the prices of small fish versus large fish – particularly, whether the canneries are even buying small fish).

The FAD prohibition periods could also affect operating costs (e.g., FAD fishing generally involves less searching time and thus lower fuel costs). In aggregate it is likely that the prohibition period would have some negative effect on the profits generated by the fleet in the short term.[53] Since other factors (e.g., shifts in ocean conditions, climatological changes, shifts in market conditions, fuel prices) also influence the catch made by a fleet and/or the revenue generated by a fleet during a specific time period, quantification of the economic impact of the FAD prohibition periods on the U.S. WCPO purse seine fleet cannot be made with any degree of precision. It seems unlikely that given current market conditions (as of this writing) that most purse seine vessels would choose not to fish as a result of the prohibition periods. However, as described below for the proposed observer coverage requirements, affected vessels would also bear costs associated with having to carry an observer during the 2009 FAD prohibition period. To mitigate the costs that the FAD prohibition period (and in 2009, the observer requirement) would bring, vessel operators might choose to schedule their routine vessel maintenance during a portion of those periods. The result of this could be somewhat less effort during those periods than there otherwise would be.

As stated above, the FAD prohibition periods are expected to affect the fishing patterns and practices of the fleet by transferring fishing effort from FAD sets to unassociated sets during the prohibition periods, and possibly reducing the amount of fishing effort during the prohibition periods relative to other periods of the year. Ideally bigeye tuna catches will be minimal as will juvenile yellowfin catch – and operators will target unassociated schools of large skipjack and yellowfin tuna.

As discussed in Chapter 3, section 3.2.4, the WCPFC ROP is currently being developed and approximately 20% of the trips made by the U.S. purse seine fleet carry observers provided by the Pacific Islands FFA. All vessels will incur additional costs in order to comply with the observer requirement during the FAD prohibition period in 2009, but these additional costs would be unlikely to affect the fishing patterns and practices of the fleet, since they would be limited in comparison to the overall revenue generated by the

[52] The closure period studied was a "three month ban during the third quarter on FAD sets within EEZs and on the high seas in the region between 20° N and 20° S (but excluding Indonesia and the Philippines and archipelagic waters)" (Hampton and Harley 2008).

[53] See the Initial Regulatory Flexibility Analysis (IRFA) and RIR for the purse seine rule for more detailed discussion of the economic impacts of the rule on the U.S. WCPO purse seine fleet.

fleet. Please see the RIR and the Initial Regulatory Flexibility Analysis (IRFA) for the purse seine rule for more detailed discussion of the economic impacts on the U.S. WCPO purse seine fleet of the requirements to increase observer coverage.

#### 4.1.2.3 High Seas Area Closures

Two areas of the high seas, otherwise known as high seas pockets, would be closed to fishing for the U.S. WCPO purse seine fleet as of January 1, 2010, through 2011. These closures could affect the revenue generated by the fleet as well as their fishing patterns and activities. However, as discussed above, the U.S. WCPO purse seine fleet exerts the majority of its fishing effort in PIC EEZs, so the closure of the high seas areas are not expected to have a large effect on the ability of the fleet to fish and generate revenue. NMFS unpublished data from vessel logbooks indicate that from 1997 through 2007, the proportion of the fleet's total annual catch that was taken from the two areas collectively was about 10%, and ranged from about 3 to 20%. Total fishing effort by particular vessels would likely be unaffected, but the spatial distribution of effort would necessarily shift out of the affected areas into what would be less attractive, and in some cases, less profitable, fishing grounds. However, the closed areas would be small relative to the available and typical fishing grounds of the fleet. Thus, overall, the high seas closures would not be anticipated to cause large operational changes to the U.S. WCPO purse seine fleet.

#### 4.1.2.4 Catch Retention

U.S. WCPO purse seine vessels would have to retain 100% of their catch of skipjack, bigeye, and yellowfin tuna, and then land or transship the catch at port, if and when NMFS determines that 100% observer coverage is being implemented throughout all the purse seine fleets, but no earlier than January 1, 2010. Exceptions to full retention are provided in the following circumstances: (1) fish that are unfit for human consumption (including but not limited to fish that are spoiled, pulverized, severed, or partially consumed at the time they are brought on board) upon their being boarded may be discarded; (2) if at the end of a fishing trip there is insufficient well space to accommodate all the fish captured in a given purse seine set, fish captured in that set may be discarded, provided that no additional purse seine sets are made during the fishing trip; or (3) if a serious malfunction of equipment occurs such that fish in the wells cannot be maintained in a way that ensures they are safe for human consumption, those fish may be discarded.

The impacts of this provision would likely be different for those vessels that fish out of a port and deliver their fish to canneries versus those vessels that transship most of their catch to other vessels. Vessels fishing out of ports typically try to maximize trip revenue, because they have to travel large distances from port to reach fishing grounds, so they may be forced to retain catches that decrease the already limited storage room on the vessels given the fishing trips typically only terminate for these vessels when all the fish holds are full. For vessels that transship most of their catch to other vessels and are less dependent on vessel capacity, this provision would likely have a lower impact on vessel profitability. It is unclear whether markets for smaller fish that up to this date would often have been discarded will develop at those ports that have historically not purchased small fish. There are also instances where the canneries charge the vessels to unload small fish in which case these costs (typically on a per ton basis) are a deduction from gross trip revenues.

#### 4.1.2.5 Increased Observer Coverage

Beginning January 1, 2010, U.S. WCPO purse seine vessels would be required to carry an observer from the WCPFC ROP on every trip. Pursuant to the SPTT, approximately 20% of the trips made by the U.S. WCPO purse seine fleet carry observers provided by the Pacific Islands FFA. Vessels would incur additional costs in order to comply with this requirement. The compliance costs are small compared to the revenue generated by vessels in the fleet, so it seems unlikely that the costs would be great enough to affect the fishing patterns and practices of the fleet. As noted above with respect to the FAD prohibition periods, during the 2009 FAD prohibition period vessel operators would bear both the costs of carrying an observer and of not being able to set on FADs. To mitigate those costs, vessel operators might schedule their routine vessel maintenance during the FAD prohibition periods. The result would be less fishing effort during that period than would otherwise occur, but probably little or no impact on total fishing effort in 2009. Please see the RIR and IRFA for the purse seine rule for more detailed discussion of the economic impacts of the rule on the U.S. WCPO purse seine fleet.

#### 4.1.2.6 Sea Turtle Interaction Mitigation Requirements

U.S. WCPO purse seine vessels and their crew would be required to carry specific equipment and use specific measures to disentangle, handle, and release sea turtles that are encountered in fishing gear, including purse seines and FADs. The required equipment would be a dip net with specified minimum design standards. The required measures would include immediately releasing sea turtles that are observed enclosed in purse seines; disentangling sea turtles that are observed entangled in purse seines or FADs, stopping net roll until a sea turtle is disentangled from the purse seine, resuscitating sea turtles that appear dead or comatose, and releasing sea turtles back to the ocean in a specified manner.

Vessel owners and operators would incur some costs in ensuring that they and their crew are adequately trained to be able to execute the required mitigation requirements: vessel owners and operators would incur some additional expense to ensure that vessels are equipped with the required dip net; and time- and labor-associated costs might be incurred in actually handling and releasing turtles in the required manner. However, in part because sea turtle interactions in the fishery are rare, the costs would be negligible compared to the overall revenue generated by the fleet (see RIR and IRFA) and thus, would be unlikely to affect the fleet's fishing patterns or practices. Fishing operations may be affected but these impacts are believed to be minor – as long as personnel are trained and available to implement the mitigation actions in the rare event of a sea turtle interaction.

As stated in Chapter 3, Section 3.6.1.1.6 (Sea Turtle Fisheries Interactions), during the six year period 1997-2002 for 6,058 sets (25% of all sets during the period) by U.S. purse seine vessels fishing in the WCPO there were three interactions with sea turtles. Thus, due to the small number of potential sea turtle interactions likely to occur with any given vessel, vessels would not be expected to experience significant reduction in fishing time in order to comply with the sea turtle mitigation requirements.

#### 4.1.2.7 Summary of Impacts

The requirements of implementing the proposed rule under Alternative B have the potential to impact the gross revenue and profits earned by the U.S. WCPO purse seine fleet and cause impacts to its fishing patterns and practices. Overall, although these effects are somewhat speculative and unquantifiable, it is unlikely that Alternative B would cause substantial financial burden to the fleet or substantially affect the fleet's current fishing patterns and practices. The primary direct effects of Alternative B on the U.S. WCPO purse seine fishery are the following: (1) the FAD prohibition periods and the catch retention requirement would affect the size and species composition of landed fish; (2) the fishing effort limit and high seas area closures could lead to slight increases in fishing effort in PIC EEZs in the WCPO and overall slight decreases in total fishing effort; and (3) the FAD prohibition periods would likely transfer some fishing effort from FAD sets to unassociated sets during the prohibition periods, and possibly shift fishing effort from the FAD prohibition periods to other periods of the year.

### 4.1.3 Alternative C: Allocation of Fishing Effort Limit

Under Alternative C, for the U.S. purse seine vessels fishing in the U.S. EEZ and high seas in the Convention Area, the effort limit would be allocated among different individual vessels in some undetermined manner (the specific manner is not fully developed in this document, as those details are not relevant to the task of analyzing the environmental consequences of the action and the comparative consequences of the alternatives). All other provisions of this alternative would be identical to Alternative B. Allocation of the effort limit would provide for individual vessels to have a fixed share of the effort limit, and thus, vessels would not compete for fishing days. The allocation scheme would not affect the overall level of fishing effort exerted by the fleet or affect overall fishing practices or patterns, except that it would not cause the temporal shift in fishing effort and catch that might occur under Alternative B as a result of a race to fish.

### 4.1.4 Alternative D: Most Restrictive Variation of the Fishing Effort Limit Provision

Under Alternative D, for the U.S. purse seine vessels fishing in the Convention Area, the effort limit would be implemented on a single year basis, coinciding with the licensing year, no extra fishing days could be transferred from other years, and there would be separate effort limits for the high seas and U.S. EEZ. All other provisions would be identical to Alternative B. As discussed above, the overall effort limit takes into consideration the maximum number of vessels that could operate in the U.S. WCPO purse seine fishery at any one time, pursuant to the provisions of the SPTT. Thus, the effort limits would likely represent no real change from the status quo. However, this alternative would not allow for any flexibility in the effort limit to account for variations in fishing patterns in different years and the separate limits for the high seas and U.S. EEZ would further restrict where the vessels could conduct fishing activities. In some years, the maximum number of fishing days may not be used when the actual fishing effort is less than that set by the effort limits; also, no fishing could be transferred from the limits of other years.

Under this alternative the fleet would be limited to 558 days in the U.S. EEZ or a limit of 2030 days on the high seas areas. The most immediate impact would occur if and when the next ENSO occurs and vessels shift to the eastern portion of the WCPO. Although not clear which constraint would apply first, it is quite possible that operators could be forced into PIC EEZs during periods of high yellowfin tuna abundance in the high seas and U.S. EEZ. With the two high seas pockets being closed – and there being considerable high seas areas in the eastern part of the WCPO – fishers could find fishing opportunities restricted. Forgone revenue typically generated by large yellowfin tuna (typically found in unassociated schools) could be forgone as a result of this alternative.

This alternative would also set the limits to begin at the start of the licensing year (June 15$^{th}$) rather than the calendar year. Since the limit would be a competitive, "Olympic" style allocation whereby fishing days are available until the cap is reached, vessel operators would have an incentive to fish harder in this zone earlier in the licensing year than they otherwise would in an attempt to obtain as many fishing days as they can (i.e., "the race to fish") before the cap is reached. As for Alternative B, the race to fish could also bring costs if it causes vessel operators to forego vessel maintenance or to fish in weather or ocean conditions than they otherwise would not. This could bring costs in terms of human safety as well as the performance of the vessel and its fishing gear and crew. This race to fish effect could also be expected in the time period between when a closure of the fishery is announced and when the fishery is closed. Given that the overall effort limit may not represent real change from the status quo, it is unlikely that any adverse impacts from the race to fish would be substantial.

### 4.1.5 Alternative E: Least Restrictive Variation for Fishing Effort Limit Provision

Under Alternative E, for the U.S. purse seine vessels fishing in the Convention Area, the effort limit would be implemented on a three-year combined basis. All other provisions would be identical to Alternative B. This alternative allows for the maximum flexibility in the effort limit to account for variations in fishing patterns in different years. Overall, the impacts to the fleet would be similar to those under Alternative B. However, the lack of any limits for a given year would bring the potential for a longer closed period (e.g., during a substantial part of 2011) than would likely occur under Alternative B (under which relatively brief closures might be expected in one or more of the years 2009-2011). To the extent that continuous fishing and continuity of supply are important for the fishery, several short closures might cause less adverse economic impacts than a single long closure. For example, with a brief closure each year, vessel owners and operators might be able to schedule routine vessel maintenance during the closed periods and mitigate the losses of not being able to fish. This would be more difficult to do during a longer closed period. In any case, because the majority of the fleet's traditional fishing grounds would not be subject to the limit or the closure, the potential losses caused by a closed period – however short or long – are likely to be relatively minor.

## 4.2 The U.S. Longline Fisheries

The direct and indirect effects to the U.S. longline fisheries from the proposed rule to ensure the timely implementation of the bigeye tuna catch limit established by the WCPFC or from any of the alternatives to the proposed rule would fall into two categories: (1) economic; and (2) changes to fishing patterns and activities. The RIR for the proposed rule provides an in-depth analysis of the potential economic impacts of the proposed rule to the fleets and is incorporated here by reference, pursuant to 40 CFR § 1502.23. The general information regarding economic impacts in the discussion below is provided to help compare the alternatives analyzed and to determine whether the economic impacts are interrelated with environmental impacts. The potential impacts from implementation of any of the alternatives to each of the potentially affected resources are analyzed in Sections 4.3 to 4.6.

### 4.2.1 Alternative 1: No-Action Alternative, U.S. Longline Fisheries Bigeye Tuna Catch Limit Rule

Under Alternative 1, the catch limit for WCPO bigeye tuna established by the WCPFC for the U.S. longline fisheries would not be implemented in a timely manner and the U.S. longline fisheries would be able to continue targeting and landing bigeye tuna after the established limit has been exceeded. This alternative would cause no direct changes to the status quo.

As discussed throughout Chapter 3, additional management measures that lead to a reduction in the mortality of yellowfin and bigeye tuna are needed to sustain WCPO tuna stocks at MSY. Thus, this alternative could lead to negative impacts on the ability of the U.S. longline fleets to maintain catch levels and in turn to generate revenue that would maintain the profitability of the fleets in the long term. However, many other factors affect the stock status of WCPO bigeye and yellowfin tuna and the proposed rule would be in effect for a three-year limited period. Thus, the status of the fleets under the No-Action Alternative would be similar to the status of the fleets under any of the action alternatives analyzed in this EA.

### 4.2.2 Alternative 2: Closure of the Deep-Set Sector

Alternative 2 would implement the specific bigeye tuna longline catch limit for the Hawaii and west-coast based U.S. longline fleets, set by the WCPFC, calculated to be 3,763 metric tons for the years 2009, 2010, and 2011, as described in Chapter 2, Section

2.1.2. Under this alternative, once the limit has been reached for a given year it would be prohibited to use a U.S. fishing vessel to deploy longline gear in the Convention Area, to retain on board bigeye tuna or yellowfin tuna captured by longline gear in the Convention Area, or to land or transship bigeye tuna or yellowfin tuna captured by longline gear in the Convention Area. Exempt from the prohibitions would be the use of a vessel to deploy longline gear in a shallow-set manner to target swordfish. Also, any bigeye tuna or yellowfin tuna on board at the time of the closure may be retained on board and landed, and captured bigeye tuna and yellowfin tuna could be landed in the Territory of American Samoa, the Territory of Guam, or the CNMI, provided that it was not caught in the portion of the U.S. EEZ surrounding the Hawaiian Archipelago and that it is landed by a U.S. fishing vessel operated in compliance with a valid permit issued under the Pelagics FMP or West Coast HMS FMP. Bigeye and yellowfin tuna currently landed in the territories is caught by the vessels based in the territories. Thus, this alternative could give Hawaii-based longline vessels the incentive to land bigeye and yellowfin tuna in the territories. However, the likelihood of this occurring is small, since the market for fresh caught bigeye and yellowfin tuna in these areas is limited and the cost of transporting the fish to larger markets could be prohibitive.

This alternative could cause changes to the fishing patterns and practices of the Hawaii longline fleet. If and when the maximum allowable amount of bigeye tuna landings is reached in a given year, affected fishing businesses would be expected to cease fishing for the remainder of the calendar year or to shift from deep-setting in the WCPO to the next best opportunity. Although those opportunities cannot be predicted with certainty, two opportunities that would appear to be attractive to vessels in the fishery include shallow-setting (i.e., for swordfish) and deep-setting for bigeye tuna in other areas, specifically the EPO. Making such shifts would bring opportunity costs to the affected fishing operations, but the magnitude of those costs cannot be projected.

Because the limit would be set on a calendar year basis, the “race to fish” effect would be expected at the beginning of the calendar year, and the closure of the deep-set sector of the fishery would be expected toward the end of the calendar year. A race to fish could cause vessel operators to forego vessel maintenance or to fish in weather or ocean conditions than they otherwise would not, which could affect human safety and the performance of the vessel and the fishing gear and its crew. This race to fish effect could also be expected in the time period between when closure of deep-setting is announced and when the closure takes place. The degree of the race to fish effect cannot be predicted with certainty. However, given that fishing effort and catch is dependent on many other factors (e.g., ocean conditions and market conditions), it is unlikely that any adverse effects would be substantial.

This alternative would also be expected to bring costs to the affected fishing operations (e.g., through lost revenues and/or opportunity costs), as well as economic impacts to forward- and backward-linked economic sectors, including businesses that supply fishing vessels and businesses that market the fish they catch. As mentioned above, detailed discussion of these economic impacts is included in the RIR for the rule.

### 4.2.3 Alternative 3: Prohibition on Retention, Landing, or Transshipping of Bigeye Tuna

Under Alternative 3, in order to ensure NMFS' timely implementation of the WCPO bigeye tuna catch limit for the U.S. longline fleets established by the WCPFC, vessels would be prohibited from retaining on board, landing, or transshipping any catch of bigeye tuna in the limit's area of application, once the limit has been reached for the calendar year, except that any bigeye tuna already on board a vessel at the time of the prohibition may be retained on board and landed and any captured bigeye tuna could be landed in the Territory of American Samoa, the Territory of Guam, or the CNMI, provided that it was not caught in the portion of the U.S. EEZ surrounding the Hawaiian Archipelago and that it is landed by a U.S. fishing vessel operated in compliance with a valid permit issued under the Pelagics FMP or West Coast HMS FMP. In other words, this alternative would differ from Alternative 2 only in that fishing vessels would be allowed to continue longlining in the affected area after the limit is reached, provided that no bigeye tuna are retained or landed.

This alternative would be expected to cause changes to the fishing patterns and practices of the Hawaii longline fleet. If and when the maximum allowable amount of bigeye tuna landings is reached in a given year, affected fishing businesses would be expected to cease fishing for the remainder of the calendar year or shift from deep-setting for bigeye tuna in the WCPO to the next best opportunity. Although those opportunities cannot be predicted with certainty, three opportunities that would appear to be attractive to vessels in the fishery include shallow-setting (i.e., for swordfish), deep-setting for bigeye tuna in other areas, specifically the EPO, and deep-set longline fishing in the Convention Area for species other than bigeye tuna. Making such shifts would bring opportunity costs to the affected fishing operations, but the magnitude of those costs cannot be projected. Unlike Alternative 2, this alternative would also allow vessels to continue deep-setting in the Convention Area, provided they do not retain or land any bigeye tuna. It is not known whether fishing in such a manner would be economically viable. Given the lack of this kind of fishing activity historically, it would appear to be more costly than shallow-setting or deep-setting for bigeye tuna in the EPO.

As for Alternative 2, because the limit would be set on a calendar year basis, the "race to fish" effect would be expected at the beginning of the calendar year, and the prohibitions would be expected to go into effect at the end of the calendar year. This race to fish effect could also be expected in the time period between when announcement of the prohibition is made and when the prohibition takes place, leading to the same potential safety and operational effects that could be caused by Alternative 2.

This alternative would also be expected to bring costs to the affected fishing operations (e.g., through lost revenues and/or opportunity costs), as well as economic impacts to forward- and backward-linked economic sectors, including businesses that supply fishing vessels and businesses that market the fish they catch. As mentioned above, detailed discussion of these economic impacts is included in the RIR for the rule.

### 4.2.4 Alternative 4: Closure of the Deep-Set and Shallow-Set Sectors

Under Alternative 4, in order to ensure the timely implementation of the WCPO bigeye tuna catch limit for the U.S. longline fishery established by the WCPFC, both the shallow-set and deep-set components would be closed once the limit has been reached for the calendar year (i.e., no U.S. vessels would be allowed to conduct longline fishing operations in the limit's area of application), except that any bigeye tuna already on board a vessel at the time of the closure may be retained on board and landed and any captured bigeye tuna could be landed in the Territory of American Samoa, the Territory of Guam, or the CNMI, provided that it was not caught in the portion of the U.S. EEZ surrounding the Hawaiian Archipelago and that it is landed by a U.S. fishing vessel operated in compliance with a valid permit issued under the Pelagics FMP or West Coast HMS FMP.

This alternative would be expected to cause changes to the fishing patterns and practices of the Hawaii longline fleet. If and when the maximum allowable amount of bigeye tuna landings is reached in a given year, affected fishing businesses would be expected to cease fishing for the remainder of the calendar year or shift from deep-setting and shallow-setting in the WCPO to the next best opportunity. Although those opportunities cannot be predicted with certainty, one opportunity that would appear to be attractive to vessels in the fishery is deep-setting for bigeye tuna in other areas, specifically the EPO. Making such shifts would bring opportunity costs to the affected fishing operations, but the magnitude of those costs cannot be projected.

Because the limit would be set on a calendar year basis, the same "race to fish" effects discussed for Alternatives 2 and 3 would be expected. This alternative would also be expected to bring costs to the affected fishing operations (e.g., through lost revenues and/or opportunity costs), as well as economic impacts to forward- and backward-linked economic sectors, including businesses that supply fishing vessels and businesses that market the fish they catch. As mentioned above, detailed discussion of these economic impacts is included in the RIR for the rule.

## *4.3 Bigeye and Yellowfin Tuna and Principal Target Stocks*

This section begins with the impact analysis for bigeye tuna and yellowfin tuna from the alternatives assessed for each of the proposed rules, because both rules focus on limiting the fishing mortality of bigeye tuna and yellowfin tuna.

The section then presents the impact analysis for other principal target stocks of the U.S. WCPO purse seine and longline fisheries, because (although bigeye tuna is not a principal target stock of the U.S. WCPO purse seine fleet), the impacts to these stocks would be similar to the impacts to bigeye tuna and yellowfin tuna.

### 4.3.1 Alternative A: No-Action Alternative for the U.S. Purse Seine Rule

Under Alternative A, the U.S. purse seine fleet would continue to be managed through existing requirements, and the provisions of the proposed rule would not be implemented. As discussed in Chapter 3, Section 3.4, WCPO bigeye tuna has been determined to be subject to overfishing, and the fishing mortality rate of WCPO yellowfin tuna is believed to be very close to the overfishing threshold. Thus, under Alternative A, the No-Action or baseline alternative, WCPO bigeye and yellowfin tuna stocks could decline to sizes smaller than that which is capable of producing MSY. However, as stated above, many other factors affect the stock status of WCPO bigeye and yellowfin tuna and implementation of the proposed rule under any of the alternatives would not substantially change the fishing practices and patterns of the fleet. Thus, the status of the stocks under the No-Action Alternative would not differ substantially from any of the action alternatives. Under this alternative, however, the minor beneficial effects that the stocks could experience from implementation of the proposed rule under any of the action alternatives would not occur. Thus, there could be some increased potential for long-term negative effects to the stocks over the action alternatives, although such effects cannot be predicted with certainty.

### 4.3.2 Impacts to Bigeye Tuna and Yellowfin Tuna from the Proposed U.S. Purse Seine Rule – Alternative B

Overall, Alternative B would likely lead to some beneficial impact on the WCPO stocks of bigeye and yellowfin tuna by reducing the fishing mortality on predominantly the juvenile stocks of yellowfin tuna and bigeye tuna during the FAD prohibition periods and possibly by reducing the fishing mortality on the same juvenile tuna through the catch retention requirement. The FAD prohibition periods would likely have some potentially negative effect on the WCPO stock of yellowfin tuna by increasing the fishing mortality on the stock as a result of targeting large unassociated tunas. This negative impact would be ameliorated by reduced catches of both juvenile yellowfin tuna and bigeye tuna, which may have a chance to move or recruit to a deeper, non-predominantly FAD associated life cycle that would provide benefits both in terms of more (larger yellowfin tuna) available to unassociated fishing as well as to the longline fishery. There could also be some as yet impossible to quantify benefits of reduced fishing mortality on juvenile yellowfin tuna through the catch retention requirement. Overall, it is likely that the indirect effects of Alternative B on WCPO bigeye and yellowfin tuna stocks would be beneficial. However, these beneficial effects would be relatively small, because: (1) the duration of the FAD prohibition periods is only three years and the catch retention requirement would be implemented for a maximum of two years; and (2) this alternative would result in only a small reduction in the fishing mortality contributed by the U.S. purse seine fleet.

As discussed in Chapter 3, section 3.5.2, both adult bigeye tuna and adult yellowfin tuna are considered among the top predators of the tropical or warm pool marine ecosystem. Changes to the WCPO stocks of these species could lead to trophic interactive effects, including increased competition for prey species with other top predators. Larval and juvenile bigeye tuna and yellowfin tuna are also sources of food for other marine species, such as fish, seabirds, porpoises, marine mammals, and sharks. Thus, increases in larval and juvenile tuna could increase the food available for these other species. It is unlikely that the effects of Alternative B to the WCPO stocks of bigeye and yellowfin tuna, which would be short-lived, would be large enough to impact the marine ecosystem. There are those who have postulated that the robustness of the WCPO skipjack stocks may in part be due to the reduction in biomass of adult bigeye tuna and yellowfin tuna – both of which are known to be voracious feeders on all forms of small fish including skipjack tuna. A return to higher biomass levels of these two stocks may lead to a reduction in the WCPO skipjack biomass, but this would be unlikely to occur from implementation of the proposed rule under Alternative B. Overall, Alternative B would not cause substantial effects on biodiversity and ecosystem function.

### 4.3.3 Impacts to Bigeye Tuna and Yellowfin Tuna from the Proposed U.S. Purse Seine Rule – Alternatives C, D, and E

Under Alternative C and E, the impacts to the WCPO stocks of bigeye and yellowfin tuna would be essentially the same as the impacts under Alternative B.

Under Alternative D there would be no flexibility in the number of fishing days available to U.S. purse seine owners and operators. In the years where fishing conditions allowed for more catch of bigeye and yellowfin tuna than in typical years (due to ocean conditions, climate conditions, or market conditions), less bigeye and yellowfin tuna catch would be expected under Alternatives D than under the Alternatives B, C, or E. Overall, the fishing mortality of bigeye and yellowfin tuna would likely be less under Alternative D than under B, C, or E because under Alternative D it would be more likely that the fishing day effort limit would be reached and the fishery closed in a given year. Alternative D would also set the limit at the start of the license period as opposed to the calendar year, meaning that the impacts from the “race to fish” would be experienced at a different time. However, because the fishery operated year round, timing of the “race to fish” would be unlikely to impact the tunas stocks. Moreover, given that the effort limit would in place for a three-year period, the differences between the alternatives in terms of effects to WCPO bigeye tuna and yellowfin tuna would not be substantial.

### 4.3.4 Alternative 1: The No-Action Alternative for the U.S. Longline Rule

Under Alternative 1, the U.S. longline fleets would continue to be managed through existing requirements, and the provisions of the proposed rule would not be implemented. As discussed in Chapter 3, Section 3.4, overfishing of the WCPO bigeye tuna stock is likely occurring, meaning that if it continues, the stock size can be expected to decline to levels smaller than those needed to produce MSY. However, as stated above, many other factors affect the stock status of WCPO bigeye tuna and implementation of the proposed rule under any of the alternatives would not substantially change the fishing practices and patterns of the fleets. Thus, the status of WCPO bigeye tuna under the No-Action

Alternative would be similar to the status of the stocks under any of the action alternatives analyzed in this EA. Under this alternative, however, the minor beneficial effects that the stocks could experience from implementation of the proposed rule under any of the action alternatives would not occur. Thus, there could be some increased potential for long-term negative effects to the stocks over the action alternatives, although such effects cannot be predicted with certainty. The analysis in the RIR indicates that implementation of the proposed rule under any of the alternatives would have the potential to reduce the stock's total fishing mortality rate by about one half of one percent.

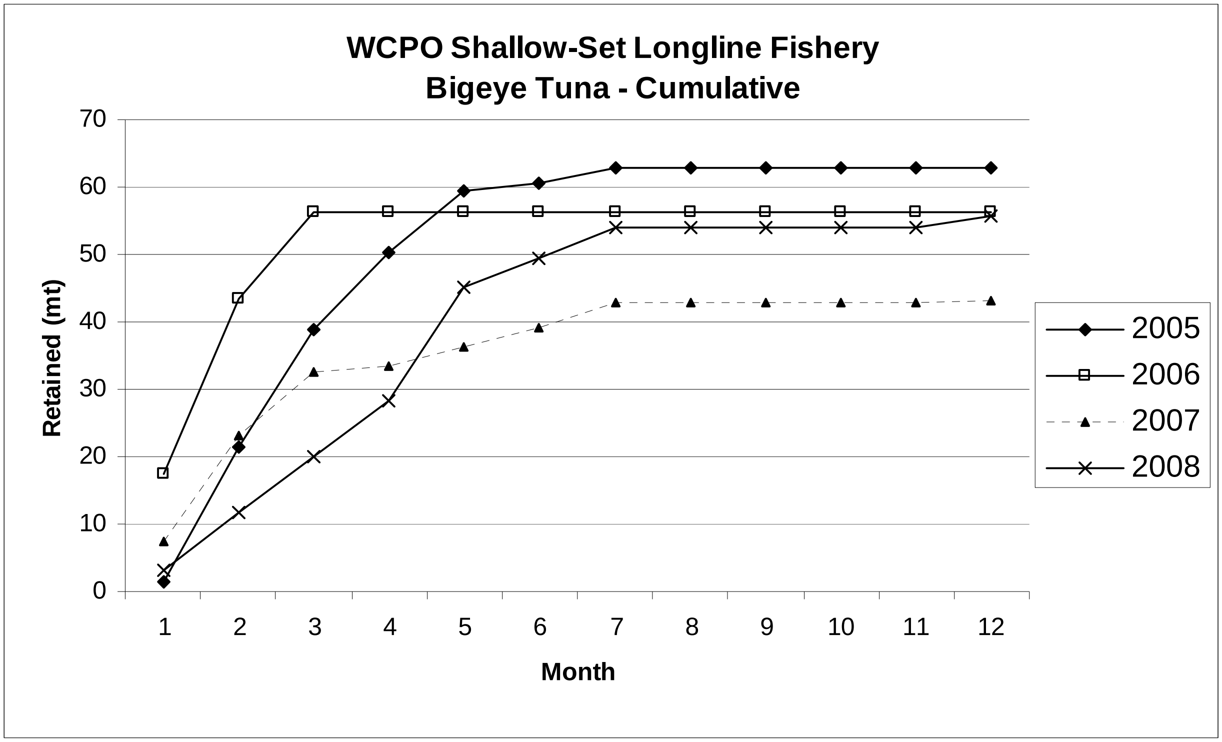
### 4.3.5 Alternative 2: Action Alternative for the U.S. Longline Rule, Closure of the Deep-Set Sector of the Fishery

Under Alternative 2, as soon as the bigeye tuna limit for bigeye tuna established by the WCPFC is reached for a given calendar year, U.S. longline vessels would not be able to conduct any deep-set fishing activities in the Convention Area, or retain on board or land or transship any catch of bigeye or yellowfin tuna caught in the Convention Area (except for fish that were taken before the limit was reached), unless the catch is landed in the Territory of American Samoa, the Territory of Guam, or the CNMI, provided that it was not caught in the portion of the U.S. EEZ surrounding the Hawaiian Archipelago and that it is landed by a U.S. fishing vessel operated in compliance with a valid permit issued under the Pelagics FMP or West Coast HMS FMP.

Alternative 2 would likely lead to a direct reduction in fishing mortality on WCPO bigeye tuna and yellowfin tuna, and thus, would have direct beneficial impacts on the stocks. However, those impacts are likely to be negligible because: (1) the limit would be in effect for only three years, after which fishing rates and fishing mortality rates contributed by the U.S. longline fisheries on the two stocks would be expected to rebound to the levels under No-Action; and (2) as stated above, under Alternative 2, after the limit is reached, longline vessels could transfer their effort to other areas, such as the EPO, mitigating any diminishing effect of the closure on fishing mortality rates (as stated in Section 3.4, the stock structure of bigeye tuna in the Pacific Ocean is not well known, but there is some degree of mixing between the EPO and WCPO, so any fishing mortality in the EPO would likely affect the status of the stock in the WCPO). Moreover, the stock of EPO yellowfin tuna is subject to overfishing. Although there is not a distinct boundary between WCPO yellowfin tuna and EPO yellowfin tuna, an increase in effort on EPO yellowfin tuna could lead to additional adverse (but again, very minor) effects on this stock. There could also be some transfer of effort to the shallow-set fishery, but the amount of bigeye tuna incidentally caught (and discarded) in the shallow-set fishery would likely be very small.

Figure 11 below shows the amount of bigeye tuna landings from the shallow-set sector of the fishery from 2005 to 2008. The effects on the stocks would be so minor under this alternative, that any effects to ecosystem function and biodiversity would not be expected.

**Figure 11 Bigeye tuna in the WCPO shallow-set fishery, cumulative by month, 2005-2008**




Source: NMFS unpublished data, compiled by the Pacific Islands Fisheries Science Center.

### 4.3.6 Alternative 3: Action Alternative for the U.S. Longline Rule, No Retention, Landing, or Transshipping of Bigeye Tuna

Under Alternative 3, as soon as the bigeye tuna limit is reached in a given calendar year, U.S. longline vessels would not be able to retain or land or transship any catches of bigeye tuna made in the Convention Area (except for fish that were taken before the limit was reached), unless the catch is landed in the Territory of American Samoa, the Territory of Guam, or the CNMI, provided that it was not caught in the portion of the U.S. EEZ surrounding the Hawaiian Archipelago and that it is landed by a U.S. fishing vessel operated in compliance with a valid permit issued under the Pelagics FMP or West Coast HMS FMP.

Alternative 3 would have effects on WCPO bigeye tuna similar to those of Alternative 2. Any beneficial impacts, however, could be somewhat less than under Alternative 2, since the longline vessels could still be used to both deep-set and shallow-set in the Convention Area, provided that no bigeye tuna is retained, landed, or transshipped. As stated above, the amount of bigeye tuna incidentally caught (and discarded) in the shallow-set fishery would likely be very small. However, given that bigeye tuna is one of the most commonly caught species in the deep-set fishery, it is likely (unless fishing methods are radically modified to reduce catch rates) that substantial amounts of bigeye tuna would be caught in any deep-setting that occurs in the Convention Area after the limit is reached.

The opportunity costs of deep-setting for species other than bigeye tuna is not known; that is, it is not known whether it would be an economically viable activity for any of the affected vessels. The opportunity cost of simply shifting to the EPO to deep-set for bigeye would seem to be almost certainly less, so substantial deep-setting in the Convention Area after the limit is reached would not be expected.

The beneficial impacts to WCPO yellowfin tuna under this alternative would be less than under Alternative 2, since yellowfin tuna could continue to be retained, landed, and transshipped. However, as for Alternative 2, the effects on WCPO bigeye tuna and WCPO yellowfin tuna would so minor, that any effects to ecosystem function and biodiversity would not be expected.

### 4.3.7 Alternative 4: Action Alternative for the U.S. Longline Rule, Closure of the Deep-set and Shallow-set Sectors of the Fishery

Under Alternative 4, as soon as the bigeye tuna limit is reached in a given calendar year, U.S. longline vessels would not be able to conduct any longline fishing in the Convention Area, or retain on board and land or transship any catch of bigeye tuna and yellowfin tuna captured in the Convention Area, unless the catch is landed in the Territory of American Samoa, the Territory of Guam, or the CNMI, provided that it was not caught in the portion of the U.S. EEZ surrounding the Hawaiian Archipelago and that it is landed by a U.S. fishing vessel operated in compliance with a valid permit issued under the Pelagics FMP or West Coast HMS FMP.

Alternative 4 would have effects on WCPO bigeye tuna and WCPO yellowfin tuna similar to those of Alternative 2. Any beneficial impacts, however, would likely be slightly greater than those of Alternatives 2 or 3. Because both the deep-set and shallow-set components of the fishery would be closed, there would be no risk that any WCPO bigeye tuna or yellowfin tuna would be captured incidentally after the fishery is closed. However, as for Alternatives 2 and 3, the effects on WCPO bigeye tuna and WCPO yellowfin tuna would be so minor, that any effects to ecosystem function and biodiversity would not be expected.

### 4.3.8 Impacts to Other Principal Target Stocks from the U.S. Purse Seine Rule

Skipjack tuna is the other principal target stock of the U.S. WCPO purse seine fishery. The impacts to the WCPO stock of skipjack tuna from the proposed purse seine rule under any of the alternatives would be similar to the impacts experienced by the WCPO stocks of bigeye and yellowfin tuna. As discussed above, studies have predicted that the FAD prohibition periods could lead to a 6.5% reduction in the overall average catch of skipjack tuna in the Convention Area in the long term. The catch retention requirement could also reduce the amount of juvenile skipjack tuna caught; because vessels would be unable to discard small-sized fish, they would have more incentive to target large-sized fish. However, because the size and species composition of landed fish are affected by many variations unrelated to the proposed rule (changes in ocean conditions, changes in climate, fuel prices, market conditions, etc.), the impacts from the proposed rule to skipjack tuna could be offset by these other factors.

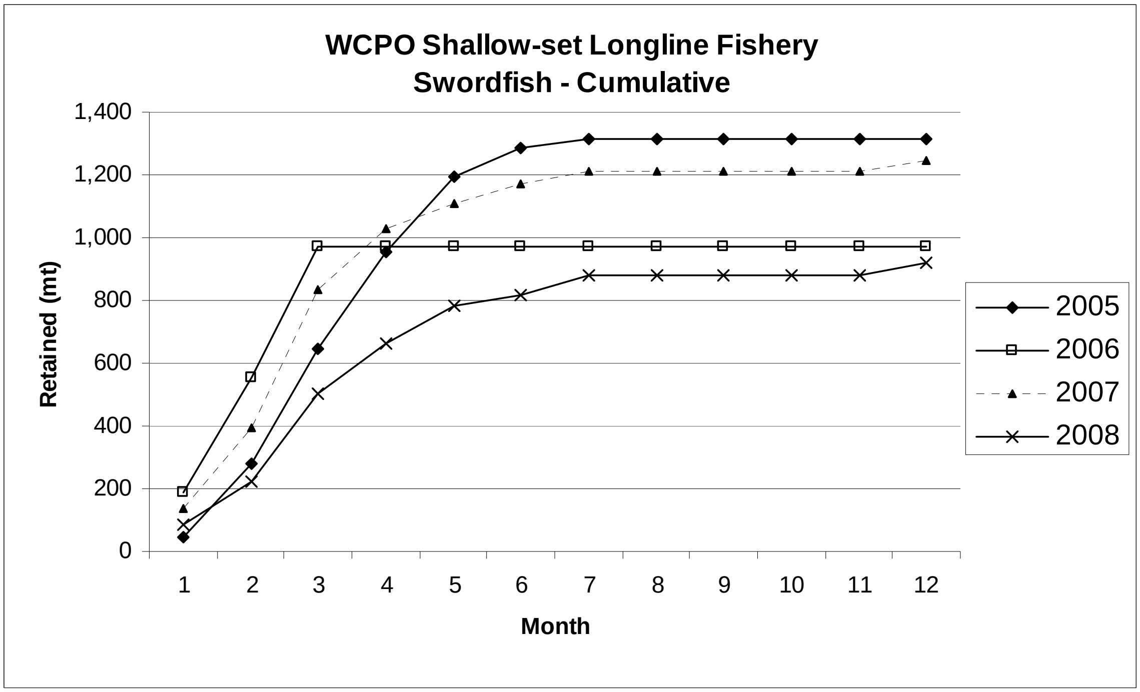
The FAD prohibition periods are projected to have a beneficial effect on the WCPO stock of skipjack tuna by decreasing the fishing mortality on the stock, which would be enhanced by the reduction in fishing mortality on juvenile skipjack tuna through the catch retention requirement.

Under Alternative A, the No-Action Alternative, the WCPO stock of skipjack tuna would not experience these small potential beneficial effects. The effects to the stock under Alternatives C and E would essentially be the same as the effects under Alternative B. Under Alternative D there would be no flexibility in the number of fishing days available under these alternatives. In the years where fishing conditions allowed for more catch of skipjack tuna than in typical years (due to ocean conditions, climate conditions, or market conditions), less skipjack tuna catch would be expected under Alternative D than under Alternatives B, C, or E. Overall, the fishing mortality of WCPO skipjack tuna would likely be less under Alternative D than under B, C, or E, because under Alternative D it would be more likely that the fishing day effort limit would be reached and the fishery closed in a given year.

### 4.3.9 Impacts to Other Principal Target Stocks from the U.S. Longline Rule

The other principal target stock for U.S. longline fleets in the Convention Area is swordfish. Under Alternative 1, the No-Action Alternative, there would be no effects to the swordfish stock. Under Alternative 2, the shallow-set sector of the longline fishery, which targets swordfish, would remain open, so there would likely be slightly increased fishing mortality of swordfish. As stated in Chapter 3, the stock status of swordfish is currently neither overfishing nor overfished, so it is unlikely that such an increase would cause detrimental impacts to the stock. Moreover, as shown in Figure 12 below, in the Convention Area for the years 2005-2008, the majority of swordfish was landed by the fleets in the beginning of the calendar year. Therefore, since any closure of the deep-set sector would take place toward the end of the calendar year, it is unlikely that any shift in effort to the shallow-set sector would cause large increases in swordfish mortality.

**Figure 12 Retained catch of swordfish by U.S. fleets in the WCPO shallow-set longline fishery**




Source: NMFS unpublished data, compiled by the Pacific Islands Fisheries Science Center.

Under Alternative 3, although both the shallow-set and deep-set sectors of the fishery would remain open, it is likely that there would be some transfer of effort to the shallow-set sector to target swordfish. So the effects to the stock under this alternative would be the same as under Alternative 2.

Under Alternative 4, both the shallow-set and deep-set sectors of the fishery would be closed, so there would be no shift in fishing effort to target swordfish.

## *4.4 Secondary Target Stocks*

This section discusses the principal effects from each of the proposed rules to the secondary target stocks of the affected fisheries.

### 4.4.1 Effects to Secondary Target Stocks from the U.S. Purse Seine Rule

#### 4.4.1.1 Alternative A

Under Alternative A, the No-Action Alternative to the purse seine rule, there would be no additional effects to secondary target stocks.

#### 4.4.1.2 Action Alternatives for the U.S. Purse Seine Rule

Under Alternatives B, C, and E for the proposed rule, there could be some change in the amount and type of secondary target stocks caught by the U.S. WCPO purse seine fleet. As discussed above, during the FAD prohibition periods, the fleet may fish in different areas than fished historically, which would affect the composition of the catch, including both target stocks and secondary target stocks, and there could be some shift in effort to PIC EEZs. If the proposed rule under any of these alternatives leads to the catch of larger amounts of secondary target stocks, the catch retention requirements could counteract potential negative effects to these species. Under the provisions of the catch retention requirement, vessels would have less well space for secondary target stocks, since they would have to retain all catch of their target species (skipjack, bigeye, and yellowfin tuna). Moreover, any decrease in overall fishing effort could also have beneficial impacts to these species.

Under Alternative D, there would be no flexibility in the number of fishing days available. In the years where fishing conditions allowed for more catch of secondary target stocks than in typical years (due to ocean conditions, climate conditions, or market conditions), less catch from these stocks would be expected under Alternative D than under Alternatives B, C, or E.

### 4.4.2 Effects to Secondary Target Stocks from the U.S. Longline Rule

None of the alternatives are anticipated to cause large changes to the overall amount of secondary target stocks currently caught by the U.S. longline fleets operating in the Convention Area. Under Alternative 1, the No-Action Alternative, there would be no change to existing conditions. Under Alternative 2, the deep-set sector of the fishery would be closed in the Convention Area, so there could be some transfer of fishing effort to the shallow-set sector and to other areas, such as the EPO; so similar amounts of secondary target stocks would be expected as under existing conditions. Under Alternative 3, both the deep-set and shallow-set sectors of the fishery would remain open; any transfer of effort would be expected to result in catch of secondary target stocks that is similar to existing conditions. Under Alternative 4, although both sectors of the fishery would be closed, transfer of effort to other areas, such as the EPO, would be expected, and thus, the amount of catch of secondary target stocks would also be expected to remain similar to existing conditions. Should vessels cease fishing during a prohibition or closure period, effects to secondary target stocks would be beneficial.

The U.S. longline fleets that would be affected by the proposed rule (the Hawaii and west coast-based fleets) do not currently target albacore. However, as stated in Chapter 3, longlining is one of the main fishing methods for targeting this species. The stock status (with respect to the status determination criteria established under the MSA, and as determined by NMFS) of North Pacific albacore tuna is currently unknown, while the stock status of South Pacific albacore tuna is neither overfished nor subject to overfishing.

In 2005, the WCPFC adopted two CMMs regarding albacore: CMM 2005-02, Conservation and Management Measure for South Pacific Albacore; and CMM 2005-03, Conservation and Management Measure for North Pacific Albacore. The WCPFC has found that the stock of albacore tuna in the North Pacific is either fully exploited or experiencing fishing mortality greater than long-term sustainable levels. Accordingly, CMM 2005-02 requires CCMs to ensure that fishing effort directed at albacore tuna in the North Pacific does not increase. As stated above, under Alternative 3, the affected fleets could shift their fishing effort to targeting other species, such as albacore tuna, in the Convention Area. Should the proposed rule under this alternative cause U.S. longline fleets to shift their fishing effort from targeting bigeye tuna to targeting albacore tuna, NMFS would have to evaluate the fishing effort directed at albacore tuna in light of the obligations of the United States under the CMM and possibly consider regulatory action with respect to North Pacific albacore tuna.

## *4.5 Protected Resources*

This section discusses the potential impacts from each of the proposed rules to protected resources in the affected environment.

### 4.5.1 Impacts to Protected Resources from the Proposed U.S. Purse Seine Rule

### 4.5.2 Alternative A

Under Alternative A, the No-Action Alternative to the purse seine rule, there would be no additional effects to protected resources, and the provisions to mitigate impacts to sea turtles from U.S. WCPO purse seine fishing activities would not be implemented.

### 4.5.3 Action Alternatives for the U.S. Purse Seine Rule

Chapter 3, Section 3.6, identifies the species in the Convention Area listed as threatened or endangered under the ESA. Table 14 lists the marine mammals in the Convention Area that are protected pursuant to the MMPA.

As stated above and in Chapter 3, the number of observed interactions between sea turtles and U.S. WCPO purse seine vessels are very limited and in most instances result in the animal being released alive and in good condition. The proposed rule under the action alternatives B, C, D, and E would have the following effects: (1) the FAD prohibition periods and the catch retention requirement would affect the size and species composition of landed fish; (2) the fishing day effort limit and high seas area closures could lead to an increase in fishing effort in PIC EEZs in the WCPO and a slight overall reduction in fishing effort; and (3) the FAD prohibition periods could transfer some fishing effort from FAD sets to unassociated sets during the prohibition period and possibly shift fishing effort from the FAD prohibition period to other periods of the year. As discussed above, overall, the changes to the fishing practices and patterns of the fleet under these alternatives are not expected to be substantial. The proposed rule under these alternatives would also contain specific provisions to mitigate the effects on sea turtles from U.S. WCPO purse seine fishing operations. Thus, the overall effects to sea turtles from the proposed rule under any of these alternatives would be beneficial – even if just for that very small portion of turtles that are reported to be harmed as a result of interaction with the purse seine fleet's fishing operations. To the extent that there could be a slight reduction in fishing effort, any effects to ESA-listed species or critical habit of these species would be beneficial, since there would be a reduced risk of interaction with the protected resource.

The Final Biological Opinion and Incidental Take Statement for the U.S. WCPO purse seine fishery for effects to ESA-listed sea turtles and marine mammals was issued on November 1, 2006, concluding formal Section 7 ESA consultation for species under the jurisdiction of NMFS. The terms and conditions of the Incidental Take Statement are very similar to the provisions of CMM 2008-03 that would be implemented through the proposed rule. By letter dated January 28, 2009, the USFWS concurred with NMFS' determination that a proposed regulation that would not alter U.S. purse seine fishing practices or fishing effort would not be likely to adversely affect ESA-listed species under the jurisdiction of USFWS. The proposed rule under these alternatives would not cause any impacts to ESA-listed threatened or endangered species that have not been addressed in prior consultations.

The proposed rule under any of these alternatives also would not cause any impacts to marine mammals not previously considered or authorized by the commercial taking exemption under section 118 of the MMPA. The changes to the fishing practices and patterns of the fleet under these alternatives are not expected to be substantial and to the extent that there could be a slight reduction in fishing effort, any effects to marine mammals would be beneficial, since there would be a reduced risk of interaction.

The proposed rule under any of these alternatives would not cause any impacts to the NWRs or National Monuments described in Chapter 3, Section 3.6.3. Any geographical shifts in fishing effort would be minor and increased fishing effort would not be expected to affect these areas (the possible increases in fishing effort would be expected in PIC EEZs).

The proposed rule under any of these alternatives would not cause any adverse impacts to areas designated as EFH or HAPC, as described in Chapter 3, Section 3.6.2, or to ocean and coastal habitats. The proposed rule under any of these alternatives would not cause changes to overall fishing practices, and any geographical shifts in fishing effort would be minor and would not occur in areas designated as EFH (the possible increases in fishing effort would be expected in PIC EEZs).

### 4.5.4 Impacts to Protected Resources from the U.S. Longline Rule

Under Alternative 1, the No-Action Alternative, there would be no change to existing conditions, and thus, no impacts to protected resources than those presently assessed under current management measures.

Alternatives 2, 3, and 4 could each lead to a shift of fishing effort to other areas and to other species. If this transfer of fishing effort leads to an increase in fishing activity in areas where there is a greater incidence of protected resources, the potential for the fleet to interact with protected resources could be increased. However, any effects in terms of catches and fishing mortality rates to protected species are expected to be small compared to, for example, typical year-to-year variations in catches among species driven by changing oceanic and economic conditions. Thus, any shift that may occur as a result of Alternatives 2, 3, and 4 would be minor. To the extent that there could be a slight reduction in fishing effort, any effects to ESA-listed species or critical habit of these species would be beneficial, since there would be a reduced risk of interaction with the protected resource.

NMFS has completed several previous ESA consultations for the U.S. longline fishery in the Convention Area. They are as follows:

(1) Biological Opinion on Adoption of (1) proposed HMS FMP; (2) continued operation of HMS fishery vessels under permits pursuant to the HSFCA; and (3) ESA regulation on the prohibition of shallow longline sets east of the 150° West longitude (NMFS 2004a).

(2) Biological Opinion for the FMP for U.S. West Coast Fisheries for HMS and its effect on the endangered short-tailed albatross (*Phoebastria albatrus*) and the endangered brown pelican (*Pelecanus occidentalis*) (USFWS 2004).

(3) Biological Opinion on Continued Authorization of the Hawaii-based Pelagic, Deep-Set, Tuna Longline Fishery based on the FMP for Pelagic Fisheries of the Western Pacific Region (NMFS 2005b).

(4) Biological Opinion on Management Modifications for the Hawaii-based Shallow-set Longline Swordfish Fishery – Implementation of Amendment 18 to the FMP for Pelagic Fisheries of the Western Pacific Region (NMFS 2008c).

(5) Biological Opinion for the Effects of the Hawaii-based Domestic Longline Fleet on the Short-tailed Albatross (*Phoebastria albatrus*) (USFWS 2002).[54]

The proposed rule under these alternatives would not cause any impacts to ESA-listed threatened or endangered species that have not been addressed in prior or ongoing consultations.

As stated in Chapter 3, pursuant to the regulations implementing the MMPA at 50 CFR Part 229, the Hawaii longline fishery is classified as a Category I fishery. This means that

[54] The Incidental Take Statement in this biological opinion expired on December 31, 2006; USFWS and NMFS are currently consulting regarding impacts of the longline fishery to the short-tailed albatross and expect this consultation to be completed by the end of 2009. See Informal Consultation for the Western and Central Pacific Fisheries Convention Implementation Act Proposed Rulemaking, Letter from USFWS to NMFS, January 28, 2009.

the fishery has the potential for frequent incidental mortality and serious injury to marine mammals. However, it is unlikely that the proposed action would affect the number of interactions between the fishery and marine mammals. As discussed above, any effects in terms of catches and fishing mortality rates to protected species from shifts in fishing effort from the action alternatives are expected to be small compared to, for example, typical year-to-year variations in catches among species driven by changing oceanic and economic conditions.

The proposed rule under any of these alternatives would not cause any impacts to the NWRs or National Monuments described in Chapter 3, Section 3.6.3. Any geographical shifts in fishing effort would be minor and would not be expected to affect these areas.

The proposed rule under any of these alternatives would not cause any adverse impacts to areas designated as EFH or HAPC, as described in Chapter 3, Section 3.6.2, or to ocean and coastal habitats. The proposed rule under any of these alternatives would not cause changes to overall fishing practices, and any geographical shifts in fishing effort would be minor.

## 4.6 Environmental Justice

Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” states that “each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.” As discussed above, the overall environmental effects from each of rules under any of the alternatives would be minor and beneficial and generally would be distributed evenly among the affected vessels. Thus, none of the alternatives considered would result in significant and adverse effects on minority or low-income populations.

# Chapter 5

# Chapter 5 Cumulative Impacts

This chapter presents the cumulative impacts analysis for the Proposed Action. The Proposed Action would involve the implementation of two distinct rules. As set forth in Chapter 2, one rule would implement six management provisions for the U.S. WCPO purse seine fishery and the other rule would ensure NMFS' timely implementation of the bigeye tuna catch limit established by the WCPFC for U.S. longline fleets.

A cumulative impact is defined by the CEQ's regulations at 40 CFR § 1508.7 as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." And further: "cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

Before beginning a cumulative impacts analysis, the geographic area of the analysis and the time frame for the analysis must be identified to determine the appropriate scope for the analysis (CEQ 1997). The geographic area of the analysis here is the Pacific Ocean area as described in Chapter 3 and in Section 5.1.1. The time frame for this analysis is from the present to some years into the future.

## *5.1 Affected Environment*

Chapter 3 describes the affected environment that potentially could be affected by the Proposed Action under any of the alternatives studied in depth. Chapter 3 sets forth the baseline for assessing the direct and indirect impacts of the Proposed Action, as presented in Chapter 4. This section supplements the information in Chapter 3 in order to establish the baseline for studying the other actions that are part of the cumulative impacts analysis. The section provides information on the fisheries that are active in the area of application of the Convention.

### 5.1.1 Convention Area HMS Fisheries

The dominant HMS fisheries in the Convention Area are tuna fisheries that target skipjack tuna, yellowfin tuna, bigeye tuna, and albacore tuna. Many distant-water fishing nations and coastal states participate and operations vary from small-scale, subsistence, and artisanal operations in the coastal waters of PIC, to industrial scale operations both in the EEZs of PIC and on the high seas.

HMS fisheries in the Convention Area are individually managed under a number of international agreements and associated domestic authorities. Catch and effort information is compiled by the OFP at the SPC as the scientific and data support provider to the WCPFC for most fisheries. The WCPFC Tuna Yearbook, produced by the OFP at SPC, summarizes this information and is available to the public (SPC website at: http://www.spc.int/oceanfish/Docs/Statistics/TYB.htm). Table 22 through Table 25 below summarize relevant data, such as, total catch by species, catch by gear, catch by nation, and number of active vessels.

Williams and Reid (2007) summarized the Convention Area HMS fishery in the following terms:

> Annual total catches of the four main tuna species (skipjack, yellowfin, bigeye, and albacore tuna) in the Convention Area increased steadily during the 1980s as the purse seine fleet expanded and remained relatively stable during most of the 1990s until the sharp increase in catch during 1998. During recent years, there has been an increasing trend in total tuna catch, primarily due to increases in purse-seine fishery catches. The provisional total Convention Area tuna catch for 2006 was estimated at 2,189,985 metric tons, the second highest annual catch recorded, and only slightly less than the record in 2005 (2,204,335 metric tons). During 2006, the purse seine fishery accounted for an estimated 1,573,447 metric tons (72% of the total catch–only 12,000 metric tons less than the record catch of 2005), with pole-and-line taking an estimated 211,829 metric tons (10%), the longline fishery an estimated 229,323 metric tons (10%), and the remainder (8%) taken by troll gear and a variety of artisanal gears, mostly in eastern Indonesia and the Philippines. The Convention Area tuna catch (2,189,985 metric tons) for 2006 represented 78% of the total Pacific Ocean catch of 2,800,740 metric tons and 51% of the global tuna catch (the provisional estimate for 2006 is just over 4.3 million metric tons).

**Table 22 Tuna catches in WCPFC Statistical Area by species (in metric tons)**

| Year | Albacore | % | Bigeye | % | Skipjack | % | Yellowfin | % | Total |
|---|---|---|---|---|---|---|---|---|---|
| 1996 | 92,032 | 6 | 92,412 | 6 | 1,022,589 | 67 | 322,072 | 21 | 1,529,105 |
| 1997 | 113,874 | 7 | 120,895 | 7 | 965,188 | 59 | 440,958 | 27 | 1,640,915 |
| 1998 | 112,997 | 6 | 122,161 | 6 | 1,309,692 | 65 | 462,769 | 23 | 2,007,619 |
| 1999 | 131,227 | 7 | 122,150 | 7 | 1,175,558 | 64 | 402,589 | 22 | 1,831,524 |
| 2000 | 101,894 | 5 | 124,234 | 7 | 1,238,181 | 65 | 430,147 | 23 | 1,894,091 |
| 2001 | 117,069 | 7 | 115,098 | 6 | 1,137,011 | 63 | 425,924 | 24 | 1,795,102 |
| 2002 | 146,196 | 7 | 130,302 | 7 | 1,312,991 | 66 | 408,900 | 20 | 1,998,389 |
| 2003 | 124,842 | 6 | 117,968 | 6 | 1,315,246 | 66 | 441,539 | 22 | 1,999,595 |
| 2004 | 122,331 | 6 | 156,348 | 8 | 1,404,977 | 68 | 374,844 | 18 | 2,058,500 |
| 2005 | 100,405 | 5 | 137,388 | 6 | 1,504,770 | 69 | 438,249 | 20 | 2,180,610 |
| 2006 | 104,405 | 5 | 139,061 | 6 | 1,566,472 | 70 | 439,756 | 20 | 2,249,694 |
| 2007 | 94,819 | 4 | 142,974 | 6 | 1,697,856 | 72 | 434,900 | 18 | 2,370,549 |
| Current 5 year average | 109,360 | 5.2 | 138,748 | 6.4 | 1,497,864 | 68.5 | 425,858 | 19.6 | 2,171,790 |

Source: Lawson, 2008, Table 90.

**Table 23 Tuna catches in WCPFC Statistical Area by gear (albacore, bigeye, skipjack, and yellowfin tuna, in metric tons)**

| Year | Longline | % | Pole & Line | % | Purse seine | % | Troll | % | Other | % | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1996 | 200,673 | 13 | 251,053 | 16 | 909,963 | 60 | 11,071 | 1 | 156,345 | 10 | 1,529,105 |
| 1997 | 217,089 | 13 | 273,844 | 17 | 993,681 | 61 | 8,848 | 1 | 147,453 | 9 | 1,640,915 |
| 1998 | 237,527 | 12 | 282,965 | 14 | 1,309,065 | 65 | 9,970 | 0 | 168,092 | 8 | 2,007,619 |
| 1999 | 206,998 | 11 | 302,239 | 17 | 1,144,752 | 63 | 6,417 | 0 | 171,118 | 9 | 1,831,524 |
| 2000 | 226,144 | 12 | 261,937 | 14 | 1,198,461 | 63 | 9,472 | 1 | 198,077 | 10 | 1,894,091 |
| 2001 | 236,038 | 13 | 207,300 | 12 | 1,175,404 | 65 | 7,790 | 0 | 168,092 | 9 | 1,795,102 |
| 2002 | 258,242 | 13 | 216,945 | 11 | 1,329,683 | 67 | 7,397 | 0 | 186,122 | 9 | 1,998,389 |
| 2003 | 241,296 | 12 | 221,676 | 11 | 1,327,211 | 66 | 8,802 | 0 | 200,610 | 10 | 1,999,595 |
| 2004 | 262,613 | 13 | 203,903 | 10 | 1,412,443 | 69 | 7,362 | 0 | 172,179 | 8 | 2,058,500 |
| 2005 | 232,210 | 11 | 213,050 | 10 | 1,565,218 | 72 | 5,856 | 0 | 164,276 | 8 | 2,180,610 |
| 2006 | 247,801 | 11 | 217,736 | 10 | 1,604,489 | 71 | 4,741 | 0 | 174,927 | 8 | 2,249,694 |
| 2007 | 230,479 | 10 | 214,735 | 9 | 1,715,702 | 72 | 4,230 | 0 | 205,403 | 9 | 2,370,549 |
| Current 5 year average | 242,880 | 11.4 | 214,220 | 10 | 1,525,013 | 70 | 6,198 | 0 | 183,479 | 8.6 | 2,171,790 |

Source: Lawson, 2008, Table 96.

**Table 24 2007 Tuna catches in WCPFC Statistical Area by nation/territory/fishing entity (albacore, bigeye, skipjack, and yellowfin tuna, in metric tons)**

| | | | |
|---|---|---|---|
| Japan | 468,104 | Fiji | 10,042 |
| Philippines | 368,518 | Kiribati | 18,020 |
| Indonesia | 322,170 | French Polynesia | 6,596 |
| Chinese Taipei | 276,458 | Spain | 19,747 |
| Korea | 278,482 | Australia | 4,735 |
| Papua New Guinea | 222,624 | Cook Islands | 2,826 |
| United States of America | 87,061 | New Caledonia | 1,770 |
| Vanuatu | 75,582 | Samoa | 3,559 |
| China | 69,796 | Tonga | 861 |
| Marshall Islands | 59,409 | Niue | 0 |
| Federated States of Micronesia | 15,440 | Canada | 27 |
| Solomon Islands | 21,511 | | |
| New Zealand | 32,905 | Total | 2,266,243 |

Source: Lawson, 2008, Table 97.

**Table 25 Number of vessels active[55] in WCPFC Statistical Area**

| Year | Purse seine | Pole & Line | Longline |
|---|---|---|---|
| 1996 | 597 | 1,668 | 4,696 |
| 1997 | 606 | 1,552 | 5,121 |
| 1998 | 338 | 1,483 | 4,982 |
| 1999 | 417 | 1,518 | 4,885 |
| 2000 | 406 | 1,436 | 4,871 |
| 2001 | 1,383 | 619 | 5,856 |
| 2002 | 1,579 | 549 | 5,788 |
| 2003 | 1,488 | 547 | 5,295 |
| 2004 | 1,468 | 553 | 5,019 |
| 2005 | 1,445 | 599 | 5,013 |
| 2006 | 1,392 | 603 | 4,935 |
| 2007 | 1,400 | 572 | 4,869 |

Source: Lawson, 2008, Tables 68-70.

The changes in purse seine and pole and line between years 2000-2001 are due to increasingly improved data coming from Indonesia. In recent years Indonesia has reported around 1,000 domestic purse seine vessels – most of which are small (under 400 gross tons), many of which had been previously counted as pole and line vessels.

## *5.2 Past, Present, and Reasonably Foreseeable Future Actions*

This section describes the other actions that have the potential to affect the same resources as the Proposed Action. The analysis of cumulative impacts is presented in the following section.

### 5.2.1 Past Actions

For the purposes of this cumulative impacts analysis, the past actions are all the fishery management actions and the actions of the fleets that have been taken in the affected environment to date, which together have resulted in the current management regime, current fishing patterns, and have affected the current status of the stocks. The effects of those actions are reflected in the baseline, as described in Chapter 3 and Section 5.1.1.

### 5.2.2 Other Present Actions

Other present actions would include specific actions being taken to manage the fisheries in the Convention Area.

The WPFMC is considering several amendments to the FMP for the Pelagic Fisheries of the Western Pacific Region at this time that would manage fishing activities. In

[55] An active vessel is any vessel that has actively fished at some point during the course of the year.

particular, Amendment 18 to the FMP for Pelagic Fisheries in the Western Pacific Region, Management Modifications for the Hawaii-based Shallow-set Longline Swordfish Fishery that Would Remove Effort Limits, Eliminate the Set Certificate Program, and Implement New Sea Turtle Interaction Caps (Amendment 18), aims to provide increased opportunities for sustainable harvest of swordfish and other fish species, while continuing to avoid jeopardizing the existence and/or recovery of threatened and endangered sea turtles or their habitat. NMFS is in the process of developing a proposed rule to implement specific provisions of the Convention. The proposed rule would impose specific regulatory requirements on U.S. HMS fleets operating in the Convention Area. The proposed requirements include the following: obtaining fishing authorizations; submitting vessel information; carrying and using VMS units; accepting observers; accepting transshipment inspectors; accepting boarding and inspection; vessel marking; maintaining and submitting information about fishing effort and catch; and at-sea transshipments of HMS from purse seine vessels.

### 5.2.3 Reasonably Foreseeable Future Actions

The categories of reasonably foreseeable future actions identified here are: (1) future fishery management actions; and (2) actions that contribute to changes in oceanic conditions.

It is reasonably foreseeable that WCPFC CCMs will implement for their purse seine and longline fisheries requirements similar to those in the Proposed Action to implement the recent decisions of the WCPFC. Given that the Proposed Action is for a limited duration (three years) it is also reasonably foreseeable that the WCPFC would adopt CMMs similar to CMM 2008-01 for bigeye tuna and yellowfin tuna that would require implementation for 2012 and beyond.[56]

Other future fishery management actions in the first category include actions taken by the United States and other nations to manage their fisheries in the Convention Area, and to some extent, Pacific Ocean as a whole, particularly HMS fisheries. In the United States, such actions will be driven by a variety of factors, including a number of different statutes with different mandates (e.g., the MSA for federal fisheries generally, the ESA with respect to threatened and endangered marine species, the SPTA to implement the SPTT or terms and conditions as a result of a renegotiated Treaty – after 2013, the WCPFCIA to implement the decisions of the WCPFC, and the Tuna Conventions Act to implement the decisions of the IATTC). Internationally and as a whole, such actions would be driven largely by, in addition to local issues and mandates, internationally agreed measures, including those adopted by the WCPFC and the IATTC.

It is not possible to predict what other specific management measures will be implemented by other nations or what additional management measures will be

[56] Paragraph 46 of CMM 2008-01 specifically states that the effectiveness of the measure will be reviewed annually and that alternative measures could be adopted in order to achieve the WCPFC's conservation goals.

implemented by the United States, but for the most part, given the biological status of many of the target stocks of HMS in the Pacific Ocean, they can be reasonably expected to be conservative in the sense that they will constrict fishing capacity, effort, and/or catch. The consequence of these measures being implemented in the fisheries in the WCPO and the Pacific Ocean would be, generally, to improve the status of affected resources (not necessarily relative to their current status, but relative to their future status under the baseline). What is not clear is how the benefits of conservation and management measures imposed by the various regulatory institutions will accrue to the various users of fleets. Ideally conservation benefits would be broadly based. However, at this time, this is difficult to predict.

The second category of future actions are actions that contribute to changes in oceanographic conditions. As discussed in Chapter 3, Section 3.1.1, there is substantial evidence that changing climate conditions may be causing observed changes in marine systems. Any changes in climate patterns would likely be associated with changes in oceanographic patterns that would have the potential to impact fishery and other biological resources. The target and non-target species that interact with the fisheries subject to this action tend to be highly migratory, wide-ranging organisms that are biologically tied to temperature regimes. Such species would be expected to respond to global or regional changes in climate and oceans in various aspects of their physiology and behavior. Examples include shifts in their geographic ranges, in the spatial (both horizontal and vertical) and temporal aspects of their migration patterns, and in their reproductive patterns. There could be interactive effects among species, such as local depletion of a given species resulting in less forage available for its predators. Species that nest on land, including seabirds and turtles, could be subject to impacts resulting from other types of climate-driven changes, such as sea level. Sea turtles, for example, as a species that exhibits temperature-dependent sex determination, might experience changes in hatchling sex ratios as a result of changes in atmospheric and oceanic temperatures. Sea turtle populations might also lose nesting habitat due to sea level rise.

Roessig, Woodley, Cech et al. (2004) discussed the potential impacts of climate change on marine and estuarine fishes and fisheries as follows:

> Possible oceanic condition scenarios would produce three expected responses by motile fish: (1) areas where favorable conditions exist will increase in size, allowing a species to expand its range and/or proliferate; (2) areas where favorable conditions exist may move, causing a population's numbers to decline in certain areas and increase in others, effectively shifting the population's range; and (3) favorable conditions for a species may disappear, leading to a population crash and possible extinction. Each species has its physiological tolerance limits, optima, and ecological needs, thus within a community you can expect different responses from different organisms. Because marine and estuarine systems are complex, and our knowledge of how they work is in its infancy, we can only speculate at the possible consequences of global climate change on their fishable stocks and the people who depend on them.

## 5.3 Discussion of Impacts

As discussed throughout Chapter 4, the overall effects to fisheries, target and secondary target stocks, and protected resources from the two rules to be implemented under the Proposed Action under any of the alternatives assessed in depth are expected to be minor and beneficial. The objective of each of the rules is to implement conservation and management measures to help sustain the resources in the affected environment and maintain fishing activities for the long term. As discussed above, the other present actions and the reasonably foreseeable future management actions have the same objective and would be expected to cause beneficial impacts to the affected environment. Specifically, should other CCM's implement the provisions of the CMMs that will be implemented in the proposed rules or the WCPFC adopt other similar CMMs that are implemented, the beneficial impacts to resources from the proposed rules would be enhanced (i.e., there could be a greater likelihood that the objectives of the CMMs could be attained, such as the 30% reduction in bigeye tuna fishing mortality). In addition, should the IATTC adopt conservation and management measures such as catch limits or other fishery restrictions for bigeye tuna, the effects of any shift in fishing effort to the EPO from the proposed U.S. Longline Rule would be reduced and the beneficial effects on bigeye tuna would be increased. As discussed in Chapters 3 and 4, the stock structure of bigeye tuna in the Pacific Ocean is not well known, but there is some degree of mixing between the EPO and WCPO, so any fishing mortality in the EPO would likely affect the status of the stock in the WCPO.

On the other hand, if and when Amendment 18 is implemented, longline vessels affected by the proposed U.S. Longline Rule under the Proposed Action may have greater incentive to target swordfish, since the current annual shallow-set effort limits would be removed and the sea turtle interactions caps would be increased. However, as discussed in Chapter 4, the shift in fishing effort that would be caused by the proposed rule is unquantifiable and would likely be minor in comparison to typical variations in fishing effort caused by ocean and market conditions.

The second category of reasonably foreseeable future actions (changes in ocean conditions, including climate change) could cause substantial adverse impacts to the resources in the affected environment but could cause some beneficial impacts as well. As discussed in Chapter 3, Section 3.1, changes to oceanographic conditions have been documented to affect fishing effort and catch.

The cumulative, or additive, impacts on the affected environment from the Proposed Action, other present actions, and all reasonably foreseeable future actions would likely be beneficial, but would be counteracted by any detrimental impacts caused by changes in ocean conditions. Thus, this EA concludes that the Proposed Action would provide a small, beneficial contribution to the cumulative environmental impacts experienced by the affected environment.

# Chapter 6

# Chapter 6 Comparison of Alternatives

This chapter provides a summary of the potential environmental impacts that could be caused by each of the alternatives analyzed in depth and compares the alternatives for the U.S. Purse Seine Rule and the U.S. Longline Rule.

## *6.1 Summary of Impacts: U.S. Purse Seine Rule*

Implementation of the U.S. Purse Seine Rule under any of the alternatives studied in depth could have some minor beneficial impacts to principal tuna stocks targeted by purse seine vessels, as well as stocks of incidentally-caught species. The primary direct effects of implementation of the proposed rule on the U.S. WCPO purse seine fishery are the following: (1) the FAD prohibition periods and the catch retention requirement that would affect the size and species composition of landed fish; (2) the fishing effort limit and high seas area closures would lead to little, if any, change in fishing effort in the U.S. purse seine fishery, but could lead to a slight geographical shift in effort to PIC EEZs in the WCPO and perhaps a slight reduction in fishing effort; and (3) the FAD prohibition periods would likely transfer some fishing effort from FAD sets to unassociated sets during the prohibition periods and possibly shift fishing effort from the FAD prohibition period to other periods of the year.

Overall, it is believed that these direct effects on the fishery would reduce the fishing mortality rate of the WCPO stocks of yellowfin and bigeye tuna (as well as skipjack tuna) and have similar impacts on secondary stocks. The possibility of an increase in fishing effort in PIC EEZs would be unlikely to lead to any adverse impacts on resources in the affected environment. The transfer of fishing effort from FAD sets to unassociated sets during the FAD prohibition periods could lead to increased fishing mortality on the WCPO stock of yellowfin tuna because comparatively more yellowfin tuna are captured in unassociated sets than in FAD sets. However, this would be counteracted by the reduction in fishing mortality on juvenile bigeye and yellowfin tunas from the FAD prohibition periods. The effect of the catch retention requirement could also have some beneficial effects on juvenile bigeye tuna and yellowfin tunas. The overall direct and indirect effects of the purse seine proposed rule on WCPO tuna stocks would likely be minor because: (1) the duration of the FAD prohibition periods would be only three years and the catch retention requirement would be implemented for a maximum of two years, so their effects on stocks would be short-lived; and (2) there would be only a small reduction in the fishing mortality rate contributed by the U.S. WCPO purse seine fleet.

The effects to protected resources similarly would be beneficial but minor, because the proposed rule would not cause substantial changes to the fishing activities of the fleet. With respect to sea turtles, however, the beneficial impacts would be long-lasting, because the proposed requirements to mitigate interactions with sea turtles would, unlike the other elements of the proposed rule, be of indefinite duration.

As discussed in Chapter 5, in terms of cumulative effects, the effects of the U.S. Purse Seine Rule and U.S. Longline Rule, under any of the action alternatives, in combination with the effects of similar actions taken by other WCPFC members, as well as possible future actions to implement any future WCPFC decisions with respect to bigeye tuna and yellowfin tuna, could have beneficial effects on the stocks. These effects would be greater than if the proposed U.S. Purse Seine Rule were implemented in isolation. The contribution of the U.S. Purse Seine Rule to cumulative effects under any of the action alternatives would be small and essentially the same under all the action alternatives.

Table 26 below summarizes the direct and indirect effects to resources in the affected environment from each of the alternatives analyzed in depth in Chapter 4, including Alternative A, the No-Action Alternative.

**Table 26 Summary of direct and indirect effects for the U.S. Purse Seine Rule alternatives**

| Alternative | Effects to WCPO Bigeye Tuna | Effects to WCPO Yellowfin Tuna | Effects to WCPO Skipjack Tuna | Effects to other Secondary Target Stocks | Effects to Protected Resources |
|---|---|---|---|---|---|
| Alternative A (No-Action) | Direct Effects: None<br><br>Indirect Effects: Increased Potential for Long-Term Negative | Direct Effects: None<br><br>Indirect Effects: Increased Potential for Long-Term Negative | Direct Effects: None<br><br>Indirect Effects: Increased Potential for Long-Term Negative | Direct Effects: None<br><br>Indirect Effects: Increased Potential for Long-Term Negative | Direct Effects: None<br><br>Indirect Effects: Increased Potential for Long-Term Negative |
| Alternative B (Action Alternative for the U.S. Purse Seine Rule) | Direct Effects: Minor Beneficial<br><br>Indirect Effects: Minor Beneficial or None | Direct Effects: Minor Beneficial<br><br>Indirect Effects: Minor Beneficial or None | Direct Effects: Minor Beneficial<br><br>Indirect Effects: Minor Beneficial or None | Direct Effects: Minor Beneficial<br><br>Indirect Effects: Minor Beneficial or None | Direct Effects: Minor Beneficial<br><br>Indirect Effects: Minor Beneficial |
| Alternative C (Effort Limit Allocated among Vessels) | Direct Effects: Minor Beneficial<br><br>Indirect Effects: Minor Beneficial or None | Direct Effects: Minor Beneficial<br><br>Indirect Effects: Minor Beneficial or None | Direct Effects: Minor Beneficial<br><br>Indirect Effects: Minor Beneficial or None | Direct Effects: Minor Beneficial<br><br>Indirect Effects: Minor Beneficial or None | Direct Effects: Minor Beneficial<br><br>Indirect Effects: Minor Beneficial |
| Alternative D (Effort Limit – Most Restrictive) | Direct Effects: Minor Beneficial<br><br>Indirect Effects: Minor Beneficial or None | Direct Effects: Minor Beneficial<br><br>Indirect Effects: Minor Beneficial or None | Direct Effects: Minor Beneficial<br><br>Indirect Effects: Minor Beneficial or None | Direct Effects: Minor Beneficial<br><br>Indirect Effects: Minor Beneficial or None | Direct Effects: Minor Beneficial<br><br>Indirect Effects: Minor Beneficial |
| Alternative E (Effort Limit – Least Restrictive) | Direct Effects: Minor Beneficial<br><br>Indirect Effects: Minor Beneficial or None | Direct Effects: Minor Beneficial<br><br>Indirect Effects: Minor Beneficial or None | Direct Effects: Minor Beneficial<br><br>Indirect Effects: Minor Beneficial or None | Direct Effects: Minor Beneficial<br><br>Indirect Effects: Minor Beneficial or None | Direct Effects: Minor Beneficial<br><br>Indirect Effects: Minor Beneficial |

As indicated in Table 26, all of the alternatives would have similar effects. The main distinction between the action alternatives would be the manner of implementation of the fishing effort limit. As stated in Chapter 4, additional management measures that lead to further reduction in the fishing mortality of WCPO bigeye tuna and that ensure no increase in the fishing mortality of WCPO yellowfin tuna are needed to sustain WCPO tuna stocks at or greater than their MSY levels. Thus, the No-Action Alternative would have increased potential for long-term negative impacts on these fish stocks over the action alternatives.

Alternative D would be the most restrictive in terms of operational effects to fishery participants. Under this alternative there would be separate fishing effort limits for the high seas and U.S. EEZ that would be fixed for each licensing year. Thus, this alternative would allow the fleet no flexibility should there be variations in optimal fishing grounds in different years. Alternative E would be the least restrictive. Under this alternative, there would be one fishing effort limit set for the entire three-year period (2009-2011) for the high seas and U.S. EEZ combined, which would allow vessel owners and operators to continue fishing through the three-year period until the limit is reached. Alternative B would implement the fishing effort limit on three different time scales. To provide operational flexibility with respect to the substantial inter-annual variability that is expected to occur in terms of the spatial and temporal distribution of fish and of optimal fishing grounds and times, the limit would be implemented on three different time scales: First, there would be a limit of 7,764 fishing days (3 times the base of 2,588) for the entire three-year 2009-2011 period. Second, there would be a limit of 6,470 fishing days (2.5 times the base of 2,588) for each of the two-year periods 2009-2010 and 2010-2011. Third, there would be a limit of 3,882 fishing days (1.5 times the base of 2,588) for each of the one-year periods 2009, 2010, and 2011. Alternative C would be the same as Alternative B, except the fishing effort limit would be allocated among different vessels in some manner.

Alternative C would eliminate the “race to fish” effect that could be caused by the other alternatives, since under this alternative, vessels would not have to compete against each other to obtain fishing days from a common pool of days.

Under Alternative D, there may be some increased benefit to living marine resources in the affected environment over the other alternatives, because it would be more likely that the fishery would be closed in certain areas in a given year. The demand for these areas – the U.S. EEZ and the high seas areas of what is the eastern portion of the WCPO – has been most acute during ENSO events. This alternative would offer the fleet no flexibility to account for the fishing patterns in different years.

Alternative E would offer the fleet the maximum amount of flexibility, since vessels could continue to fish until the single three-year limit is reached and there would be only one potential closure of the fishery. However, the lack of any limits for a given year would bring the potential for a longer closed period (e.g., during a substantial part of 2011) than would likely occur under Alternative B (under which relatively brief closures might be expected in one or more of the years 2009-2011). To the extent that continuous fishing and continuity of supply are important for the fishery, several short closures might cause less adverse economic impacts than a single long closure. For example, with a brief closure each year, vessel owners and operators might be able to schedule routine vessel maintenance during the closed periods and mitigate the losses of not being able to fish. This would be more difficult to do during a longer closed period.

Under Alternative B, there would be some flexibility to accommodate variations in optimal fishing grounds in different years. However, the fishing effort limit would be set so that there would be a maximum number of fishing days set for any given year (and for each of the two-year periods), so, the potential lengths of fishery closures would be shorter than under Alternative E.

## 6.2 Summary of Impacts: U.S. Longline Rule

Implementation of the U.S. Longline Rule under any of the alternatives could have some minor beneficial effects to WCPO bigeye tuna as well as other fish stocks present in the WCPO. The proposed rule would implement the WCPFC's established catch limit for WCPO bigeye tuna for the years 2009-2011, which could cause some beneficial effects on the stocks. Each of the action alternatives could cause some shift in fishing effort from targeting bigeye tuna in the WCPO, which could cause effects to other fish stocks in both the WCPO and EPO. Such shifts in fishing effort could also cause effects to protected resources, but these effects would be minor, since the shift in fishing effort would likely be less than that caused by typical year-to-year variations in catches among species driven by changing oceanic and economic conditions. Thus, because the duration of the rule would be limited to three years and because the proposed rule would not cause substantial changes to the fishing practices and patterns of the affected fleets, the overall direct and indirect impacts from implementation of the rule under any of the action alternatives would be minor.

As discussed in Chapter 5, in terms of cumulative effects, the effects of the U.S. Longline Rule and U.S. Purse Seine Rule, under any of the action alternatives, in combination with the effects of similar actions taken by other WCPFC members, as well as possible future actions to implement any future WCPFC decisions with respect to bigeye tuna and yellowfin tuna, could have beneficial effects on the stocks. These effects would be greater than if the proposed U.S. Longline Rule were implemented in isolation. The contribution of the U.S. Longline Rule to cumulative effects under any of the action alternatives would be essentially the same under all the action alternatives.

**Table 27 Summary of direct and indirect effects for the U.S. Longline Rule alternative**

| Alternative | Effects to WCPO Bigeye Tuna | Effects to WCPO Yellowfin Tuna | Effects to WCPO Swordfish | Effects to other Secondary Target Stocks | Effects to Protected Resources |
|---|---|---|---|---|---|
| Alternative 1 (No-Action) | Direct: None<br><br>Indirect: Increased Potential for Long-Term negative | Direct: None<br><br>Indirect: Increased Potential for Long-Term negative | Direct: None<br><br>Indirect: Increased Potential for Long-Term negative | Direct: None<br><br>Indirect: Increased Potential for Long-Term negative | Direct: None<br><br>Indirect: Increased Potential for Long-Term negative |
| Alternative 2 (Closure of Deep-Set Fishery) | Direct: Minor beneficial<br><br>Indirect: Minor beneficial or None | Direct: Minor beneficial<br><br>Indirect: Minor beneficial or None | Direct: Minor detrimental or None<br><br>Indirect: Minor detrimental or None | Direct: Minor detrimental or beneficial or None<br><br>Indirect: Minor detrimental or beneficial or None | Direct: Minor<br><br>Indirect: Minor |
| Alternative 3 (No Retention, Landing, or Transshipment of Bigeye Tuna) | Direct: Minor beneficial<br><br>Indirect: Minor beneficial or None | Direct: Minor detrimental or None<br><br>Indirect: Minor detrimental or None | Direct: Minor detrimental or None<br><br>Indirect: Minor detrimental or None | Direct: Minor detrimental or beneficial or None<br><br>Indirect: Minor detrimental or beneficial or None | Direct: Minor<br><br>Indirect: Minor |
| Alternative 4 (Closure of Fishery) | Direct: Minor beneficial<br><br>Indirect: Minor beneficial or None | Direct: Minor beneficial<br><br>Indirect: Minor beneficial or None | Direct: Minor beneficial<br><br>Indirect: Minor beneficial or None | Direct: Minor detrimental or beneficial or None<br><br>Indirect: Minor detrimental or beneficial or None | Direct: Minor<br><br>Indirect: Minor |

Table 27 indicates that the overall effects from the alternatives would be similar and minor. However, each of the action alternatives would cause some slightly disparate effects to the resources in the area. As stated in Chapter 4, additional management measures that lead to a reduction in the fishing mortality of bigeye tuna and that ensure no increase in the fishing mortality of yellowfin tuna are needed to sustain WCPO tuna stocks at or greater than their MSY levels. Thus, the No-Action Alternative would have increased potential for long-term negative impacts on these fish stocks over the action alternatives.

Alternative 3 is the least restrictive of the action alternatives. Under this alternative, once the limit for WCPO bigeye tuna established by the WCPFC is reached, U.S. longline vessels would be prohibited from retaining on board, landing, or transshipping any bigeye tuna captured in the limit's area of application for the remainder of the calendar year, except that any bigeye tuna already on board a vessel at the time of the closure may be retained on board and landed. Under this alternative, vessels could continue to fish in both the shallow-set and deep-set sectors of the fishery, provided that no bigeye tuna are kept. As a result, there could be a shift in effort to the shallow-set sector, to deep-setting for bigeye tuna in the EPO, or to deep-setting for species other than bigeye tuna in the WCPO. Thus, to the extent that deep-setting for species other than bigeye tuna in the WCPO does occur after the limit is reached, the beneficial impacts to WCPO bigeye tuna would be less than under the other action alternatives, since WCPO bigeye tuna would likely be caught and discarded in the course of such fishing activities (to an unknown degree).[57]

Alternative 2 is more restrictive than Alternative 3, but less restrictive than Alternative 4. Under this alternative, once the WCPO bigeye tuna limit is reached, vessels would be prohibited from deep-setting in the limit's area of application. This could lead vessels to shift their effort to deep-setting for bigeye tuna in the EPO or to shallow-setting in the WCPO, although, as discussed in Chapter 4 the degree of such shifts in effort cannot be predicted with certainty or estimated quantitatively at this juncture. Because no deep-setting would be allowed in the limit's area of application, this alternative could have some beneficial effects on both WCPO bigeye tuna and to a lesser degree WCPO yellowfin tuna. However, this alternative could cause increased fishing in the shallow-set sector, leading to increased fishing mortality on swordfish and other species caught in that sector, including sea turtles (but any such increase would be slight, as it would be constrained by the existing annual limits on shallow-set effort and on interactions with loggerhead and leatherback turtles). Under this alternative, the overall beneficial impacts to WCPO bigeye tuna could be greater than under Alternative 3; because deep-setting would be prohibited in the WCPO, there would be less WCPO bigeye tuna being caught and discarded (but only to the extent that under Alternative 3 deep-setting for species other than bigeye tuna in the WCPO would occur and bigeye tuna would be caught after the limit is reached).

Alternative 4 is the most restrictive of the action alternatives. Under this alternative, once the limit for WCPO bigeye tuna established by the WCPFC is reached, U.S. fishing vessels would be prohibited from longline fishing in the limit's area of application. This could cause vessels to shift their effort to deep-setting in the EPO, although, as discussed in Chapter 4 the likely degree of such a shift cannot be predicted. Under this alternative, the overall beneficial impacts to WCPO bigeye tuna could be greater than under the other action alternatives; because the entire fishery would be closed, no WCPO bigeye tuna would be caught by longlining in the limit's area of application.

[57] The discussion of the action alternatives for the U.S. Longline Rule in this chapter focuses on comparing the impacts of the alternatives on WCPO bigeye tuna – to which the WCPFC's established catch limited directly applies. As stated in Chapter 3 Section 3.4, the stock structure of bigeye tuna in the Pacific Ocean is not well known, but there is some degree of mixing between the EPO and WCPO, so any fishing mortality in the EPO would likely affect the status of the stock in the WCPO as well as in the EPO. So, though the direct effects to WCPO bigeye tuna under the alternatives would differ, the overall effects from any of the alternatives to WCPO bigeye tuna would be similar.

# Consultation

# Consultation

NAO 216-6 requires a listing of the agencies and persons who were consulted while preparing the EA. Table 28 lists the agencies, NOAA units, and entities that were contacted for information. Table 29 lists the names of the individuals who were responsible for the preparation of this document.

**Table 28 List of agencies and offices contacted**

| Agency/Organization |
|---|
| Department of State - Office of Marine Conservation |
| NMFS - International Affairs |
| NMFS - Office for Law Enforcement, Pacific Islands Division |
| NMFS - Pacific Islands Fisheries Science Center |
| NMFS - Southwest Regional Office |
| NMFS - Southwest Fisheries Science Center |
| NOAA - General Counsel for Enforcement and Litigation, Pacific Islands Region |
| U.S. Coast Guard |

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# List of Preparers

Table 29 lists the preparers of this document.

**Table 29 List of Preparers**

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# Literature Cited

Abernathy, K. and D.B. Siniff. 1998. Investigations of Hawaiian monk seal, *Monachus schauinslandi*, pelagic habitat use: Range and diving behavior. Long Beach, California, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Region.

Alverson, F.G. and C.L. Peterson. 1963. Synopsis of the biological data on bigeye tuna *Parathunnus sibi* (Temminck and Schlegel) 1844. FAO Fisheries Report 6(2):482-514. Rome, Food and Agriculture Organization for the United Nations.

Angliss, R.P. and R. Outlaw. 2005. Draft Alaska marine mammal stock assessments, 2005. NOAA-NMFS Report AFSC-144. Seattle, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Alaska Fisheries Science Center.

Appleyard, S., P. Grewe, B. Innes, and R. Ward. 2001. Population structure of yellowfin tuna (*Thunnus albacares*) in the western Pacific Ocean, inferred from microsatellite loci. *Marine Biology* 139(2):383-393.

Balazs, G.H. 1994. Homeward bound: Satellite tracking of Hawaiian green turtles from nesting beaches to foraging pastures. Proceedings of the Thirteenth Annual Symposium on Sea Turtle Biology and Conservation. NOAA Report TM-NMFS-SEFSC-341, 205-208. Miami, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Fisheries Science Center.

Balazs, G.H., P. Craig, B.R. Winton, and R.K. Miya. 1994. Satellite telemetry of green turtles nesting at French Frigate Shoals, Hawaii, and Rose Atoll, American Samoa. Proceedings of the Fourteenth Annual Symposium on Sea Turtle Biology and Conservation. NOAA Report TM-NMFS-SEFSC-351, 184-187. St. Petersberg, Florida, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Fisheries Science Center.

Balazs, G.H., L.K. Katahira, and D.M. Ellis. 1996. Satellite tracking of hawksbill turtles nesting in the Hawaiian Islands. Sixteenth Annual Symposium on Sea Turtle Biology Conservation: 18-19, 1996. La Jolla, California, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center.

Balazs, G.H., S.G. Pooley, and S.K. Murakawa. 1995. Guidelines for handling marine turtles hooked or entangled in the Hawaii longline fishery: Results of an expert workshop held in Honolulu, Hawaii, March 15-17, 1995. NOAA-NMFS Report SWFSC-222. La Jolla, California, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center.

Balazs, G.H. and M. Chaloupka. 2004. Thirty year recovery trend in the once depleted Hawaiian green turtle stock. *Biological Conservation* 117:491-498.

Balcomb, K.III. 1987. *The whales of Hawaii*. Waipahu, Hawaii. Island Heritage Publisher.

Barlow, J. 1994. Recent information on the status of large whales in California waters. NOAA Report TM-NMFS-SWFSC-203. La Jolla, California, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center.

Barlow, J. 1997. Preliminary estimates of cetacean abundance off California, Oregon, and Washington based on a 1996 ship survey and comparisons of passing and closing modes. NOAA-NMFS Report LJ-97-11. La Jolla, California, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center.

Barlow, J. 2003a. Cetacean abundance in Hawaiian waters during summer/fall 2002. NOAA-NMFS Report LJ-03-13. La Jolla, California, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center.

Barlow, J. 2003b. Preliminary estimates of cetacean abundance off the U.S. west coast: 1991-2001. NOAA-NMFS Report LJ-03-03. La Jolla, California, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center.

Baretta, L. and G.L. Hunt Jr. 1994. Changes in the numbers of cetaceans near the Pribilof Islands, Bering Sea, between 1975-78 and 1987-89. *Arctic* 47(4):321-326.

Bartoo, N. and T.J. Foreman. 1994. A review of the biology and fisheries for North Pacific albacore (*Thunnus alalunga*). *In* Shomura, R. S., J. Majkowski, and S. Langi (eds.) Interactions of Pacific Tuna Fisheries. Proceedings of the First FAO Expert Consultation on Interactions of Pacific Tuna Fisheries, 3-11 December 1991, Noumea, New Caledonia. Vol. 2: Papers on Biology and Fisheries. FAO Fisheries Report 336(2):173-187. Rome, Food and Agriculture Organization for the United Nations.

Begon, M., C.A. Townsend, and J.L. Harper. 2006. *Ecology: From Individuals to Ecosystems*. Hoboken, New Jersey: Wiley-Blackwell.

Blackburn, M. 1965. Oceanography and ecology of tunas. *Oceanography and Marine Biology: An Annual Review* 3:299-322.

Boggs, C.H. 1992. Depth, capture time, and hooked longevity of longline-caught pelagic fish: Timing bites of fish with chips. *Fishery Bulletin* 90(4):642-658.

Bowen, B.W., F.A. Breu-Grobois, G.H. Balazs, N. Kamezaki, C.J. Limpus, and R.J. Ferl. 1995. Trans-Pacific migrations of the loggerhead turtle (*Caretta caretta*) demonstrated with mitochondrial DNA markers. *Proceedings of the National Academy of Sciences of the United States of America* 92(9)3731-3734.

Brogan, D. 2002. A review of turtle by-catch in the western and central Pacific Ocean tuna fisheries. Noumea, New Caledonia, Oceanic Fisheries Programme, Secretariat of the Pacific Community.

Brownell, R.L., T. Kasuya, W.F. Perrin, C.S. Baker, F. Cipriano, J.R. Urban, D.P. Demaster et al. 2000. Unknown status of the western North Pacific humpback whale population: A new conservation concern. Unpublished report to the International Whaling Commission.

Calkins, T.P. 1980. Synopsis of biological data on the bigeye tuna, *Thunnus obesus* (Lowe, 1839), in the Pacific Ocean. *In* Bayliff, W.H. (ed.) Synopses of Biological Data on Eight Species of Scombrids. IATTC Special Report 2. La Jolla, California, Inter-American Tropical Tuna Commission.

Chaloupka, M. and C. Limpus. 2001. Trends in the abundance of sea turtles resident in southern Great Barrier Reef waters. *Biological Conservation* 102(3):235-249.

Chavez, F.P., J. Ryan, S.E. Lluch-Cota, and C.M. Niquen. 2003. From anchovies to sardines and back: Multidecadal change in the Pacific Ocean. *Science* 299(5604):217-221.

Clark, C.W., M.L. Tasker, M. Ferguson, J.P. Hartley, I. Fletcher, A. Whitehead, A.A. Duff et al. 1997. Monitoring the occurrence of large whales off north and west Scotland using passive acoustic arrays. Proceedings of "Contributing to Environmental Progress-Getting the Message Across". European Environmental Conference Aberdeen, Scotland, 15-16 April, 1997. SPE/UKOOA Report 37831:23-29. Dallas, Society of Petroleum Engineers and United Kingdom Offshore Operators Association.

Coan, A.L. and D.G. Itano. 2003. Updates (2003) of factors that may have affected U.S. purse seine catch rates in the central-western Pacific Ocean: An examination of fishing strategy and effective fishing effort. Sixteenth Meeting of the Standing Committee on Tuna and Billfish, 9–16 July. Working Paper FTWG-2. Mooloolaba, Australia, Oceanic Fisheries Programme, Secretariat of the Pacific Community.

Cole, J.S. 1980. Synopsis of biological data on the yellowfin tuna *(Thunnus albacares)* (Bonnaterre 1788) in the Pacific Ocean. IATTC Special Report 2:75-150. La Jolla, California, Inter-American Tropical Tuna Commission.

Collette, B.B. and C.E. Nauen. 1983. *Scombrids of the world: An annotated and illustrated catalogue of tunas, mackerels, bonitos, and related species known to date*. Rome: Food and Agriculture Organization for the United Nations.

Council on Environmental Quality. 1997. Considering cumulative effects under the National Environmental Policy Act. Washington D.C., Executive Office of the President of the United States.

Cox, S.P., T.E. Essington, J.F. Kitchell, S.J.D. Martell, C.J. Walters, C. Boggs, and I. Kaplan. 2002. Reconstructing ecosystem dynamics in the central Pacific Ocean, 1952-1998. II. A preliminary assessment of the trophic impacts of fishing and effects on tuna dynamics. *Canadian Journal of Fisheries and Aquatic Sciences* 59:1736-1747.

Dagorn, L., K.N. Holland, J.P. Hallier, M. Taquet, G. Moreno, G. Sancho, D.G. Itano et al. 2006. Deep diving behavior observed in yellowfin tuna (*Thunnus albacares*). *Aquatic Living Resources* 19:85-88.

Dobbs, K. 2001. Marine turtles in the Great Barrier Reef World Heritage Area: A compendium of information and basis for the development of policies and strategies for the conservation of marine turtles. Townsville, Australia, Great Barrier Reef Marine Park Authority.

Donoghue, M., R. Reeves, and G.S. Stone. 2003. Report of the workshop on interactions between cetaceans and longline fisheries. New England Aquatic Forum Series Report 03-1, 103-4. Boston, New England Aquarium Press.

Eckert, K.L. 1993. The biology and population status of marine turtles in the North Pacific Ocean. NOAA Report TM-NMFS-SWFSC-186. La Jolla, California, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center.

Eckert, S.A. and L. Sarti. 1997. Distant fisheries implicated in the loss of the world's largest leatherback nesting population. *Marine Turtle Newsletter*, 2-7. Exeter, United Kingdom, Centre for Ecology and Conservation, University of Exeter.

Ehrhardt, N.M., R.J. Robbins, and F. Arocha. 1996. Age validation and growth of swordfish, *Xiphias gladius*, in the northwest Atlantic. *Collected Volume of Scientific Papers* 45(2):358-367.

Ely, B., J. Vinas, J.R. Alvarado Bremer, D. Black, L. Lucas, K. Covello, A.V. Labrie et al. 2005. Consequences of the historical demography on the global population structure of two highly migratory cosmopolitan marine fishes: The yellowfin tuna (*Thunnus albacares*) and the skipjack tuna (*Katsuwonus pelamis*). *Biomed Central Evolutionary Biology* 2005(5):19.

Fonteneau, A. 1991. Sea mounts and tuna in the tropical eastern Atlantic. *Aquatic Living Resources* 4(1):13-25.

Foreman, T.J. 1980. Synopsis of biological data on the albacore tuna, *Thunnus alalunga* (Bonnaterre, 1788), in the Pacific Ocean. *In* W.H. Bayliff (ed.) Synopses of Biological

Data on Eight Species of Scombrids. IATTC Special Report No. 2, 17-70. La Jolla, California, Inter-American Tropical Tuna Commission.

Forney, K.A., J. Barlow, M. Muto, M. Lowry, J. Baker, G. Cameron, J. Mobley et al. 2000. U.S. Pacific marine mammal stock assessments. NOAA Report TM-NMFS-SWFSC-300. La Jolla, California, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center.

Forney, K.A. 2004. Estimates of cetacean mortality and injury in two United States Pacific longline fisheries, 1994-2002. NOAA-NMFS Report LJ-04-07. La Jolla, California, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center.

Gillett, R.D., M. McCoy, and D.G. Itano. 2002. Status of the United States western Pacific tuna purse seine fleet and factors affecting its future. SOEST/JIMAR Report SOEST contribution 00-02 and JIMAR contribution 00-01. Honolulu, Joint Institute for Marine and Atmospheric Research and School of Ocean and Earth Science and Technology, University of Hawaii.

Gillet, R. and A. Langley. 2007. Tuna for tomorrow? Some of the science behind an important fishery in the Pacific Islands. Noumea, New Caledonia, Asian Development Bank and Secretariat of the Pacific Community.

Grewe, P.M. and J. Hampton. 1998. An assessment of bigeye (*Thunnus obesus*) population structure in the Pacific Ocean based on mitochondrial DNA and DNA microsatellite analysis. Hobart, Australia, Australian Commonwealth Scientific and Research Organization.

Halpern, B.S., K. Cottenie, and B.R. Broitman. 2006. Strong top-down control in southern California kelp forest ecosystems. *Science* 312:1230-1232.

Hampton, J. and K. Bailey. 1993. Fishing for tunas associated with floating objects: A review of the western Pacific fishery. SPC Report 31. Noumea, New Caledonia, South Pacific Commission, Tuna and Billfish Assessment Programme, South Pacific Commission.

Hampton, J., K. Bigelow, and M. Labelle. 1998. A summary of current information on the biology, fisheries, and stock assessment of bigeye tuna (*Thunnus obesus*) in the Pacific Ocean, with recommendations for data requirements and future research. SPC Report 36. Noumea, New Caledonia, Oceanic Fisheries Programme, Secretariat of the Pacific Community.

Hampton, J., P. Kleiber, and A. Langley. 2006. Stock assessment of bigeye tuna in the western and central Pacific Ocean, including an analysis of management options. WCPFC Report SC2 SA WP-2. Pohnpei, Federated States of Micronesia, Western and Central Pacific Fisheries Commission.

Hampton, J. and S. Harley. 2008. Predicted impact of potential management options on stock status and catches of bigeye, skipjack, and yellowfin tunas in the western and central Pacific Ocean. WCPFC Report TCC4-2008-14 supplement. Pohnpei, Federated States of Micronesia, Western and Central Pacific Fisheries Commission.

Hanamoto, E. 1987. Effect of oceanographic environment on bigeye tuna distribution. *Bulletin of the Japanese Society of Fisheries Oceanography* 51:203-216.

Hill, P.S. and D.P. Demaster. 1999. Alaska marine mammal stock assessments 1999. NOAA Report TM-NMFS-AFSC-110. United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Alaska Fisheries Science Center.

Hinke, J.T., I.C. Kaplan, K. Aydin, G.M. Watters, R.J. Olson, and J.F. Kitchell. 2004. Visualizing the food-web effects of fishing for tunas in the Pacific Ocean. *Ecology and Society* 9(1) Article 10.

Hirth, H. 1997. Synopsis of Biological data on the green turtle *Chelonia mydas* (Linnaeus, 1758). Department of Interior, United States Fish and Wildlife Service.

Hodge, R. and B.L. Wing. 2000. Occurrence of marine turtles in Alaska waters: 1960-1998. *Herpetological Review* 31:148-151.

Holland, K., P. Kleiber, and S. Kajiura. 1999. Different residence times of bigeye and yellowfin tuna occurring in mixed aggregations over a seamount. *Fisheries Bulletin* 97:392-395.

Horwood, J. 1987. *The sei whale: Population biology, ecology, and management*. London: Croom Helm.

Inter-American Tropical Tuna Commission. 2005. Tunas and billfishes in the eastern Pacific Ocean in 2004. IATTC Fisheries Report SAR-6-09. La Jolla, California, Inter-American Tropical Tuna Commission.

Intergovernmental Panel on Climate Change. 2007. Climate change 2007: Synthesis report. An assessment of the Intergovernmental Panel on Climate Change, IPCC Plenary Session XXVII, Valencia, Spain.

International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean. 2007. Report of the seventh meeting of the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean. WCPFC Report SC3-2007/GN IP-5. Pohnpei, Federated States of Micronesia, Western and Central Pacific Fisheries Commission.

International Whaling Commission. 2007. The International Whaling Commission's figures for estimated whale populations. Cambridge, United Kingdom, International Whaling Commission.

Itano, D.G. 2000. The reproductive biology of yellowfin tuna (*Thunnus Albacares*) in Hawaiian waters and the western tropical Pacific Ocean: Project summary. SOEST/Jimar Report SOEST contribution 00-01 JIMAR Contribution 00-328. Honolulu, Joint Institute for Marine and Atmospheric Research and the School for Ocean and Earth Science and Technology, University of Hawaii.

Itano, D.G. 2003. Documentation and classification of fishing gear and technology on board tuna purse seine vessels. Paper FTWG–3. Sixteenth Meeting of the Standing Committee on Tuna and Billfish 9–16 July. Mooloolaba, Australia.

International Union for the Conservation of Nature. 2008. The IUCN Red List of Threatened Species: *Puffinus Newelli*. Accessed on December 5, 2008. http://www.iucnredlist.org/details/144888.

Joseph, J. 2002. Managing fishing capacity of the world tuna fleet. FAO Fisheries Circular Number 982. Rome, Food and Agriculture Organization of the United Nations.

Kamezaki, N., Y. Matsuzawa, O. Abe, H. Asakawa, T. Fujii, K. Goto, S. Hagino et al. 2003. Loggerhead turtles nesting in Japan. *In* Bolten, A.B. and B.E. Witherington (eds.) *Loggerhead Sea Turtles,* 210-217. Washington D.C., Smithsonian Institution Press.

Katz, S.L., R. Zabel, C. Harvey, T. Good, and P. Levin. 2003. Ecological sustainable yield. *American Scientist* 91:1-150.

Kleiber, P. and K. Yokawa. 2002. Stock assessment of swordfish in the North Pacific using MULTIFAN-CL. NOAA-NMFS Report ISC3/SWO-WG/02/04. Honolulu, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center.

Kume, S. 1967. Distribution and migration of bigeye tuna in the Pacific Ocean. *Report of the Nankai Regional Fisheries Research Laboratory* 25:75-80.

Langley, A., P. Williams, P. Lehodey, and J. Hampton. 2004. The western and central Pacific tuna fishery 2003: Overview and status of tuna stocks. Noumea, New Caledonia, Oceanic Fisheries Programme, Secretariat of the Pacific Community.

Langley, A.D. 2006. The South Pacific albacore fishery: A summary of the status of the stock and fishery management issues of relevance to Pacific Island countries and territories. Noumea, New Caledonia, Oceanic Fisheries Programme, Secretariat of the Pacific Community.

Langley, A.D., W.J. Hampton, P.M. Kleiber, and S.D. Hoyle. 2008. Stock assessment of bigeye tuna in the western and central Pacific ocean, including an analysis of management options. WCPFC Report SC4-2008/SA-WP-1. Noumea, New Caledonia, Oceanic Fisheries Programme, Secretariat of the Pacific Community.

Laurs, R.M. and R.J. Lynn. North Pacific albacore ecology and oceanography. 1991. North Pacific Transition Zone Workshop, Honolulu, 9-11 May, 1988. NOAA Report TR-NMFS-105. Honolulu, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

Lawson, T.A. 2001. Predation of tuna by whales and sharks in the western and central Pacific Ocean. SPC Report SWG-6. Noumea, New Caledonia, Oceanic Fisheries Programme, Secretariat of the Pacific Community.

Lawson, T. 2008. Western and Central Pacific Fisheries Commission tuna fishery yearbook 2007. Noumea, New Caledonia, Oceanic Fisheries Programme, Secretariat of the Pacific Community.

Lehodey, P., M. Bertignac, J. Hampton, A. Lewis, and J. Picaut. 1997. El Niño Southern Oscillation and tuna in the western Pacific. *Nature* 389(6652):715-718.

Lehodey P., JM. Andre, M. Bertignac, J. Hampton, A. Stoens, C. Menkes, L. Memery, and N. Grima. 1998. Predicting skipjack tuna forage distributions in the equatorial Pacific using a coupled dynamical bio-geochemical model. *Fisheries Oceanography* (special issue of GLOBEC Open Science Meeting) 7(3 and 4):317–32.

Lewison, R.L., S.A. Freeman, and L.B. Crowder. 2004. Quantifying the effects of fisheries on threatened species: The impact of pelagic longlines on loggerhead and leatherback sea turtles. *Ecology Letters* 7(3):221-231.

Limpus, C. 1992. The hawksbill turtle, *Eretmochelys imbricata*, in Queensland: Population structure within a southern Great Barrier Reef feeding ground. *Wildlife Research* 19(4):489-506.

Limpus, D. and C.J. Limpus. 2003. The loggerhead turtle, *Caretta caretta*, in the equatorial and southwest Pacific Ocean: A species in decline. *In* Bolten, A.B. and B.E. Witherington (eds.) *Loggerhead Sea Turtles,* 199-209. Washington D.C., Smithsonian Institution Press.

Link, J. 2002. Does food web theory work for marine ecosystems? *Marine Ecology Progress Series* 230:1-9.

Marine Resources and Fisheries Consultants Americas (MRAG Americas). Review of ecosystem by-catch issues for the western and central Pacific region. 2002. Pohnpei, Federated States of Micronesia, Western and Central Pacific Fisheries Commission.

Masaki, Y. 1976. Biological studies on the North Pacific sei whale. *Bulletin of the Far Seas Fisheries Research Laboratory* 14:1-104.

Masaki, Y. 1977. The separation of the stock units of sei whales in the North Pacific. IWC Special Issue 1:71-77. Cambridge, International Whaling Commission.

Matsuzawa, Y. 2005. Nesting beach management of eggs and pre-emergent hatchlings of North Pacific loggerhead sea turtles in Japan. In *Proceedings of the Second Western Pacific Sea Turtle Cooperative Research and Management Workshop*, 13-22. Honolulu, Western Pacific Regional Fishery Management Council.

McCoy, M. and R. Gillet. 1998. Foreign tuna purse seining in the Pacific Islands: The current situation and business opportunities. Honiara, Solomon Islands, Pacific Islands Forum Fisheries Agency.

McLachlan, N., B. McLachlan, J. McLachlan, and B. McLachlan. 2006. Queensland turtle conservation project, Wreck Rock study 2005-2006. EPA Vol. 2006, Report 6. Freshwater and Marine Sciences Unit, Queensland Parks and Wildlife Services, The State of Queensland, Environmental Protection Agency.

Meylan, A. 1985. The role of sponge collagens in the diet of the hawksbill turtle (*Eretmochelys imbricata*). 1499. *In* Vairati, A. and R. Garrone (eds.) Biology of Inverterbrate and Lower Verterbrate Collagens, 191-196. New York, World Wildlife Fund Project, Plenum Press.

-----. 1988. Spongivory in hawksbill turtles: A diet of glass. *Science* 239(4838):393-395.

Meylan, A.B. and M. Donnelly. 1999. Status justification for listing the hawksbill turtle (*Eretmochelys imbricata*) as critically endangered on the 1996 IUCN Red List of Threatened Animals. *Chelonian Conservation and Biology* 3(2):200-224.

Miyabe, N. 1994. A review of the biology and fisheries for bigeye tuna, *Thunnus obesus*, in the Pacific Ocean. FAO Fisheries Report T336 Volume 2. Rome, Food and Agriculture Organization for the United Nations.

Miyabe, N. and W.H. Bayliff. 1998. A review of information on the biology, fisheries, and stock assessment of bigeye tuna, *Thunnus obesus*, in the Pacific Ocean. *In* Deriso, R.B., W.H. Bayliff, and N.J. Webb (eds.) Proceedings of the First World Meeting on Bigeye Tuna, 129-170. La Jolla, California: Inter-American Tropical Tuna Commission.

Mizroch, S.A., L.M. Herman, J.M. Straley, D. Glockner-Ferrari, C. Jurasz, J. Darling, S. Cerchio et al. 2004. Estimating the adult survival rate of central North Pacific humpback whales (*Megaptera novaeangliae*). *Journal of Mammalogy* 85:963-972.

Mobley Jr., J.R., S.S. Spitz, R. Grotefendt, P.H. Forestell, A.S. Frankel, and G.A. Bauer. 2001. Abundance of humpback whales in Hawaiian waters: Results of 1993-2000 aerial surveys. Honolulu, Hawaii, United States Department of Commerce, National Oceanic and Atmospheric Administration, Office of National Marine Sanctuaries.

Molony, B. 2005. Estimates of the mortality of non-target species with an initial focus on seabirds, turtles, and sharks. WCPFC Report SC1 EB WP-1. Pohnpei, Federated States of Micronesia, Western and Central Pacific Fisheries Commission.

Montevecchi, W.A. 2002. Interactions between fisheries and seabirds. *In* Schreiber, E.A. and J. Burger (eds.) *Biology of Marine Birds*, 527-557. Boca Raton, Florida, CRC Press.

Moore, S.E., J.M. Waite, L.L. Mazzuca, and R.C. Hobbs. 2000. Provisional estimates of mysticete whale abundance on the central Bering Sea shelf. *Journal of Cetacean Research and Management* 2(3):227-234.

Murray, T. 1994. A review of the biology and fisheries for albacore, *Thunnus alalunga*, in the South Pacific Ocean. FAO Fisheries Report 366(2):188-206. Rome, Food and Agriculture Organization for the United Nations.

Nakamura, I. 1985. Billfishes of the world: An annotated and illustrated catalogue of marlins, sailfishes, spearfishes, and swordfishes known to date. *Fisheries Synopsis* 125(5):1-4.

National Marine Fisheries Service. 1998a. Biological opinion on the Fishery Management Plan for the pelagic fisheries of the Western Pacific region: Hawaii central North Pacific longline fishery. La Jolla, California, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Region.

National Marine Fisheries Service. 1998b. Re-initiation of formal section 7 consultation on the Fishery Management Plan for the pelagic fisheries of the western Pacific region: Hawaii central North Pacific longline fishery impacts of the Hawaii-based longline fishery on listed sea turtles. Honolulu, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Islands Regional Office.

National Marine Fisheries Service. 2001a. Biological opinion on the authorization of pelagic fisheries under the Fishery Management Plan for the pelagic fisheries of the western Pacific region. Long Beach, California, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Regional Office.

National Marine Fisheries Service. 2001b. Final environmental impact statement for Fishery Management Plan: Pelagic fisheries of the western Pacific region. Honolulu, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Region.

National Marine Fisheries Service. 2004a. Environmental assessment - U.S. South Pacific albacore troll fishery. Long Beach, California, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Region.

National Marine Fisheries Service. 2004b. Environmental assessment for the third extension of the South Pacific Tuna Treaty. Honolulu, United States Department of

Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Islands Regional Office.

National Marine Fisheries Service. 2004c. Management measures to implement new technologies for the western Pacific pelagic longline fisheries - Amendment to pelagics Fishery Management Plan including a supplemental environmental impact statement. Honolulu, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Islands Regional Office.

National Marine Fisheries Service. 2004d. Pacific Islands region bycatch reduction implementation plan FY04-FY05. Honolulu, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Islands Regional Office.

National Marine Fisheries Service. 2005a. Final environmental impact statement on seabird interaction avoidance measures and pelagic squid fishery management. Honolulu, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Islands Regional Office.

National Marine Fisheries Service. 2005b. Biological opinion on continued authorization of the Hawaii-based pelagic, deep-set, tuna longline fishery based on the Fishery Management Plan for pelagic fisheries of the western Pacific region. Honolulu, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Islands Regional Office.

National Marine Fisheries Service. 2008a. 2007 status of U.S. fisheries. Silver Spring, Maryland, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

National Marine Fisheries Service. 2008b. False Killer Whale (*Pseudorca crassidens*): Pacific Islands Region Stock Complex - Hawaii Insular, Hawaii Pelagic, and Palmyra Atoll Stocks. United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Protected Resources. Marine Mammal Stock Assessment Reports. http://www.nmfs.noaa.gov/pr/sars/species.htm

National Marine Fisheries Service. 2008c. Biological opinion on management modifications for the Hawaii-based shallow-set longline swordfish fishery – implementation of Amendment 18 to the FMP for pelagic fisheries of the western Pacific region. Honolulu, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Islands Regional Office.

National Marine Fisheries Service. 2009. 2008 status of U.S. fisheries. Silver Spring, Maryland, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

Nikaido, H., N. Miyabe, and S. Ueyanagi. 1991. Spawning time frequency of bigeye tuna, *Thunnus obesus*. *Bulletin of Natural Resources: Institute of the Far Seas Fisheries* 28:47-73.

Nybakken, J.W. 1997. *Marine biology: An ecological approach*. New York: Addison-Wesley.

Olavarria, C., C. Scott Baker, C.G. Garrigue, M. Poole, N. Hauser, S. Caballero, L. Florez-Gonzalez et al. 2007. Population structure of South Pacific humpback whales and the origin of the eastern Polynesian breeding grounds. *Marine Ecology Progress Series* 330:257-268.

Pacific Fishery Management Council. 2003. Final environmental impact statement, consolidated with Fishery Management Plan for U.S. west coast fisheries for highly migratory species. Portland, Oregon, Pacific Fishery Management Council.

Pacific Fishery Management Council. 2005. Status of the U.S. west coast fisheries for highly migratory species through 2004: Stock assessment and fishery evaluation. Portland, Pacific Fishery Management Council.

Pacific Fishery Management Council. 2008. Status of the U.S. west coast fisheries for highly migratory species through 2007: Stock assessment and fishery evaluation. Portland, Oregon, Pacific Fishery Management Council.

Palko, B.J., G.L. Beardsley, and W.J. Richards. 1981. Synopsis of the biology of the swordfish, *Xiphias gladius*. NOAA Report TR-NMFS-CIRC-441. Seattle, Washington, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

Parker, D.M., W. Cooke, and G.H. Balazs. 2002. Dietary components of pelagic loggerhead turtles in the North Pacific Ocean. NOAA Report NMFS-SEFSC-477. *In* Proceedings of the Twentieth Annual Symposium on Sea Turtle Biology and Conservation, February 29–March 4, 2000, Orlando, Florida, 148–151. United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

Pauly, D., A.W. Trites, E. Capuli, and V. Christensen. 1998. Diet composition and trophic levels of marine mammals. *International Council for Exploration of the Sea Journal of Marine Science* 55(3):467-481.

Perry, S.L., D.P. Demaster, and G.K. Silber. 1999. The great whales: History and status of six species listed as endangered under the U.S. Endangered Species Act of 1973. *Marine Fisheries Review* 61(1).

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.

Plotkin, P.T., R.A. Bales, and D.C. Owens. 1993. Migratory and reproductive behavior of *Lepidochelys olivacea* in the eastern Pacific Ocean. *In* B.A. Schroeder and B.E. Witherington (compilers) Proceedings of the Thirteenth Annual Symposium on Sea Turtle Biology and Conservation. NOAA Report TM-NMFS-SEFSC-341, Page 138. United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

Polovina, J.J., G.T. Mitchum, and G.T. Evans. 1995. Decadal and basin-scale variation in mixed layer depth and the impact on biological production in the central and North Pacific 1960-88. *Deep Sea Research* 142:1701-1716.

Polovina, J.J. 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(2):114-119.

Polovina, J.J., E. Howell, D.R. Kobayashi, and M.P. Seki. 2001. The transition zone chlorophyll front, a dynamic global feature defining migration and forage habitat for marine resources. Beyond El Niño conference: Climate variability and marine ecosystem impacts from the tropics to the Arctic, 49(1-4):469-483. La Jolla, California, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center.

Reeves, R.R., P.J. Clapham, R.L. Brownell, and G.K. Silber. 1998. Recovery plan for the blue whale (*Balaenoptera musculus*). Silver Spring, Maryland, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

Reilly, S.B. and V.G. Thayer. 1990. Blue whale (*Balaenoptera musculus*) distribution in the eastern tropical Pacific. *Marine Mammal Science* 6(4):265-277.

Rice, D. 1977. Synopsis of biological data on the sei whale and Bryde's whale in the eastern North Pacific. IWC Special Issue 1:333-336. Cambridge, International Whaling Commission.

Rice, D. 1989. Sperm whale *Physeter macrocephalus* Linnaeus, 1758. *In* Ridgway, S. H. and R. Harrison (eds.) *Handbook of Marine Mammals*, 177-233. London, Academic Press.

Richardson, T.L., G.A. Jackson, H.W. Ducklow, and M.R. Roman. 2004. Planktonic food webs 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.

Romanov, E.V. 2002. Bycatch in the tuna purse-seine fisheries of the western Indian Ocean. *Fishery Bulletin* 100(1). Crimea, Ukraine, Southern Scientific Research Institute of Marine Fisheries and Oceanography.

Saito, S. 1973. Studies on fishing of albacore, *Thunnus alalunga* (Bonnaterre) by experimental deep-sea tuna long-line. *Memoirs of the Faculty of Fisheries* 21(2):107-184.

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.

Secretariat of the Pacific Community. 2001. A review of turtle by-catch in the western and central Pacific Ocean tuna fisheries. Noumea, New Caledonia, Oceanic Fisheries Programme, Secretariat of the Pacific Community.

Secretariat of the Pacific Community. 2009a. Preliminary review of the western and central Pacific Ocean purse seine fishery 2008. Oceanic Fisheries Programme, Secretariat of the Pacific Community.

Secretariat of the Pacific Community. 2009b. A description of observer and port sampling data collected under the U.S. multilateral treaty and FSM arrangement 2007-2008. A paper prepared for the Internal Meeting of Pacific Island Parties to the South Pacific Regional US Multilateral Treaty March 10–13, 2009 Koror, Palau. Noumea, New Caledonia, Oceanic Fisheries Programme, Secretariat of the Pacific Community.

Seki, M.P., R. Lumpkin, and P. Flament. 2002. Hawaii cyclonic eddies and blue marlin catches: The case study of the 1995 Hawaiian International Billfish Tournament. *Journal of Oceanography* 58(5):739-745.

Seminoff, J.A. 2002. Global status of the green turtle (*Chelonia mydas*): A summary of the 2001 stock assessment for the IUCN Red List Programme. Honolulu, Hawaii, Western Pacific Sea Turtle Cooperative Research and Management Workshop.

Sibert, J. and J. Hampton. 2003. Mobility of tropical tunas and the implications for fisheries management. *Marine Policy* 27(1):87-95.

Sibert, J., J. Hampton, P. Kleiber, and M. Maunder. 2006. Biomass, size, and trophic status of top predators in the Pacific Ocean. *Science* 314(5806):1773-1776.

Silva-Batiz, F.A., E. Godinez-Dominguez, and J.A. Trejo-Robles. 1995. Status of the olive ridley nesting population in Playon de Mismaloya, Mexico: Thirteen years of data. Fifteenth Annual Symposium, Sea Turtle Biology and Conservation.

Solomon, S., D. Quin, M. Manning, Z. Chen, M. Marquis, K.B. Avryt, M. Tignor et al. 2007. Summary for policy makers. *In* Climate Change 2007: The Physical Science Basis. WGI-IPCC Report 4. Cambridge and New York, Cambridge University Press.

Spotila, J.R., A.E. Dunham, A.J. Leslie, A.C. Steyermark, P.T. Plotkin, and F.V. Paladino. 1996. Worldwide population decline of *Dermochelys coriacea*: Are leatherback turtles going extinct? *Chelonian Conservation and Biology* 2(2):209-222.

Spotila, J.R., R.D. Reina, A.C. Steyermark, P.T. Plotkin, and F.V. Paladino. 2000. Pacific leatherback turtles face extinction. *Nature* 405(6786):529-530.

Stewart. R.H. 2005. *Introduction to physical oceanography*. September 2005 Edition. Galveston, Texas: Department of Oceanography, Texas A&M University.

Sturman, A.P. and H.A. McGowan. 1999. Mesoscale and local climates in New Zealand. *Progress Physical Geography* 23(4):611-635.

Suzuki, Z. 1994. A review of the biology and fisheries for yellowfin tuna (*Thunnus albacares*) in the western and central Pacific Ocean. *In* Shomura, R. S., J. Majkowski, and S. Langi (eds.) Interactions of Pacific Tuna Fisheries. Volume 2: Papers on biology and fisheries, 108-137. Rome, Food and Agriculture Organization for the United Nations.

Suzuki, Z., P.K. Tomlinson, and M. Honma. 1978. Population structure of Pacific yellowfin tuna. *Inter-American Tropical Tuna Commission Bulletin* 17(5):227-446.

Suzuki, Z., Y. Warashina, and M. Kishida. 1977. The comparison of catches by regular and deep tuna longline gears in the western and central equatorial Pacific. *Bulletin of the Far Seas Fisheries Research Laboratory* 15:51-89.

Takahashi, M., H. Okamura, K. Yokawa, and M. Okazaki. 2003. Swimming behaviour and migration of a swordfish recorded by an archival tag. *Marine and Freshwater Research* 54(4):527-534.

The World Bank. 2000. *Cities, seas, and storms: managing change in Pacific Islands economies.* Volume IV: Adapting to climate change. Washington D.C.: The World Bank.

Troeng, S. and E. Rankin. 2005. Long-term conservation efforts contribute to positive green turtle (*Chelonia mydas)* nesting trend at Tortuguero, Costa Rica. *Biological Conservation* 121(1):111-116.

Tudela, S. 2004. *Ecosystem effects of fishing in the Mediterranean: An analysis of the major threats of fishing gear and practices to biodiversity and marine habitats.* Studies and reviews: General Fisheries Commission for the Mediterranean 74, 44. Rome: Food and Agriculture Organization for the United Nations.

United States Coast Guard and National Marine Fisheries Service. 2009. Distant water tuna fleet (aka U.S. purse seine fleet). Annual report to Congress. United States Coast Guard, Homeland Security and United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Islands Regional Office.

United States Fish and Wildlife Service. 2002. Biological opinion for the effects of the Hawaii-based domestic longline fleet on the short-tailed albatross (*Phoebastria albatrus*). FWS Report 1-2-99-F-02. Honolulu, United States Fish and Wildlife Service, United States Department of the Interior.

United States Fish and Wildlife Service. 2004. Biological opinion for the effects of the FMP for the U.S. west coast fisheries for HMS and its effect on the endangered short-tailed albatross (*Phoebastria albatrus*) and the endangered brown pelican (*Pelecanus occidentalis*).USFWS Report AFWO 1-14-2003-F-1479.1. Portland, Oregon, United States Fish and Wildlife Service, United States Department of the Interior.

United States Fish and Wildlife Service. 2005. Short-tailed albatross draft recovery plan. Anchorage, United States Department of the Interior, U.S. Fish and Wildlife Service, Region 7.

Ward, P. and S. Elscot. 2000. Broadbill swordfish: Status of world fisheries. Report 3:208-213. Canberra, Australia, Bureau of Rural Sciences.

Ware, D.M., and R.E. Thomson. 2005. Bottom-up ecosystem trophic dynamics determine fish production in the northeast Pacific. *Science* 308:1280-1284.

Watling, D. 2002. Interactions between seabirds and Pacific Islands fisheries, particularly tuna fisheries. Noumea, New Caledonia, Oceanic Fisheries Programme, Secretariat of the Pacific Community.

Western Pacific Fishery Management Council, National Marine Fisheries Service, and WorldFish Center. 2004. What can be done to restore Pacific turtle populations? The Bellagio blueprint for action on Pacific sea turtles. Penang, Malaysia, Available from http://www.worldfishcenter.org/Pubs/bellagio-blueprint/pdf/Blueprint-Full.pdf

Western Pacific Regional Fishery Management Council. 2005. 2004 Western Pacific Pelagic Supplemental Environmental Impact Statement. Honolulu, Western Pacific Fishery Management Council.

Western Pacific Regional Fishery Management Council. 2008. Pelagic fisheries of the western Pacific region: 2007 annual report. Honolulu, Western Pacific Fishery Management Council.

Western Pacific Regional Fishery Management Council. 2009. Pelagic fisheries of the western Pacific region: 2007 annual report (updated April 6, 2009). Honolulu, Western Pacific Regional Fishery Management Council.

Wetherall, J.A., G.H. Balazs, R.A. Tokunaga, and M.Y. Yong. 1993. Bycatch of marine turtles in North Pacific high-seas driftnet fisheries and impacts on the stocks. *North Pacific Commission Bulletin* 53:519-538.

Whitehead, H. 2002. Estimates of the current global population size and historical trajectory for sperm whales. *Marine Ecology Progress Series* 242:295-304.

Whitelaw, A.W. and V.K. Unithan. 1997.Synopsis on the distribution, biology, and fisheries of the bigeye tuna (*Thunnus obesus*) with a bibliography. Hobart, Australia, Australian Commonwealth Scientific and Research Organization.

Williams, P. and C. Reid. 2007. Overview of tuna fisheries in the western and central Pacific Ocean including economic conditions -2006. WCPFC Report SC3-2007/GN WP-1. Honolulu, Scientific Committee, Western and Central Pacific Fisheries Commission.

Williams, P. 2003. Overview of the western and central Pacific Ocean tuna fisheries – 2002. Sixteenth Meeting of the Standing Committee on Tuna and Billfish 9–16 July. Working Paper GEN-1. Mooloolaba, Australia.

Wilson, C. A. and J. M. Dean. 1983. The potential use of sagittae for estimating age of Atlantic swordfish, *Xiphias gladius*. Proceedings of the International Workshop on Age Determination of Oceanic Pelagic Fishes: Tunas, Billfishes and Sharks. NOAA Report TR-NMFS-8, 151-156. United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

Van Dam, R. P. and C. E. Diez. 1997. Predation by hawksbill turtles on sponges at Mona Island, Puerto Rico. *In* Lessios H. A., Macintyre I. G. (eds.) Proceedings to the Eighth International Coral Reef Symposium, 24 to 29 June 1996, Panama City, Report 2, 1421–1426. Balboa, Republic of Panama, Smithsonian Tropical Institute.

Vang, L. 2002. Distribution, abundance, and biology of Group V humpback whales *Megaptera novaeangliae*: A review. Brisbane, Australia, Queensland Parks and Wildlife Services, Environmental Protection Agency.

Yochem, P. K. and S. Leatherwood. 1985. *Blue whale (Balaenoptera musculus) (Linnaeus, 1758)*. London: Academic Press.

## Appendix 2 – 2009 SEA

# Supplemental 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:

# Specific Analysis on Bigeye Tuna Catch Limits in Longline Fisheries in 2009, 2010, and 2011


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# LIST OF ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| CCM | Commission Members, Cooperating Non-Members, and Participating Territories |
| CEQ | Council on Environmental Quality |
| CMM | Conservation and Management Measure |
| CNMI | Commonwealth of the Northern Mariana Islands |
| Convention | Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean |
| Convention Area | Area of Application of the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean |
| EA | Environmental Assessment |
| EEZ | Exclusive Economic Zone |
| EFH | Essential Fish Habitat |
| EIS | Environmental Impact Statement |
| EPO | eastern Pacific Ocean |
| ESA | Endangered Species Act |
| FMP | Fishery Management Plan |
| HAPC | Habitat Areas of Particular Concern |
| HMS | Highly Migratory Species |
| IATTC | Inter American Tropical Tuna Commission |
| IUCN | International Union for the Conservation of Nature |
| MMPA | Marine Mammal Protection Act |
| MSA | Magnuson-Stevens Fishery Conservation and Management Act |
| MSY | Maximum Sustainable Yield |
| mt | metric tons |
| NEPA | National Environmental Policy Act |
| NMFS | National Marine Fisheries Service |
| NOAA | National Oceanic and Atmospheric Administration |
| NWR | National Wildlife Refuge |
| PMUS | Pelagic Management Unit Species |
| PNG | Papua New Guinea |
| RIR | Regulatory Impact Review |
| USFWS | United States Fish and Wildlife Service |
| VMS | vessel monitoring system |

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| WCPFC | Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean, also known as the Western and Central Pacific Fisheries Commission |
| WCPFCIA | Western and Central Pacific Fisheries Convention Implementation Act |
| WCPO | Western and Central Pacific Ocean |
| WPRFMC | Western Pacific Regional Fishery Management Council |

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Chapter 1

# Chapter 1 Background and Purpose and Need

The National Marine Fisheries Service (NMFS) prepared an Environmental Assessment (EA) to analyze the effects on the human environment that could result from implementation of two rules to implement certain decisions made by the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC) at its Fifth Regular Session, in Busan, Republic of Korea, in December 2008. One rule implements specific management measures for the U.S. purse seine fleet operating in the western and central Pacific Ocean (WCPO) (hereafter "U.S. Purse Seine Rule"). The other rule implements a specific catch limit established by the WCPFC for bigeye tuna (*Thunnus obsesus*) for the U.S. longline fleets in the WCPO (hereafter "U.S. Longline Rule").

NMFS issued the EA ("Environmental Assessment for the Implementation of the Decisions of the Fifth Regular Annual Session of the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean: Fishing Restrictions and Observer Requirements in Purse Seine Fisheries for 2009-2011 and Turtle Mitigation Requirements in Purse Seine Fisheries and Bigeye Tuna Catch Limits in Longline Fisheries in 2009, 2010, and 2011") in draft form in conjunction with the issuance of the proposed U.S. Purse Seine Rule on June 1, 2009, for public review and comment. Two comment letters were received, one of which included comments on the EA, including several comments pertaining to the U.S. Longline Rule.

NMFS issued the proposed U.S. Longline Rule on July 8, 2009, for public review and comment, reissuing the EA in draft form. NMFS received six comment letters, two of which raised issues pertaining to the EA.

On August 4, 2009, NMFS issued the final U.S. Purse Seine Rule as well as the EA (July 2009 version), finding of no significant impact for the U.S. Purse Seine Rule, and an Errata sheet, indicating several corrections to the draft EA. In the final rule, NMFS indicated that the specific comments pertaining to the U.S. Longline Rule would be addressed, as appropriate, in the context of the U.S. Longline Rule.

This Supplemental EA has been prepared to address those comments received on the U.S. Longline Rule that can be answered by additional environmental analysis or information. The Supplemental EA has been prepared pursuant to the provisions of the National Environmental Policy Act (NEPA; 42 U.S.C. 4321, et seq.) and related authorities, such as the Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508) and the National Oceanic and Atmospheric Administration's (NOAA) Environmental Review Procedures for Implementing NEPA (NAO 216-6). This document supplements the EA[1] and refers to

[1] In order to distinguish the Supplemental EA from the EA, this document refers to the EA (July 2009 version) as "the original EA" throughout.

specific sections of the EA, where appropriate; as a supplement it is meant to be read in conjunction with the original EA.

The following sections in this chapter provide a summary of the specific issues being analyzed in this Supplemental EA, the organization of this document, and the purpose of and need for the U.S. Longline Rule.

## *1.1 Overview of Substantive Comments on the U.S. Longline Rule that Can Be Answered by Additional Environmental Analysis or Information*

Issue #1 (New Alternative):

Several comments questioned the way bigeye tuna catches would be attributed to various fisheries under the proposed rule – specifically, how the longline fisheries of the three U.S. Participating Territories to the WCPFC would be distinguished from the other U.S. longline fisheries. Under the proposed rule, bigeye tuna catches would be attributed primarily based on where the catch is landed. The comments suggested that permit type should be the primary criterion for distinguishing among the fisheries (e.g., American Samoa Longline Limited Access Permit versus Hawaii Longline Limited Access Permit). One comment was phrased thus:

> In the case of a vessel landing bigeye tuna and other fish species in Hawaii that has both a Hawaii limited entry permit and American Samoa limited entry permit or any future territorial permits, the catch should be assigned based on a determination of which permit program the vessel was attributing its catches with respect to the landing involved.

NMFS recognizes that, as indicated in these comments, a vessel with an American Samoa Longline Limited Access Permit does indeed have a connection to the longline fishery of American Samoa, and accordingly, NMFS has developed a new alternative. Alternative 5, explained in detail in Chapter 2, is almost identical to Alternative 3 in the original EA, but provides for bigeye tuna caught by fishing vessels registered for use under a valid American Samoa Longline Limited Access Permit, regardless of where it is landed, to be assigned to the longline fishery of American Samoa provided that: (1) the fish were not caught in the portion of the U.S. Exclusive Economic Zone (EEZ) around the Hawaiian Archipelago, and (2) they are landed by a U.S. vessel operated in compliance with one of the permits required under the regulations implementing the Pelagics Fishery Management Plan (FMP) and the West Coast Highly Migratory Species (HMS) FMP.

Issue #2 (Transferred Effects):

Several comments stated that the original EA does not analyze a certain type of effect reported to occur in some situations from fishery closures, termed “market transferred effects.” These market transferred effects are those that could occur when fishing effort is shifted from one market to another (e.g., from the Hawaii-based deep-set longline fishery to foreign longline fisheries as a result of catches in the former fishery being constrained by the annual limits). These “market transferred effects” can cause impacts on the environment if the fishery where increased effort occurs functions differently or is under a different management regime. According to the comments, market transferred effects from fishing effort being transferred from the Hawaii-based longline fishery to foreign fisheries after the catch limit is reached could result in serious adverse environmental effects, such as increased protected species interactions.

NMFS has provided further information and analysis about these possible effects, as presented in Chapters 3 and 4 of this Supplemental EA.

Issue #3 (Alternatives Excluded from Detailed Analysis):

A comment indicated that the original EA does not provide sufficient explanation of the alternatives for the U.S. Longline Rule that were initially considered but excluded from detailed analysis. The original EA states that these generally described alternatives would be more appropriately considered, if the Regional Fishery Management Councils find appropriate, through the Magnuson-Stevens Fishery Conservation and Management Act (MSA; 16 U.S.C. 1801, et seq.) process.

In order to respond to this comment, Chapter 2 of this Supplemental EA contains additional discussion of the U.S. Longline Rule alternatives that were initially considered but excluded from detailed analysis.

Issue #4 (Protected Resources):
Several comments stated that the original EA included outdated and cursory information on protected resources and that updated and more detailed information should be included.

In order to respond to this comment, Chapter 3 of this Supplemental EA contains additional information on protected resources.

## *1.2 Organization of this Document*

Chapter 1: (*Background and Purpose and Need*) Provides background information for this Supplemental EA and sets forth the purpose of and need for the U.S. Longline Rule.

Chapter 2: (*Proposed Action and Alternatives*) Describes the new U.S. Longline Rule alternative – Alternative 5 – and provides a summary of the alternatives analyzed in the original EA.

Chapter 3: (*Affected Environment*) Includes descriptive information needed to analyze Alternative 5 and to respond to the substantive comments on the U.S. Longline Rule that can be answered by additional environmental analysis or information.

Chapter 4: (*Environmental Consequences*) Sets forth the analysis of direct, indirect, and cumulative impacts that could result from implementation of Alternative 5 and compares the effects of Alternative 5 to those of the other alternatives analyzed in the original EA.

Chapter 5: (*Comment Summary and Response*) Presents a detailed summary of all the comments received regarding the U.S. Longline Rule-related aspects of the original EA, and provides responses to each comment.

## *1.3 Purpose and Need*

The WCPFC adopted a Conservation and Management Measure (CMM) for Bigeye and Yellowfin Tuna in the Western and Central Pacific Ocean (CMM 2008-01) at its Fifth Regular Session, in Busan, Republic of Korea, in December 2008. The provisions of the CMM are based on an objective to achieve a 30% reduction in fishing mortality on WCPO bigeye tuna[2] and a reduction in the risk of overfishing WCPO yellowfin tuna (*Thunnus albacares*) in a three-year period, commencing in 2009. With respect to bigeye tuna, the CMM is based in part on the finding by the WCPFC Scientific Committee that WCPO bigeye tuna is experiencing a fishing mortality rate greater than the rate associated with maximum sustainable yield (MSY). With respect to yellowfin tuna, the CMM is based on the finding by the WCPFC Scientific Committee that WCPO yellowfin tuna is being fished at capacity. CMM 2008-01 has the stated objective of reducing, over the period 2009-2011, the fishing mortality rate for bigeye tuna in the WCPO by at least 30% from the annual average during the period 2001-2004 or 2004 and ensuring that there is no increase in fishing mortality for WCPO yellowfin tuna beyond the annual average during the period 2001-2004 or 2004.

One of the provisions of CMM 2008-01 requires the United States to implement a specific limit for bigeye tuna caught by longline fleets from 2009 through 2011. The U.S. Longline Rule would ensure NMFS' timely implementation of the annual catch limit for bigeye tuna established by the WCPFC for the U.S. longline fleets for each of the years 2009 through 2011. As prescribed by Paragraph 33 of CMM 2008-01, for 2009, the limit would be equal to the amount landed by the Hawaii and west coast longline fleets in 2004, less 10%. The amount landed in 2004, which is specified in CMM 2008-01 based on information provided by the United States to the WCPFC, was 4,181 metric tons (mt). Consequently, the calculated reduction (less 10%) results in an annual limit of 3,763 mt. Under CMM 2008-01, the longline fisheries of Participating Territories, including American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands (CNMI), have separate annual bigeye tuna catch limits of 2000 mt for 2009-2011. However, if these Participating Territories are undertaking responsible development of their domestic fisheries, the bigeye tuna catch limits do not apply.

[2] As discussed in Chapter 3 of the original EA, the stock structure of bigeye tuna in the Pacific Ocean is not well known. The WCPFC has to date treated bigeye tuna in the WCPO as a single and entire stock, both in terms of stock assessments and management decisions. The WCPFC decisions and this document, consequently, deal with bigeye tuna in the WCPO, and the term "WCPO bigeye tuna" is used throughout this document to refer to that stock. The same is true with WCPO yellowfin tuna.

The Western and Central Pacific Fisheries Convention Implementation Act (WCPFCIA; Pub. L. 109-479, Sec 501, et seq., and codified at 16 U.S.C. 6901 et seq.) authorizes the Secretary of Commerce, in consultation with the Secretary of State and the Secretary of the Department in which the Coast Guard is operating, to develop such regulations as are needed to carry out the obligations of the United States under the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (Convention). The authority to promulgate regulations to implement the provisions of the Convention and WCPFC decisions, such as regulations to implement CMMs, has been delegated by the Secretary of Commerce to NMFS. To comply with the international obligations of the United States, NMFS is issuing the U.S. Longline Rule under the WCPFCIA pertaining to the U.S. longline fleets for the discrete and limited purpose of implementing the catch limit.

As stated in the original EA, the purpose of the U.S. Longline Rule is for NMFS to ensure the timely implementation by the United States of the bigeye tuna catch limit established by the WCPFC in CMM 2008-01. The need for the rule is to satisfy the international obligations of the United States as a Contracting Party to the Convention, pursuant to the WCPFCIA, and to make effective a CMM provision that requires immediate implementation.

**Chapter 2**

# Chapter 2 Proposed Action and Alternatives

This chapter provides a detailed description of the proposed action analyzed in this Supplemental EA – NMFS' new alternative for the U.S. Longline Rule, Alternative 5 – as well as a description of the three action alternatives and the No-Action, or baseline, alternative, analyzed in the original EA. The chapter concludes with a section providing more detailed information on the alternatives for the U.S. Longline Rule initially considered but excluded from detailed analysis.

## *2.1 Alternative 5 (New Alternative)*

Although the bigeye tuna limits established in CMM 2008-01 are termed "catch" limits, the baseline amount of bigeye tuna specified for the United States in the CMM, from which the limit is derived, is from information provided to the WCPFC by the United States. That information is expressed in terms of bigeye tuna that are retained on board, not captured, per se. Consistent with U.S. recordkeeping and reporting conventions, the U.S. Longline Rule would establish a limit on retained catches (as a proxy for catches) of bigeye tuna.

For the purpose of implementing the bigeye tuna catch limits of CMM 2008-01, NMFS would distinguish the longline fisheries of the three Participating Territories from the other longline fisheries of the United States, based upon a combination of the types of federal longline fishing permits registered to the fishing vessel and where the bigeye tuna are landed. Specifically, bigeye tuna landed in any of the three Participating Territories, with certain provisos, will be treated as fish that are harvested in support of the development of the Participating Territory's domestic fisheries and will be assigned to the longline fishery of that Participating Territory. As well, bigeye tuna that are captured by a fishing vessel registered for use under a valid American Samoa Longline Limited Access Permit, with certain provisos, will be treated as fish that are harvested in support of the development of American Samoa's domestic fisheries and will be assigned to the longline fishery of American Samoa. The provisos in both these cases are that the bigeye tuna must not have been captured in the portion of the EEZ around the Hawaiian Archipelago, and they must be landed by a U.S. fishing vessel operated in compliance with a permit issued under 50 CFR 660.707 or 665.21. Any bigeye tuna assigned to the longline fisheries of any of the three Participating Territories as described above will not be subject to the limit. All other bigeye tuna captured by longline gear in the Convention Area (see Figure 1 below) by U.S. longline vessels and retained will be subject to the limit.

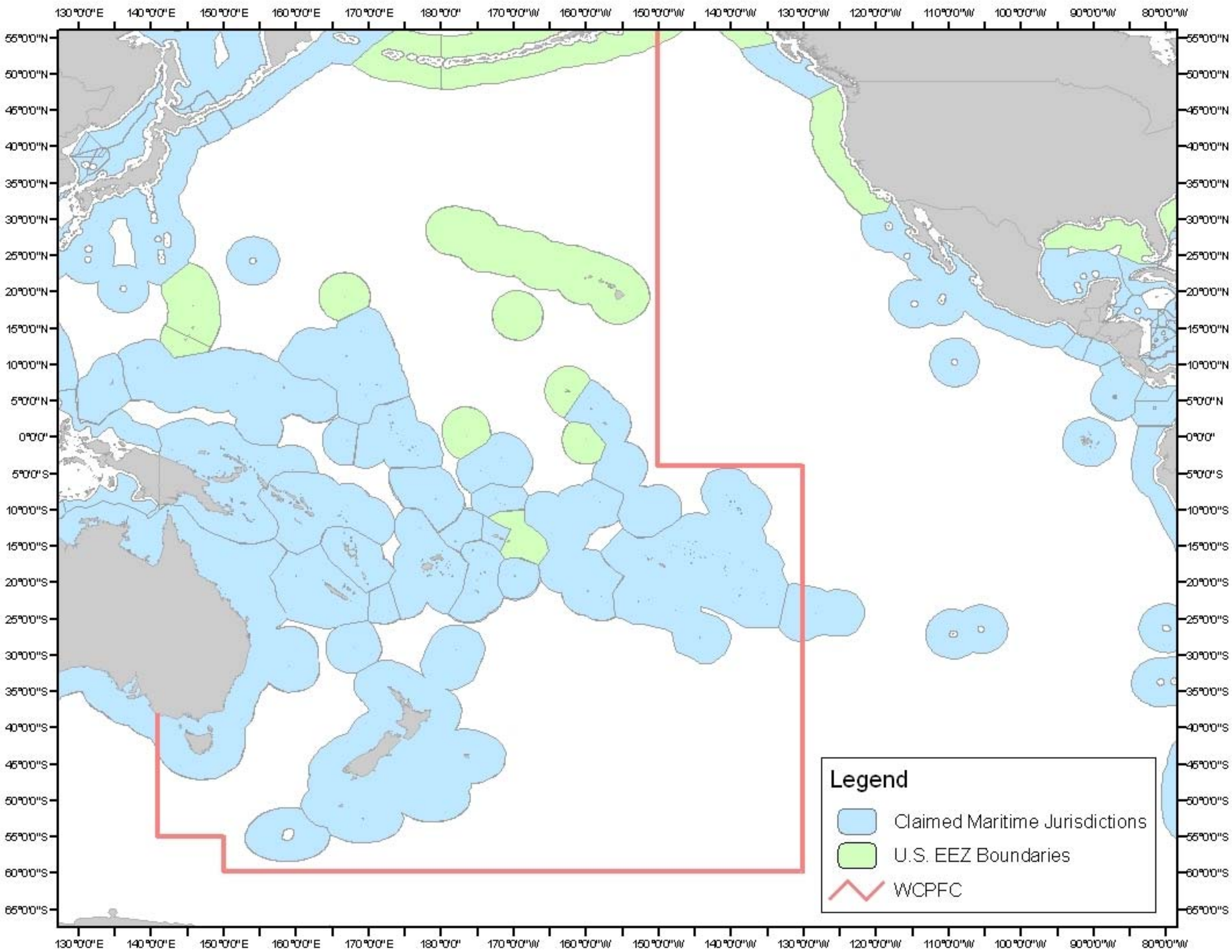
Once NMFS determines in any of the years 2009, 2010, or 2011 that the limit is expected to be reached by a specific future date in that year, NMFS will publish a notice in the *Federal Register* announcing that specific restrictions will be effective on that specific future date until the end of the calendar year. NMFS will publish the notice at least seven calendar days before the effective date of the restrictions to provide fishermen advance notice of the restrictions. NMFS will also endeavor to make publicly available, such as on a web site, regularly updated estimates and/or projections of bigeye tuna catches in order to help fishermen plan for the possibility of the limit being reached.

Under Alternative 5, starting on the announced date and extending through the last day of that calendar year, it will be prohibited to use a U.S. fishing vessel to retain on board, transship, or land bigeye tuna captured in the Convention Area by longline gear, except any bigeye tuna already on board a fishing vessel upon the effective date of the restrictions may be retained on board, transshipped, and/or landed, provided that they are landed within 14 days after the restrictions become effective. In the case of a vessel that has declared to NMFS pursuant to 50 CFR 665.23(a) that the current trip type is shallow-setting, the 14-day limit is waived, but the number of bigeye tuna retained on board, transshipped, or landed must not exceed the number on board the vessel upon the effective date of the restrictions, as recorded by the NMFS observer on board the vessel. Furthermore, bigeye tuna captured by longline gear may be retained on board, transshipped, and/or landed if they are captured by a fishing vessel registered for use under a valid American Samoa Longline Limited Access Permit or if they are landed in American Samoa, Guam, or the CNMI. However, the bigeye tuna must not have been caught in the portion of the EEZ surrounding the Hawaiian Archipelago, and, they must be landed by a U.S. fishing vessel operated in compliance with a valid permit issued under 50 CFR 660.707 or 665.21.

Starting on the announced date and extending through the last day of that calendar year, it will also be prohibited to transship bigeye tuna caught in the Convention Area by longline gear to any vessel other than a U.S. fishing vessel operated in compliance with a valid permit issued under 50 CFR 660.707 or 665.21.

These restrictions do not apply to bigeye tuna caught by longline gear outside the Convention Area, such as in the eastern Pacific Ocean (EPO). However, to help ensure compliance with the restrictions related to bigeye tuna caught by longline gear in the Convention Area, under Alternative 5, two additional, related, prohibitions will be in effect starting on the announced date and extending through the last day of that calendar year. First, it will be prohibited to fish with longline gear both inside and outside the Convention Area during the same fishing trip, with the exception of a fishing trip that is in progress at the time the announced restrictions go into effect. In that exceptional case, the vessel, unless on a declared shallow-setting trip, will still be required to land any bigeye tuna taken within the Convention Area within 14 days of the effective date of the restrictions, as described above. Second, if a vessel is used to fish using longline gear outside the Convention Area and the vessel enters the Convention Area at any time during the same fishing trip, the longline gear on the fishing vessel must be stowed in a manner so as not to be readily available for fishing while the vessel is in the Convention Area.

**Figure 1 Convention Area: high seas (in white); areas under U.S. jurisdiction (in green); and foreign jurisdictions ("claimed maritime jurisdictions," in blue)**




Source: NMFS unpublished data.

## *2.2 The Alternatives Analyzed in the Original EA*

The original EA analyzed three action alternatives as well as the No-Action, or baseline alternative, which are described below.

### 2.2.1 Alternative 1: The No-Action Alternative to the U.S. Longline Bigeye Tuna Catch Limit Rule

Under Alternative 1, the catch limit for WCPO bigeye tuna established by the WCPFC for the U.S. longline fishery would not be implemented and U.S. longline fleets operating in the Convention Area could continue targeting and landing bigeye tuna after the amount specified in CMM 2008-01 has been landed in any of the years 2009-2011. The fleets would continue to operate under the relevant FMPs with limited entry and a variety of other regulatory measures currently in place (observers, reporting, vessel monitoring system (VMS), endangered species mitigation, etc.).

### 2.2.2 Alternative 2: Closure of the Deep-Set Sector

Under Alternative 2, the rule to ensure NMFS' timely implementation of the bigeye tuna catch limit established by the WCPFC for applicable U.S. longline fleets would prohibit deep-set fishing operations (which target tunas) after a catch limit of 3,763 metric tons has been reached in any of the calendar years 2009 through 2011, as well as prohibit the retention on board and landing of bigeye tuna by longline vessels (e.g., by vessels engaged in shallow-setting).[3]

Once NMFS determines in any of the years 2009, 2010, or 2011 that the limit is expected to be reached by a specific future date in that year, NMFS would publish a notice in the *Federal Register* announcing that the fishery will be closed on that specific date and will remain closed until the end of the calendar year. NMFS would publish the notice at least seven calendar days before the effective date of the restrictions to provide fishermen advance notice of the restrictions. NMFS would also endeavor to make publicly available, such as on a web site, regularly updated estimates and/or projections of bigeye tuna landings in order to help fishermen plan for a possible fishery closure.

Starting on the closure date and extending through the last day of that calendar year, it would be prohibited to use a U.S. fishing vessel to deploy longline gear in the Convention Area, to retain on board bigeye tuna or yellowfin tuna captured by longline gear in the Convention Area, or to land or transship bigeye tuna or yellowfin tuna captured by longline gear in the Convention Area, with the following exceptions:

First, any bigeye tuna or yellowfin tuna already on board a fishing vessel upon the start of the closure may be retained on board, transshipped, and/or landed, provided that it is landed within 14 days after the start of the closure. In the case of a vessel that has declared to NMFS pursuant to 50 CFR 665.23(a) that the current trip type is shallow-setting, the 14-day limit would be waived, but the number of bigeye tuna or yellowfin tuna retained on board, transshipped, or landed could not exceed the number on board the vessel upon the start of the closure, as recorded by the NMFS observer on board the vessel.

Second, any bigeye tuna or yellowfin tuna captured by longline gear could be retained on board, transshipped, or landed, if it is landed in American Samoa, Guam, or the CNMI, provided that it was not caught in the portion of the EEZ surrounding the Hawaiian Archipelago and that it is landed by a U.S. fishing vessel operated in compliance with a valid permit issued under the FMP for the Pelagic Fisheries of the Western Pacific

[3] As discussed in more detail in Chapter 3, Section 3.3 of the original EA, the deep-set component of the longline fishery targets tuna species at depths ranging from 100 to 300 meters; the shallow-set component targets swordfish at depths less than 100 meters.

Region (Pelagics FMP) or the FMP for U.S. West Coast Fisheries for Highly Migratory Species (West Coast HMS FMP).

Third, vessels could continue to deploy longline gear in a shallow-set manner to target swordfish, provided that no bigeye tuna are landed or retained on board.

The purpose of the prohibitions with respect to yellowfin tuna would be to prevent vessels from targeting yellowfin tuna during the closure, which could potentially result in a large number of unutilized bigeye tuna mortalities, which would undermine the objective of the closure.

These restrictions would not apply to bigeye tuna caught by longline gear outside the Convention Area, such as in the EPO. However, to ensure compliance with the restrictions in the Convention Area, NMFS would prohibit vessels from fishing with longline gear in areas both within and outside the Convention Area during the same fishing trip.

### 2.2.3 Alternative 3: Prohibition on Retention, Landing, or Transshipping of Bigeye Tuna

Under Alternative 3, in order to ensure the timely implementation of the United States with the WCPO bigeye tuna catch limit for the U.S. longline fleets established by the WCPFC, vessels would be prohibited from retaining on board, landing or transshipping any catch of bigeye tuna in the limit’s area of application, once the limit has been reached for the calendar year. However, any bigeye tuna already on board a vessel at the time of the closure may be retained on board and landed and any bigeye tuna could be retained on board, transshipped, or landed in American Samoa, Guam, or the CNMI, provided that it was not caught in the portion of the EEZ surrounding the Hawaiian Archipelago and that it is landed by a U.S. fishing vessel operated in compliance with a valid permit issued under the Pelagics FMP or West Coast HMS FMP. In other words, it would differ from Alternative 2 only in that fishing vessels would be allowed to continue deep-set longlining in the affected area after the limit is reached, provided that no bigeye tuna are retained or landed. As for Alternative 2 and Alternative 5, these restrictions would not apply to bigeye tuna caught by longline gear outside the Convention Area, such as in the EPO. However, to ensure compliance with the restrictions in the Convention Area, NMFS would prohibit vessels from fishing with longline gear in areas both within and outside the Convention Area during the same fishing trip.

### 2.2.4 Alternative 4: Closure of the Deep-Set and Shallow-Set Sectors

Under Alternative 4, in order to ensure the timely implementation of the WCPO bigeye tuna catch limit for the U.S. longline fishery established by the WCPFC, both the shallow-set and deep-set components would be closed once the annual limit of 3,763 mt of bigeye tuna has been reached for the calendar year (i.e., no U.S. vessel would be allowed to conduct longline fishing operations in the Convention Area). However, any bigeye tuna already on board a vessel at the time of the closure may be retained on board and landed and any bigeye tuna could be retained on board, transshipped, or landed in American Samoa, Guam, or the CNMI, provided that it was not caught in the portion of the EEZ surrounding the Hawaiian Archipelago and that it is landed by a U.S. fishing vessel operated in compliance with a valid permit issued under the Pelagics FMP or West Coast HMS FMP. As for the other action alternatives, these restrictions would not apply to bigeye tuna caught by longline gear outside the Convention Area, such as in the EPO. However, to ensure compliance with the restrictions in the Convention Area, NMFS would prohibit vessels from fishing with longline gear in areas both within and outside the Convention Area during the same fishing trip.

## 2.3 Differences Between Alternative 5 and the Other Action Alternatives

As described above, Alternative 5 is similar to Alternative 3, which was the preferred alternative in the proposed U.S. Longline Rule. The difference is that, under Alternative 5, bigeye tuna captured by a vessel registered for use under an American Samoa Longline Limited Access Permit would be considered to be fish caught as part of the American Samoa longline fishery, regardless of where the fish are landed, and thus would not be subject to the limit or to the prohibitions established once the limit is reached. However, for such bigeye tuna to be considered part of the American Samoa longline fishery, they must not have been caught in the portion of the EEZ surrounding the Hawaiian Archipelago, and must be landed by a U.S. fishing vessel operated in compliance with a valid permit issued under 50 CFR 660.707 or 665.21.

## 2.4 Alternatives to the U.S. Longline Rule Excluded from Detailed Analysis

As stated in Chapter 1 of this Supplemental EA, the purpose of the U.S. Longline Rule is to ensure the timely implementation (prior to the limit being reached in 2009) by the United States of the bigeye tuna catch limit established by the WCPFC in CMM 2008-01. The need for the rule is to satisfy the international obligations of the United States as a Contracting Party to the Convention, pursuant to the WCPFCIA, and to make effective a CMM provision that requires immediate implementation. All of the action alternatives that NMFS analyzed in depth in the original EA and this Supplemental EA meet the purpose of, and need for, the U.S. Longline Rule.

The original EA in Section 2.2.3 indicated that NMFS considered other alternative methods of implementing the WCPO bigeye tuna catch limit, such as time and/or area closures, other limitations on fishing effort, allocation of the catch limit among vessels, and non-calendar-year catch limits. NMFS did not develop these alternatives in detail. NMFS discussed these alternatives internally and purely on a conceptual basis.

These alternatives would exceed the scope of the purpose of and need for the rule because they could not be implemented prior to the United States reaching the limit established by the WCPFC for 2009. These alternatives would require detailed consideration of many factors, ideally including the national standards established under the MSA and the objectives set forth in the relevant FMPs. Thus, because these alternatives would exceed the limited purpose of and need for the U.S. Longline Rule to ensure the United States' timely implementation of the bigeye tuna catch limit established by the WCPFC, NMFS excluded these alternatives from further consideration.

Chapter 3

# Chapter 3 Affected Environment

This chapter supplements the information compiled in Chapter 3 of the original EA, in order to provide the background information regarding the affected environment that is needed to analyze Alternative 5 and to respond to the substantive comments on the U.S. Longline Rule that can be answered by additional environmental analysis or information. Section 3.1 provides supplemental information on the U.S. fisheries in the WCPO, particularly, the fisheries of the U.S. Participating Territories to the WCPFC. Section 3.2 includes background information on a specific type of effect raised in comments to the original EA termed “market transferred effects,” and Section 3.3 presents additional information on protected resources.

## *3.1 Fishing Fleets*

### 3.1.1 Additional Information for the Hawaii Longline Fleet

This information supplements the information provided in Section 3.3.1.2 and in Table 7 of the original EA.

The Hawaii Longline Limited Entry Program has a cap of 164 permits. There are currently 131 active permits in the fleet (NMFS 2009c). Permits may be sold or transferred. However, obtaining a Hawaii Longline Limited Access Permit via a sale entails an economic burden ranging in the thousands of dollars. A Hawaii Longline Limited Access Permit may be transferred: (1) to a different person for registration for use with the same or another vessel; or (2) for use with another U.S. vessel under the same ownership (50 CFR 665.21).

Other requirements to being able to fish under the Hawaii Longline Limited Access Permit include: carrying a VMS on board the vessel; carrying a NMFS observer (100% coverage for shallow-set trips and 20% coverage for deep-set trips); maintaining logbooks of catch and effort; and marking the vessel and its gear in a specific manner.

Table 1, Table 2, and Table 3 provide information regarding bigeye tuna catches and landings in Hawaii and American Samoa by the Hawaii-based longline fleet. Table 1breaks down the Hawaii fleet’s bigeye tuna retained catch by area, shows the total retained catches of bigeye tuna landed in Hawaii from 2006-2008, and identifies the retained catch from deep-setting for vessels in the fleet with both a Hawaii Longline Limited Access Permit and an American Samoa Longline Limited Access Permit (hereafter, “dual permit vessels”). Table 2 shows the total landings of bigeye tuna in Hawaii and American Samoa by dual permit vessels. Table 3 identifies the number of Hawaii-based longline vessels, the longline bigeye tuna retained catch in the Hawaii longline fishery, by area, and percentages of the bigeye tuna caught within the EEZ surrounding the Hawaiian Archipelago out of the total retained catch by the Hawaii-based longline fleet over the twelve-year period from 1996-2007.

**Table 1 Retained catches of bigeye tuna in the Hawaii longline fishery by area**

| Year | Number of active vessels | Bigeye tuna retained from WCPO (deep set and shallow set) (mt) | Bigeye tuna retained from EPO (deep set and shallow set) (mt) | Total landings (mt) | Bigeye tuna retained – EPO as % of total | Bigeye tuna retained from WCPO – deep set (mt) | Bigeye tuna retained from WCPO – shallow set (mt) | Number of dual permit vessels | Dual permit deep set Hawaii landed WCPO bigeye tuna (mt) | % dual permit deep set WCPO bigeye tuna landings as % of total WCPO deep-set bigeye tuna landings |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 127 | 4,376 | 79 | 4,455 | 2 | 4,319 | 56 | 10 | 184 | 4% |
| 2007 | 129 | 5,399 | 417 | 5,816 | 7 | 5,356 | 43 | 12 | 444 | 8% |
| 2008 | 127 | 4,624 | 1,275 | 5,899 | 22 | 4,568 | 56 | 11 | 466 | 10% |
| Avg. | 128 | 4,800 | 590 | 5,390 | 10.3 | 4,657 | 55 | 11 | 365 | 7% |

Source: NMFS unpublished data provided by the Pacific Islands Fisheries Science Center based on vessel logbook data (estimates are subject to change as estimation methods are improved) and NMFS 2009a.

**Table 2 Total landings of bigeye tuna in Hawaii and American Samoa by dual-permitted vessels**

| Year | Total dual permit vessel bigeye tuna landings in Hawaii and American Samoa (mt) | Dual permit vessel total bigeye tuna landings in Hawaii (mt) | Dual permit vessel total bigeye tuna landings in American Samoa (mt) | % dual permit vessel bigeye tuna landings in Hawaii | % dual permit vessel landings of bigeye tuna in American Samoa |
|---|---|---|---|---|---|
| 2006 | 230 | 184 | 46 | 80% | 20% |
| 2007 | 518 | 444 | 74 | 86% | 14% |
| 2008 | 503 | 466 | 37 | 93% | 7% |
| Avg. | 417 | 365 | 52 | 86% | 8% |

Source: NMFS unpublished data provided by the Pacific Islands Fisheries Science Center based on vessel logbook data (estimates are subject to change as estimation methods are improved).

**Table 3 Retained catch of bigeye tuna for the U.S. Hawaii longline fleet from 1996-2007 by area**

| Year | Number of active vessels | Number of bigeye tuna caught in the portion of the U.S. EEZ around the Hawaiian Archipelago | Number of bigeye tuna caught outside the portion of the U.S. EEZ around the Hawaiian Archipelago | Percentage of bigeye tuna caught in the portion of the U.S. EEZ around the Hawaiian Archipelago |
|---|---|---|---|---|
| 1996 | 103 | 45,212 | 18,354 | 71% |
| 1997 | 105 | 51,565 | 28,219 | 65% |
| 1998 | 114 | 43,352 | 55,428 | 44% |
| 1999 | 119 | 38,875 | 41,397 | 48% |
| 2000 | 125 | 29,206 | 45,287 | 39% |
| 2001 | 101 | 45,449 | 33,275 | 58% |
| 2002 | 100 | 60,669 | 80,178 | 43% |
| 2003 | 110 | 48,830 | 58,296 | 46% |
| 2004 | 125 | 57,919 | 84,043 | 41% |
| 2005 | 124 | 59,553 | 69,793 | 46% |
| 2006 | 127 | 53,182 | 65,483 | 45% |
| 2007 | 129 | 55,277 | 104,159 | 35% |
| Total | | 589,089 | 683,912 | 46% |

Source: Western Pacific Regional Fishery Management Council (WPRFMC) 2009

The following sections describe the longline fisheries of the U.S. Participating Territories to the WCPFC.

### 3.1.2 American Samoa Longline Fishery

The longline method of pelagic fishing was introduced to American Samoa by fishers from neighboring independent Samoa in 1995. Prior to this, the pelagic fishery was largely a troll fishery. Initially, most of the longline vessels were small, locally built, twin-hulled vessels called alia. These vessels deploy as many as ten miles of mainline from a hand-cranked reel. Trips typically last for a single day, and the target species, albacore (*Thunnus alalunga*), is sold to the local canneries. By 2004 the number of alia had fallen dramatically and mono-hull vessels larger than 15 meters in length that take multiple-day trips now dominate the fishery.

#### Management

The American Samoa Longline Limited Entry Program was established under Amendment 11 to the Pelagics FMP. The final regulations implementing the program were published in the *Federal Register* on May 24, 2005 (70 FR 29646) and codified at 50 CFR 665.36. In order to use longline gear to catch pelagic fish in the EEZ around American Samoa, fishermen are required to have an American Samoa Longline Limited Access Permit on board the vessel. That permit is also required to land pelagic fish in American Samoa caught with longline gear in the EEZ around American Samoa, or to transship pelagic fish within the EEZ around American Samoa caught by longline gear in the EEZ around American Samoa or on the high seas. The American Samoa Longline Limited Entry Program allows for as many as 60 vessels. Permits are issued by vessel size class and permit holders are restricted to using vessels within their size class or smaller. The class sizes are as follows: Class A vessels are 40 feet long or smaller; Class B (and B-1) vessels are longer than 40 feet, but no longer than 50 feet; Class C (and C-1) vessels are longer than 50 feet, but no longer than 70 feet; and Class D (and D-1) vessels are longer than 70 feet.[4]

Permits are subject to renewal. To be eligible to renew a permit one must land specific amounts of Pacific pelagic management unit species (PMUS) harvested in the EEZ around American Samoa using longline gear during the three consecutive calendar years beginning with the year after the permit was issued. The three-year total for vessels in Class A or Class B must be at least 1,000 pounds of PMUS and the three-year total for vessels in Class C or Class D must be at least 5,000 pounds of PMUS.

The initially-issued permits include all in Class A, B, C, or D. The regulations allow Class A permits to be upgraded in limited amounts to permits of Class B–1, C–1, and D–1, in the four calendar years after the initial permits were issued (2006-2009), for a total of 14 upgrades to Class B-1, 6 upgrades to Class C-1, and 6 upgrades to Class D-1. The number of Class A permits is reduced when Class A permits are replaced by B–1, C–1, or D–1 permits. Thereafter, if any Class A, B, C, or D permit becomes available, NMFS

[4] Class A vessels are 12 meters or less; Class B (and B-1) vessels are longer than 12 meters, but no longer than 15 meters; Class C (and C-1) vessels are longer than 15 meters, but no longer than 21 meters; and Class D (and D-1) vessels are longer than 21 meters.

shall re-issue that permit accordingly. The American Samoa Longline Limited Access Permit has a stipulation on the concentration of ownership of permits. No more than 10% of the maximum number of permits, of all size classes combined, may be held by the same permit holder.

The holder of an American Samoa Longline Limited Access Permit may transfer the permit to another individual, partnership, corporation, or other entity. Class A permits may only be transferred (by sale, gift, bequest, intestate succession, barter, or trade) to: (1) a family member; (2) a western Pacific community located in American Samoa that meets the criteria set forth in section 305(I)(2) of the Magnuson-Stevens Act, 16 U.S.C. 1855(I)(2); and (3) any person with documented participation in the pelagic longline fishery on a Class A size vessel in the EEZ around American Samoa prior to March 22, 2002. Class B, C, and D permits may only be transferred (by sale, gift, bequest, intestate succession, barter, or trade) to: (1) a western Pacific community located in American Samoa that meets the criteria set forth in section 305(I)(2) of the Magnuson-Stevens Act, 16 U.S.C. 1855(I)(2), and its implementing regulations; or (2) any person with documented participation in the pelagic longline fishery in the EEZ around American Samoa. Class B–1, C–1, and D–1 permits may not be transferred to a different owner for 3 years from the date of initial issuance, except by bequest or intestate succession if the permit holder dies during those 3 years. After the initial 3 years, Class B–1, C–1, and D–1 permits may be transferred only in accordance with the restrictions for Class B, C, and D permits, as mentioned above.

In 2009, NMFS determined that 24 of the original 60 limited access permits had expired. Because of this, on January 28, 2009, NMFS announced the availability of 22 American Samoa Longline Limited Access Permits with 13 available for Class A, 4 for Class B, 4 for Class C, and one for Class D (74 FR 4942) and received 25 applications. Based on the permit eligibility criteria, 16 were re-issued by NMFS to qualified applicants (11 Class A permits, 4 Class C permits and 1 Class D permit). Six permits remain available and two permits recently expired, bringing the total number of valid American Samoa Longline Limited Access Permits to 52.

The Western Pacific Regional Fishery Management Council (WPRFMC) is currently considering an amendment to the American Samoa pelagic longline fishery management program that would re-open the application process for all vessel size classes for one year. This amendment, if formally proposed and then approved by NMFS, would provide all eligible individuals a second opportunity to apply for and receive permits for the American Samoa longline fishery, which could potentially change the total number of permits from the current limit of 60. The WPRFMC identified 138 potentially eligible applicants when initially developing the American Samoa Longline Limited Entry Program. The current proposal to re-open the application process would maintain the existing permit eligibility criteria needed to obtain an American Samoa Longline Limited Access Permit set forth at 50 CFR 665.36(e). These criteria require: (1) any U.S. national or U.S. citizen or company, partnership, or corporation, on or prior to March 21, 2002, to have owned a vessel that was used during the time of their ownership to harvest PMUS with longline gear in the EEZ around American Samoa; and (2) that fish was landed in American Samoa prior to March 22, 2002, or prior to June 28, 2002, provided that the person or business provided to NMFS or the WPRFMC, prior to March 22, 2002, a written notice of intent to participate in the pelagic longline fishery in the EEZ around American Samoa.

The primary regulations and mitigation measures for this fishery, as set forth at 50 CFR Part 665, are summarized in Table 4.

**Table 4 Requirements in the American Samoa longline fishery**

| Longline Requirements |
| --- |
| • A vessel of the United States must be registered for use under a valid American Samoa longline limited access permit (50 CFR 665.36) if that vessel is used:<br><br>(1) To fish for PMUS using longline gear in the EEZ around American Samoa; or (2) to land shoreward of the outer boundary of the EEZ around American Samoa Pacific PMUS that were harvested using longline gear in the EEZ around American Samoa; or (3) to transship shoreward of the outer boundary of the EEZ around American Samoa Pacific PMUS that were harvested using longline gear in the EEZ around American Samoa or on the high seas (50 CFR 665.21(c));<br><br>• All U.S. vessels that fish on the high seas are required to have a permit issued by NMFS in accordance with the High Seas Fishing Compliance Act of 1995 (16 U.S.C. 5501–5509). Permits are valid for five years and require that vessels fish on the high seas in accordance with international conservation and management measures recognized by the United States;<br>• The holder of a size Class C or D American Samoa Longline Limited Access permit and master of the vessel must carry and operate a VMS unit on board whenever the vessel is at sea;<br>• NMFS may notify the permit holder of the obligation to carry an observer aboard the vessel;<br>• Sea turtle mitigation requirements: Any owner or operator of a U.S. longline vessel that has a freeboard of more than 3 feet (0.91 meters) must carry aboard the vessel line clippers, dip nets, and dehookers meeting the specified minimum design standards. Any owner or operator of a U.S. longline vessel that has a freeboard of 3 feet (0.91 meters) or less must carry aboard their vessels line clippers capable of cutting the vessel's fishing line or leader within approximately 1 foot (0.3 meters) of the eye of an embedded hook, as well as wire or bolt cutters capable of cutting through the vessel's hooks. If a sea turtle is observed to be hooked or entangled in fishing gear, vessel owners and operators must use the required mitigation gear to comply with the designated handling requirements;<br>• Each year, both the owner and the operator of an American Samoa Longline Limited Access Permit must attend and be certified for completion of a workshop conducted by NMFS on interaction mitigation techniques for sea turtles, seabirds, and other protected species;<br>• The operator of any fishing vessel with an American Samoa Longline Limited Access Permit must maintain on board the vessel an accurate and complete record of catch, effort, and other data; and<br>• Any person subject to the requirements of 50 CFR 665.21(c) must maintain on board the vessel an accurate and complete NMFS transshipment logbook containing report forms. |

### Catch, Effort, and Revenue

Table 5 includes general information on the overall performance of the American Samoa longline fishery from 1996 to 2007.

**Table 5 Performance of the American Samoa longline fishery**

| Year | Total (tuna plus non tuna PMUS) Catch (mt) | Tuna Catch (mt) | Swordfish Catch (mt) | Number of Active Vessels | Number of Trips | Number of Hooks (million) |
|---|---|---|---|---|---|---|
| 1996 | 165 | 142 | 0.94 | 12 | NA | 0.16 |
| 1997 | 408 | 362 | 1.83 | 21 | NA | 0.52 |
| 1998 | 549 | 506 | 1.68 | 26 | NA | 1.0 |
| 1999 | 480 | 431 | 1.03 | 29 | NA | 1.2 |
| 2000 | 800 | 744 | 0.52 | 37 | NA | 1.6 |
| 2001 | 3,599 | 3,530 | 5.96 | 62 | NA | 5.8 |
| 2002 | 6,971 | 6,806 | 14.86 | 58 | NA | 13.2 |
| 2003 | 4,960 | 4,774 | 14.58 | 49 | NA | 13.9 |
| 2004 | 4,040 | 3,826 | 9.00 | 41 | NA | 11.8 |
| 2005 | 3,921 | 3,703 | 7.48 | 36 | 402 | 11.2 |
| 2006 | 5,293 | 4,983 | 37.95 | 31 | 331 | 14.3 |
| 2007 | 6,542 | 6,320 | 12.66 | 29 | 377 | 17.6 |

Source: WPRFMC 2009
[a] NA stands for Not Available.

Albacore continued to dominate the catch in 2007. The catch composition for 2007 was as follows: 81% albacore (*Thunnus alalunga*), 9% yellowfin tuna (*Thunnus albacares*), 3% bigeye tuna (*Thunnus obesus*), 3% wahoo (*Acanthocybium solanderi*), and 2% skipjack tuna (*Katsuwonus pelamis*) (WPRFMC 2009).

### Economics

This fleet differs from the Hawaii-based longline fleet in having two discrete components based on vessel size and fishing technology: small-scale vessels (mostly alia) less than 12 meters in length, generally fishing within 25 nautical miles from shore; and larger monohull vessels, mostly over 15 meters in length, fishing throughout the EEZ. The recent entry of numerous large (>15 meters) longline vessels resulted in a dramatic increase in longline fishing effort as well as a shift of fishing effort in waters between 50 and 200 nautical miles from shore. On average, the alia fleet has three person crews, while the large vessel fleet generally has six person crews. As of September 25, 2009, 52 vessels had permits under the American Samoa Longline Limited Entry Program outlined in the FMP (NMFS 2009c). Out of the 52 permitted vessels, 11 also held Hawaii longline permits (permitted under the Hawaii Longline Limited Access Permit). There has been a total of 10, 12, and 11 dual permitted vessels for the years 2006, 2007, and 2008, respectively. Permit data as of September 25, 2009 shows that out of the 11 dual permit vessels three vessels are permitted under Class C and eight are permitted under Class D (NMFS 2009c). Four permit holder hold multiple American Samoa Longline Limited

Access Permits, ranging from 2-4 permits per each of these permit holders (NMFS 2009c).

The fishery is based almost entirely on albacore caught for the two local canneries.[5] The economics of the American Samoa large vessel longline fleet is dependent on albacore prices at the American Samoa canneries. The small resident population means that the domestic market is limited, as are the opportunities for air freighting fresh fish to lucrative markets in Japan, Hawaii, or the U.S. mainland. There may, however, be opportunities for shipping frozen fish to markets in the U.S. mainland and Japan. The development of exporting fresh sashimi-grade fish for distant markets would have to take into account the economics of vessel operation in American Samoa, possible reconfiguration of some boats, increased ice supply, and the cost of providing air freight service.[6] The large vessels land their catch as frozen, gilled, and gutted product. The canneries only export to the U.S. market.

The alia fleet lands its catch as whole fresh product, with the albacore going to the canneries and other species marketed locally.

The second highest adjusted revenue for tuna was recorded in 2007 at $13.8 million, a 17% increase since 2006. For non-tuna PMUS adjusted revenue decreased to $198,255 in 2007 from $566,636 in 2006 (WPRFMC 2009). Since 1998 price-per-pound for tuna has been decreasing. In 2007 the price-per-pound for tunas was $0.99, a $0.05 decrease since 2006, while the price-per-pound of non-tuna PMUS fell to $0.75, a $0.08 decrease since 2006 (WPRFMC 2009). Table 6 shows the change in price per pound for tuna and for non-tuna species over a period of eleven years (1996-2007).

[5] Chicken of the Sea, the second largest cannery, is in the process of closing its cannery in American Samoa and relocating to the U.S. mainland, which is affecting about 2,000 workers (Sagapolutele 2009).

[6] While the viability of exporting fresh fish has been demonstrated in several neighboring countries, including Samoa, Tonga, and Fiji, the economics of operating large longline vessels in those countries is believed to be very different from that in American Samoa, with labor costs being much higher in the latter.

**Table 6 1996-2007 average price/pound in U.S. dollars for tuna and non-tuna species in American Samoa**

| Year | Tuna: Adjusted Price/Pound ($) | Non Tuna: Adjusted Price/Pound ($) |
|---|---|---|
| 1996 | $1.79 | $2.05 |
| 1997 | $1.61 | $2.12 |
| 1998 | $1.51 | $2.10 |
| 1999 | $1.45 | $1.88 |
| 2000 | $1.30 | $1.64 |
| 2001 | $1.35 | $1.64 |
| 2002 | $1.11 | $1.37 |
| 2003 | $1.15 | $1.25 |
| 2004 | $1.13 | $1.12 |
| 2005 | $1.09 | $1.05 |
| 2006 | $1.04 | $0.83 |
| 2007 | $0.99 | $0.75 |

Source: WPRFMC 2009

### 3.1.3 Guam and the CNMI Longline Fishery

During the last few years, there have been a small number of vessels with permits for longline fishing based out of Guam and the CNMI. Due to the limited number of vessels in the fishery, data regarding these vessels is confidential.

Vessels in the fisheries of U.S. Participating Territories may transship their catch (which tends to be vessel-to-vessel and is rare) to a receiving vessel. A receiving vessel must be of the United States and must be registered for use with a valid receiving vessel permit if that vessel is used to land or transship, within the Western Pacific Fishery Management Area, PMUS that were harvested using longline gear (50 CFR 665.21(e)).

## *3.2 Transferred Effects*

Market transferred effects can be described as indirect effects from a proposed action "when regional regulation to control externalities in one market leads to increased market production and environmental damages [or other environmental consequences] in another market" (Rausser, Hamilton, Kovach et al. 2009). For example, if a regulation to limit fishing activity for a product in one region causes fishing activity to increase in another region to meet the overall market demand for the regulated product, and that increased fishing activity leads to environmental consequences – beneficial or adverse – a transferred effect has occurred. Quantifying such transferred effects can be difficult because factors such as variations in global production, variations in demand for the regulated good, and the effects that the regulation of one market may have on the global market as a whole, must be taken into consideration (Rausser, Hamilton, Kovach et al. 2009).

However, these transferred effects have been documented for the swordfish (*Xiphias gladius*) sector of the longline fishery, in particular, the swordfish sector of the Hawaii-based longline fishery (Rausser, Hamilton, Kovach et al. 2009; Sarmiento 2006). According to recent studies, the closure of this sector of the Hawaii-based longline fishery from 2001-2004 led to an increase in foreign fishing activity to provide imports of fresh swordfish to the United States, which in turn caused additional sea turtle interactions (Rausser, Hamilton, Kovach et al. 2009; Sarmiento 2006).

## 3.3 Protected Resources

This section provides additional information on protected resources in the WCPO.

### 3.3.1 Sea Turtles

The following information on leatherback turtles (*Dermochelys coriacea*) supplements Section 3.6.1.1.1 of the original EA and is taken directly as excerpts from Sections 5.3 through 5.3.3 of the Biological Opinion for Amendment 18 to the Pelagics FMP.[7] The citations and references have been omitted in this section but can be found in the original document (NMFS 2008).

> …It is difficult to characterize the global status and trend of the leatherback turtle as a whole because the species consists of many discrete populations that may increase or decrease independently of one another. The most recent leatherback 5-year status review does not make a determination regarding global status and trends, but rather limits its conclusions to the status and trends of populations for which information is available. Some populations are stable or increasing, but other populations for which information is available are either decreasing or have collapsed, while there is not sufficient information to determine status and trends of many populations. The available information is not sufficient to determine the status and trend of the species as a whole.
>
> The global leatherback population is not homogeneous because natal homing of female leatherbacks to nesting beaches maintains regional population structure. Leatherback populations occur in at least the Western Pacific, the Eastern Pacific, the Indian Ocean, Florida, the Caribbean, Africa, and Brazil, with further population structure at smaller spatial scales in some areas (e.g., the Caribbean). All 18 leatherbacks sampled so far in bycatch of the Hawaii-based shallow-set longline fishery are from the Western Pacific population. Of the 12 leatherbacks sampled so far in bycatch of the deep-set component of the Hawaii-based longline fishery, 1 individual was determined to be from the eastern Pacific population.

[7] The material in these excerpts and the excerpts that follow has been condensed from the original, as appropriate.

Western Pacific leatherbacks nest primarily in Papua Indonesia (formerly Irian Jaya, hereafter referred to as Papua), Papua New Guinea (PNG), and the Solomon Islands. Minor nesting occurs on Vanuatu and possibly elsewhere in the region. The total number of nests per year in the Western Pacific population was estimated at 5,067 – 9,176 for the period 1999-2006. Based on 5,067 – 9,176 Western Pacific nests, estimates of nesting females (844 – 3294) and breeding females (2,110 – 5,735) in this population were derived, but the authors recommended using nest numbers instead of estimated female numbers because of uncertainty in the assumptions. Estimates suggest that during 1999-2006, two-thirds of the nesting occurred in Papua, most of the remainder occurred in PNG and the Solomon Islands, and a small fraction (about 1%) occurred in Vanuatu. Of the 28 nesting sites identified in these 4 countries, nesting data for more than 5 years are only available for the Jamursba-Medi site (hereafter referred to as the 'Jamursba-Medi component' of the Western Pacific population). The status and trends at Jamursba-Medi are described below, followed by a description based on the little information that is available for the other sites (hereafter collectively referred to as the 'non-Jamursba-Medi component' of the Western Pacific population).

The largest nesting site for the Western Pacific population is at Jamursba-Medi, with an estimated mean of 2,733 nests annually in 1999-2006, making up approximately 38% of the total estimated nesting for the Western Pacific population during this time period. Nest data were not collected consistently or reliably until the early 1990s, hence most reports of Jamursba-Medi nesting trends start at that time. However, anecdotal reports from the early 1980s suggest that nesting at Jamursba-Medi declined during the decade preceding initiation of nest counts in 1993. Nesting during the 1999-2007 period has fluctuated annually, with the overall trend stable or slightly declining. These nesting data may be overestimates: Nesting data collected from the same beaches during the same seasons and years by Japanese turtle researcher Hiroyuki Suganuma were 31 – 38% lower for 2003 – 2007.

Besides Jamursba-Medi, Dutton et al. reported leatherback nesting at 27 other sites in the Western Pacific region (6 in Papua, 10 in PNG, 8 in the Solomon Islands, and 3 in Vanuatu). Approximately 62% of the leatherback nesting in 1999-2006 occurred at these 27 sites, while the remaining 38% occurred at Jamursba- Medi, the largest nesting site. The largest of the non-Jamursba-Medi sites is Wermon, 30 kilometers east of Jamursba-Medi. Wermon produced approximately 30% of all Western Pacific nests in 1999-2006. Leatherback nesting at Wermon occurs primarily between November and March, the opposite of Jamursba-Medi. Nest counts have been carried out at Wermon since 2002, thus data are available for the 5 year period from 2002–03 (Nov-Oct) to 2006-07 (Nov-Oct): 2002-03 = 1,788 nests, 2003-04 = 2,881 nests, 2004-05 = 2,080 nests, 2005-06 = 1,345 nests, and 2006-07 = 1,319 nests. Since the first complete survey in 2002-03, nesting levels at Wermon have been variable, with fewer nests during the last 2 years (2005-06, 2006-07) than in previous years.

The Huon Coast of PNG hosts an estimated 50% of leatherback nesting in that country. Anecdotal information in Quinn et al., Quinn and Kojis, and Bedding and Lockhart suggest that 200 to 300 females nested annually between Labu Tali and Busama on the Huon Coast in the late 1980s, but less than 50 females nested annually in 2005-06 and 2006-07 at this location. Further south along the Huon Coast, an estimated 260 females nested at Kamiali during the 2001-02 nesting season, but only 30 were counted during the 2006-07 nesting season on the same section of beach. Current monitoring data indicate continuing impacts to leatherbacks from egg harvesting, beach erosion and wave inundation, and domestic dog predation. The Solomon Islands support leatherback nesting that 30 years ago was widely distributed across at least 61 beaches. Dutton et al. estimated that approximately 640 – 700 nests were laid annually in the Solomon Islands in 1999 – 2006. No information exists regarding population trends over time, but it is believed that local consumption of turtles and eggs has reduced nesting populations over the last few decades. Leatherback turtles have only recently been reported nesting in Vanuatu. Petro et al., reviewed archival data and unpublished reports, and interviewed residents of coastal communities, all of which suggested that leatherback nesting has declined in recent years. There appears to be low levels of scattered nesting on at least 4 or 5 beaches with a total of approximately 50 nests laid per year. Adult leatherbacks are opportunistically hunted for meat in some areas. In addition, leatherback eggs are occasionally collected from these beaches.

The total number of Pacific leatherbacks susceptible to longline fishing was estimated at 32,000 individuals in 2000. The total number of adult females in the Jamursba-Medi component of the Western Pacific population was estimated at 1,515 for the period 2005-07 by Snover, which is estimated to make up 38% of the population, giving a total number of adult females in the Western Pacific population of 1,515/0.38 = 3,987. This estimate lies within the range of 2,110 – 5,735 breeding females estimated for this population by Dutton et al. However, due to the uncertainty of the assumptions used to derive sea turtle population estimates, in this opinion NMFS uses nesting or nesting female data as population indices, as recommended by Dutton et al.

Adult leatherbacks range more widely across oceanic habitat than any other reptile, including into subpolar waters. Recent tagging studies have shown that adults sometimes migrate to highly productive upwelling areas near continental shelves, such as off Oregon and Washington.

Adult leatherbacks typically feed on pelagic soft-bodied animals, especially jellyfish, siphonophores, and tunicates. Despite the low nutritive value of their prey, leatherbacks grow rapidly and attain large sizes, hence they must consume enormous quantities of prey. Most water content of the prey is expelled before swallowing to maximize nutritive value per unit volume. Leatherbacks feed from near the surface to depths exceeding 1,000 meters, including nocturnal feeding on tunicate colonies within the deep scattering layer. Although leatherbacks can dive deeper than any other reptile, most dives are < 80 meters.

Leatherback turtles have most likely already been affected by anthropogenic climate change. The global mean temperature has risen 0.76°C over the last 150 years, and the linear trend over the last 50 years is nearly twice that for the last 100 years. As global temperatures continue to increase, so will sand temperatures, which in turn will alter the thermal regime of incubating nests and alter natural sex ratios within hatchling cohorts, presumably toward a heavier female bias. Sea level rose approximately 15 centimeters during the 20th century and further increases are expected, resulting in inundation of nesting beaches. While under natural conditions beaches can move landward or seaward with fluctuations in sea level, extensive shoreline hardening (e.g., seawalls) inhibits this natural process.

The following section on loggerhead turtles (*Caretta caretta*) supplements Section 3.6.1.1.2 in the original EA and is taken directly as excerpts from Sections 5.2 through 5.2.3 of the Biological Opinion for Amendment 18 to the FMP for Pelagic Fisheries of the Western Pacific Region. The citations and references have been omitted in this section but can be found in the original document (NMFS 2008).

… The most recent loggerhead 5-year status review does not make a determination regarding global status and trends, but rather limits its conclusions to the status and trends of populations for which information is available. Some populations are increasing, but most populations for which information is available are decreasing, while there is not sufficient information to determine status and trends of many populations. The available information is not sufficient to determine the status and trend of the species as a whole.

Natal homing of female loggerheads to nesting beaches maintains regional population structure, and loggerhead populations occur in at least the North Pacific, South Pacific, the Western North Atlantic, the Western South Atlantic, the East Atlantic, the Mediterranean, and the Indian Ocean. Of the 125 loggerheads sampled so far in bycatch of the Hawaii-based shallow-set longline fishery, all have been determined to be from the North Pacific population, based on genetic analyses. North Pacific loggerheads nest exclusively in Japan, where monitoring of loggerheads nesting began in the 1950s on some beaches, and grew to encompass all known nesting beaches starting in 1990. In recent years, approximately 60% of the total nests in Japan have been laid on Yakushima. Hence, the total for 2008 is estimated in this opinion at 6,500 nests based on the best available data from STAJ at the time this opinion was completed. However, the actual total for 2008 may exceed 10,000 nests, after the STAJ data are tallied and verified.

For the 19-year period 1990-2008, the total number of nests per year for the North Pacific population ranged between 2,064 – 6,638 nests (using 6,500 as the

2008 total, not 10,000). Assuming a clutch frequency of 3.49 per female per year, the number of nesting females per year during 1990-2008 was 591 – 1,902. The total number of adult females in the population was estimated at 2,915 for the period 2005-07 by Snover.

Few population estimates are available, especially for Pacific populations. However, in order to estimate loggerhead and leatherback bycatch in Pacific longline fisheries, Lewison et al. made several assumptions regarding numbers of nesting females, remigration interval, the proportion of nesting-age females to the total population, and sex ratio, leading to a total population estimate across all life stages in 2000 for Pacific loggerheads (North Pacific and South Pacific populations combined) of 335,000 individuals (all ages, both sexes). In addition, they estimated that approximately 20% of the population (67,000) was in size classes susceptible to longline fishing. Due to the uncertainty of the assumptions used to derive sea turtle population estimates, in this opinion NMFS uses nesting or nesting female data as population indices. Nesting data from the 2 nesting beaches that have been monitored since the 1950s suggest that the North Pacific loggerhead population declined by 50-90% in the latter half of the 20th century. However, from 1999 to 2005, annual nests more than doubled, before declining in 2006 and 2007. Preliminary data for 2008 indicate at least a similar number of nests as the early 1990s.

Loggerhead life history is characterized by early development in the oceanic (pelagic) zone followed by later development in the neritic zone over continental shelves. The oceanic developmental period may last for over a decade, followed by recruitment to the neritic zone where maturation is reached. Adults forage primarily in neritic zones rather than oceanic zones, but adult migrations across oceanic zones may be undertaken for reproduction. Given that the action area is oceanic, the main aspects of North Pacific loggerhead life history affecting their vulnerability to Hawaii-based shallow-set longline fishing are juvenile foraging behavior in the oceanic zone, and migration across the oceanic zone, as discussed below.

Loggerhead life history is characterized by early development in the oceanic (pelagic) zone followed by later development in the neritic zone over continental shelves. The oceanic developmental period may last for over a decade, followed by recruitment to the neritic zone where maturation is reached. Adults forage primarily in neritic zones rather than oceanic zones, but adult migrations across oceanic zones may be undertaken for reproduction.

Loggerheads are a slow-growing species that reach sexual maturity at 25 to 37 years of age, depending on the subpopulation. Generation time for the North Pacific population is estimated at 33 years.

Loggerhead turtles are probably already being affected by anthropogenic climate change. The global mean temperature has risen 0.76°C over the last 150 years, and the linear trend over the last 50 years is nearly twice that for the last 100 years. Warmer temperatures within the nest chamber produce females while cooler ones produce males. Loggerheads nesting in the U.S. are already skewed towards females. As global temperatures increase, so will sand temperatures, which in turn will alter the thermal regime of incubating nests and alter natural sex ratios within hatchling cohorts, likely toward a larger proportion of females. Sea level rose approximately 15 centimeters during the 20th century and further increases are expected, resulting in inundation of nesting beaches. While under natural conditions beaches can move landward or seaward with fluctuations in sea level, extensive shoreline hardening (e.g., seawalls) inhibits this natural process. Erosion due to increased typhoon frequency and extreme temperatures are documented and known to cause high nest mortality. Lower breeding capacity of North Pacific loggerheads in years following higher sea surface temperatures may reflect reduced ocean productivity during warmer years, an indirect effect of climate change on this species.

Nesting trends through 2008, presented by Dr. Yoshimasa Matsuzawa at the Symposium for North Pacific Loggerhead Turtle Conservation in Japan, convened in Kagoshima, Japan, December 7, 2008, indicated a total of 10,847 nests. This is considerably higher than the 7,700 nests that the 2008 Biological Opinion (see information above) assumed before the nesting season was finished and all data compiled (Y. Matsuzawa, Sea Turtle Association of Japan, Senior Scientist, personal communication 2009).

### 3.3.1.1 Sea Turtle Interactions with Longline Fisheries

The following section supplements Section 3.6.1.1.6 of the original EA. Paragraph three in Section 3.6.1.1.6.2 sets forth observed sea turtle interactions with the Hawaii-based deep-set and shallow-set longline fisheries in 2008. Table 16 in the original EA identifies the number of the sea turtle fisheries interactions for the two sectors of the Hawaii longline fleet, the shallow-set component and the deep-set component. Section 3.3.1.2 of the original EA describes in detail the management requirements for the Hawaii longline fleet. Specifically, Table 7 sets forth requirements for the two sectors of the Hawaii-based longline fleet – the shallow-set and deep-set components. The following table (Table 7) shows the sea turtle mitigation measures required for the entire Hawaii longline fleet. Also required to comply with these sea turtle mitigation measures under 50 CFR 665.32 are other longline vessels:

- With freeboards of more than 3 feet. Any owner or operator of a longline vessel with a permit issued under 50 CFR 665.21 other than a Hawaii Longline Limited Access Permit must carry aboard the vessel line clippers, dip nets, and dehookers.
- With freeboards of 3 feet or less. Any owner or operator of a longline vessel with a permit issued under 50 CFR 665.21 other than a Hawaii Longline Limited Access Permit must carry aboard their vessels line clippers capable of cutting the vessels fishing line or leader within approximately 1 foot of the eye of an embedded hook, as well as wire or bolt cutters capable of cutting through the vessel's hooks.

**Table 7 Sea turtle mitigation measures required for the Hawaii longline fleet (50 CFR 665.32)**

• Annually, owners and operators of longline vessels registered to a Hawaii Longline Limited Access Permit must attend and be certified in the Protected Species Workshop held by PIRO on mitigation, handling, and release techniques for sea turtles, seabirds, and marine mammals;

• Vessel owners and operators must follow specific guidelines for handling, dehooking, resuscitating, and releasing sea turtles that interact with longline fishing gear;

• The vessel owner and operator must have the following turtle handling/dehooking gear on board the vessel:

1) Long-handled line clipper
2) Long-handled dip net
3) Long-handled dehooker for ingested hooks (may substitute for item 4)
4) Long-handled dehooker for external hooks
5) Long-handled device to pull an “inverted V”
6) Tire
7) Short-handled dehooker with bite guard for ingested hooks (may substitute for item 8)
8) Short-handled dehooker for external hooks
9) Long-nose or needle-nose pliers
10) Wire or bolt cutters
11) Monofilament line cutters
12) At least two of the following mouth openers and gags:
    - Block of hard wood
    - Set of three canine mouth gags
    - Set of two sturdy canine chew bones
    - Set of two rope loops covered with hose
    - Hank of rope
    - Set of four PVC splice couplings
    - Large avian oral speculum (to be used to hold a turtle's mouth open and control the head with one hand while removing a hook with the other); and

• No sea turtle, including a dead turtle, may be consumed or sold.

The following is taken directly as excerpts from Sections 5.3 through 5.3.3 of the Biological Opinion for Amendment 18 to the FMP for Pelagic Fisheries of the Western Pacific Region. The citations and references have been omitted in this section but can be found in the original document (NMFS 2008).

> The Hawaii-based shallow-set fishery interacts mostly with adult leatherback turtles. Western Pacific leatherbacks nesting during the northern summer (Jun-Aug) in Papua go northeast on their way to productive temperate waters off of the west coast of the U.S. Primary foraging depth overlaps with fishing depth of the Hawaii-based shallow-set fishery. Approximately 69% of the observed

> leatherback interactions in the Hawaii-based longline fishery (shallow-set and deep-set component combined) from 1994 to early 2008 were in the shallow-set component.

The following is taken directly as excerpts from Sections 5.2.2 and 5.2.3 of the Biological Opinion for Amendment 18 to the FMP for Pelagic Fisheries of the Western Pacific Region. The citations and references have been omitted in this section but can be found in the original document (NMFS 2008).

> The main aspects of North Pacific loggerhead life history affecting their vulnerability to Hawaii-based shallow-set longline fishing are juvenile foraging behavior in the oceanic zone, and migration across the oceanic zone, as discussed below. The Hawaii-based shallow-set fishery interacts mostly with juvenile loggerhead turtles, typically 50 – 80 centimeters carapace length. In the oceanic zone of the central North Pacific Ocean, foraging juvenile loggerheads congregate in the boundary between the warm, vertically-stratified, low chlorophyll water of the subtropical gyre and the vertically-mixed, cool, high chlorophyll transition zone water. This boundary area is referred to as the Transition Zone Chlorophyll Front, and is favored foraging habitat for both juvenile loggerhead turtles and swordfish, hence bringing the loggerheads into contact with the shallow-set fishery. Data collected from stomach samples of juvenile loggerheads indicate a diverse diet of pelagic food items. In addition to the geographic overlap of juvenile loggerheads with the shallow-set fishery, tagging studies indicate that juvenile loggerheads are shallow divers that forage frequently at depths fished by shallow-set gear (<100 meters). Because juvenile loggerheads forage within the action area, and they often forage at depths fished by the shallow-set fishery, this species is the most susceptible of the Pacific sea turtle species to interactions with shallow-set gear: About 75% of the bycaught turtles observed in the shallow-set fishery from 1994 to early 2008 were loggerheads, whereas only 10% of the deep-set observed bycatch was loggerheads during this period. Because deep-set gear is typically set >100 meter depth, loggerheads rarely encounter it. The opposite occurs with olive ridleys, which have little bycatch in the shallow-set fishery but make up the majority of the turtle bycatch in the deep-set fishery.
>
> North Pacific loggerhead range spans the entire north Pacific Ocean, hence migration of juveniles and adults between terrestrial (nesting), near-shore, and pelagic habitats may result in criss-crossing of the action area during all life stages, thereby exposing an individual loggerhead to shallow-set longlining for many years or even decades. Juveniles are likely more abundant than adults in the action area, as most loggerhead bycatch is from this life history stage in the Hawaii-based shallow-set longline fishery. However, adult loggerhead interactions occasionally occur in the fishery.
>
> In the North Pacific, longline fisheries operating out of Hawaii were estimated to kill hundreds of loggerheads a year before the fishery was closed in 2001, and

then modified and reopened with measures to minimize bycatch and post-hooking mortality in 2004.

### 3.3.2 Marine Mammals

The following section supplements Section 3.6.1.2.1.3 of the original EA. The primary impacts of the Hawaii-based longline fleet on the Central North Pacific stock of humpback whales (*Megaptera novaeangliae*) could result from direct interactions with the fishing gear. Fishery effects on humpback whales could result from entanglement and subsequent injury or death of individuals that interact with the longline gear. Humpback whales are present in the Hawaii portion of the action area as they migrate to and from and occur in waters surrounding the Hawaiian Islands during the winter months. However, the activities of the longline fishery generally take place at locations where humpback whales are uncommon. Thus, interactions between the Hawaii-based longline fleet and humpback whales are rare and unpredictable events.

Since 2001, there have been only five observed interactions between the species and the entire Hawaii-based longline fleet (Forney and Kobayashi, 2007; McCraken and Forney, 2008). During this same time period, the Central North Pacific stock of humpback whales has been steadily increasing in abundance (Allen and Angliss, 2009). One interaction per year with adult humpback whales was observed in the Hawaii deep-set longline fishery in 2001, 2002, and 2004 (Forney and Kobayashi, 2007). The fourth and fifth interactions were observed in the Hawaii shallow-set longline fishery in 2006 and 2007 (McCracken and Forney, 2008). In each instance, efforts were taken to disentangle the whale, and all whales were either released or able to break free from the gear without noticeable impairment to the animals' ability to swim or feed. NMFS intends to have the Alaska Scientific Review Group review the interaction records for Hawaii during the upcoming winter meeting for incorporation into the 2010 draft reports.

### 3.3.3 Seabirds

Section 3.6 of the original EA identifies all the species found in the Convention Area listed as threatened or endangered under the Endangered Species Act (ESA; 16 U.S.C. 1531 et seq.). Section 3.6 is subdivided into sections specific to sea turtles, marine mammals, and seabirds. All three sections list and describe the species listed as threatened or endangered under the ESA and further describe the interactions between the species and the different fishing fleets. This section supplements Section 3.6.1.3 of the original EA.

Table 20 of the original EA lists the seabird species listed as threatened or endangered in the WCPO. These two species are the Short-tailed albatross (*Phoebastria albatrus*), listed as endangered under the ESA, and the Newell's shearwater (*Puffinus auricularis newelli)*, listed as threatened under the ESA. Sections 3.1.1.1.3.1.1 and 3.1.1.1.3.1.2 of the original EA summarize the biology and population status of these two species in the Pacific Ocean. The most current fishery interaction report lists no reported fishery interactions for the first two quarters in 2009 with either of these two species in the Hawaii longline fishery, including the shallow-set and deep-set sectors (NMFS 2009b).

In 2008 the Hawaii shallow-set and deep-set longline sectors combined had a total of 103 seabird interactions, out of which 40 involved Black-footed albatross (*Phoebastria nigripes*), 47 involved Laysan albatross (*Phoebastria immutabilis*), one involved a red-footed booby (*Sula sula*), 14 involved shearwater species, and one involved an unidentified seabird (NMFS 2009b). The latest status assessment conducted by the U.S. Geological Survey concludes that the Laysan albatross is not at risk of decline because of fishery bycatch while the Black-footed albatross may be at risk of decline because of fishery bycatch (Arata, Sievert, and Naughton 2009).

## Chapter 4

# Chapter 4 Environmental Consequences

This chapter analyzes the environmental consequences that could result from the implementation of Alternative 5, the new alternative for the U.S. Longline Rule. Section 4.1 presents the analyses of the direct, indirect, and cumulative impacts, while Section 4.2 compares the potential environmental impacts of implementing Alternative 5 to the potential environmental impacts of implementing the other alternatives studied in the original EA.

## *4.1 Alternative 5: Direct, Indirect, and Cumulative Impacts*

### 4.1.1 Direct and Indirect Effects[8] to the Affected Fisheries

Section 2.1 of this Supplemental EA describes Alternative 5. This alternative is similar to Alternative 3, analyzed in the original EA. Under both of these alternatives, U.S. vessels would be prohibited from retaining on board, landing, or transshipping any catch of bigeye tuna captured by longline gear in the limit's area of application, once the limit has been reached for the calendar year.[9] However, under Alternative 5, bigeye tuna caught by a vessel registered for use under an American Samoa Longline Limited Access Permit would be considered to be fish caught as part of the American Samoa longline fishery, and thus would not be subject to the limit or to the prohibitions established once the limit is reached. For such bigeye tuna to be considered part of the American Samoa longline fishery, they must not have been caught in the portion of the EEZ surrounding the Hawaiian Archipelago, and must be landed by a U.S. fishing vessel operated in compliance with a valid permit issued under 50 CFR 660.707 or 665.21. Section 4.1.1.1 describes the potential effects that all of the vessels in the Hawaii longline fleet could experience under Alternative 5.[10] Section 4.1.1.2 sets forth the potential effects that the subset of vessels in the Hawaii longline fleet – those with both an American Samoa Longline Limited Access Permit and a Hawaii Longline Limited Access Permit (the "dual permit vessels") – could experience.

[8] Similar to the CEQ's regulations for implementing NEPA at 40 CFR 1508.8, the terms effects and impacts as used in this document are synonymous. The choice of which term to use when is based solely on NMFS' stylistic preference for this document.

[9] The original EA indicated that the limit for 2009 could be reached or exceeded in the third quarter of 2009. Current estimates indicate that the limit could be reached or exceeded in December 2009.

[10] As discussed in the original EA, although the catch limit applies to both the Hawaii longline fleet and west-coast based longline vessels, there have been very few active west-coast based vessels in the Convention Area in recent years.

#### 4.1.1.1 Direct and Indirect Effects to All Affected Vessels

Alternative 5 would be expected to cause changes to the fishing patterns and practices of the Hawaii longline fleet. If and when the bigeye tuna catch limit is reached in a given year and the prohibitions are consequently put into effect, affected fishing businesses would be expected to cease fishing for the remainder of the calendar year or, if they typically engage in deep-setting, shift from deep-setting for bigeye tuna in the WCPO to the next best opportunity. Although those opportunities cannot be predicted with certainty, three opportunities that would appear to be attractive to vessels in the fishery include shallow-setting (i.e., for swordfish), deep-setting for bigeye tuna in other areas, specifically the EPO, and deep-set longline fishing in the Convention Area for species other than bigeye tuna. Making such shifts would bring costs to the affected fishing operations, but the magnitude of those costs cannot be projected.

A fourth opportunity, which is discussed in more detail in the following section, is for vessels that do not have dual permits to engage in transshipping activities with the dual permit vessels (i.e., the vessels with dual permits could catch bigeye tuna outside of the EEZ of the Hawaiian Archipelago and transship their catch to vessels without dual permits who could then land the catch in Hawaii).

Because the limit would be set on a calendar year basis, the prohibitions would be expected to go into effect towards the end of the calendar year. The establishment of a competitive limit could cause a "race to fish" effect in that part of the year prior to the prohibitions going into effect. This race to fish effect could also be expected in the time period between when announcement of the prohibition is made and when the prohibition takes place, leading to some potential safety and operational effects; vessel owners could forego maintenance or fish in unsafe weather or ocean conditions in order to compete for their share of the limit. However, due to the limited time period that the prohibitions would be in effect and the other opportunities available to the affected vessels, it is unlikely that any race to fish effect would be pronounced.

This alternative would be expected to bring costs to the affected fishing operations (e.g., through lost revenues and/or greater operating costs associated with the next-best opportunity that they engage in), as well as economic impacts to forward- and backward-linked economic sectors, including businesses that supply fishing vessels and businesses that market the fish. Detailed discussion of these economic impacts is included in the Regulatory Impact Review (RIR) as revised (NMFS 2009d) for the rule.

Vessels could continue to land bigeye tuna in American Samoa, Guam, or the CNMI. However, the bigeye tuna must not have been caught in the portion of the EEZ surrounding the Hawaiian Archipelago, and they must be landed by a U.S. fishing vessel operated in compliance with a valid permit issued under 50 CFR 660.707 or 665.21.

#### 4.1.1.2 Direct and Indirect Effects to Dual Permit Vessels

As stated above, under Alternative 5, bigeye tuna caught by dual permit vessels outside the EEZ surrounding the Hawaiian Archipelago would not be counted against the limit, and these vessels would be allowed to continue to use longline gear to fish for bigeye tuna in the Convention Area (but not in the portion of the EEZ around the Hawaiian Archipelago) and land the bigeye tuna in Hawaii (or transship it to vessels that subsequently land it in Hawaii) after the limit is reached and the prohibitions go into effect. This subset of the Hawaii longline fleet would have this opportunity while the rest of the fleet would not, so it could be faced with new motivations that might lead it to alter its fishing patterns relative to its historical patterns. The following discussion focuses on the potential shifts in fishing patterns for this subset of vessels.

As stated in Chapter 3, Table 1 of this Supplemental EA, there have been 10-12 vessels with dual permits in each of the three full years that the American Samoa Longline Limited Entry program has been in place (2006-2008), and there were 11 dual permit vessels as of September 25, 2009.

Once the limit is reached in a given calendar year and until the end of the year, the number of U.S. longline vessels that could continue to fish for bigeye tuna for the Hawaii market in the Convention Area would be constrained to those with dual permits (bigeye tuna could be landed elsewhere and shipped to the Hawaii market, but that has not been demonstrated to be cost-effective to date). The supply of U.S. longline-caught bigeye tuna and other longline-caught species to the Hawaii market would be dampened accordingly, and prices for these products could be expected to increase. However, various other factors besides quantity of local product influence the price of fresh bigeye tuna in the Hawaii market, so it is not clear if and to what degree price would be influenced by the limit being reached.

According to a study based on data from 1994-1996, seasonal changes in the quality of bigeye tuna had a greater impact on the price of bigeye tuna landed in Hawaii than the volume of landings (Pan and Pooley 2004) (it should be noted that once the limit is reached under this alternative, landings volumes could be reduced to levels below the range observed in the course of that study). Preliminary analysis of more recent data suggests that other factors may contribute more to bigeye tuna price changes in the Hawaii market than seasonal changes, including the availability of yellowfin tuna (a substitute product) and the location of catch (EPO versus WCPO) (NMFS unpublished data).

Overall, this alternative could lead to some changes in the fishing patterns of individual dual permit vessels, as described below.

As indicated in Table 2 in Chapter 3, about 20% of the bigeye tuna catch of the dual permit vessels was landed in American Samoa in 2006, 14% of their bigeye tuna catch was landed in American Samoa in 2007, and 7% of their bigeye tuna catch was landed in American Samoa in 2008. The remainders in each year – that is, the majority – was landed in Hawaii. Should bigeye tuna price in the Hawaii market increase after the catch limit is reached, these vessels would have an incentive to land more bigeye tuna in Hawaii. On the other hand, because any fishing for bigeye tuna after the limit is reached would need to take place outside of the EEZ surrounding the Hawaiian Archipelago, the dual permit vessels may decide to increase their fishing effort for bigeye tuna in areas nearer to American Samoa. However, given that the trend from 2006 through 2008 shows that the percentage of bigeye tuna catch landed in American Samoa has been decreasing for these vessels, it is unlikely that there would be a large market for additional fresh-caught bigeye tuna landed in American Samoa, and the cost of transporting bigeye tuna caught farther away from Hawaii to the Hawaii market may be prohibitive. Vessels in the American Samoa fishery primarily target albacore, so any shift in fishing effort in areas nearer to American Samoa may primarily be an increase in effort on albacore.

Over the twelve-year period from 1996-2007, 46% of the bigeye tuna caught by the Hawaii-based longline fleet was caught inside the EEZ surrounding the Hawaiian Archipelago (Table 3) (WPRFMC 2009). Using catch as a proxy for effort and given that the average number of active vessels in the Hawaii longline fleet during that period was 115 (see Table 8 in the original EA) and using 11 as the number of dual permit vessels (the average of the number of dual permit vessels for 2006-2008) (or about 10% of the Hawaii fleet – that is, of vessels with Hawaii Longline Limited Access Permits) during the years when the catch limit is in place, the maximum estimated shift in fishing effort for bigeye tuna from inside the EEZ surrounding the Hawaiian Archipelago to outside the EEZ surrounding the Hawaiian Archipelago under Alternative 5 could be 4.6%. This percentage is based on the assumption that dual permit vessels would shift their entire effort to areas outside the EEZ surrounding the Hawaiian Archipelago both before and after the catch limit is reached so that none of their catch would be counted as part of the catch limit. Due to the productivity of the fishing grounds inside the EEZ surrounding the Hawaiian Archipelago, this assumption is unlikely, but is presented here to set forth an approximation for the maximum possible shift in spatial fishing effort.

Prior to the limit being reached in a given year, dual permit holders would not be expected to behave any differently than they would under the No-Action Alternative, unless the Hawaii longline fleet as a whole (or a substantial portion of it) collectively responds to the impending limit and cooperates to put off the limit being reached while maximizing their returns. For example, dual permit vessels could transship their catches outside the EEZ of the Hawaiian Archipelago at sea to vessels that then steam to port and land the catch (e.g., to vessels in the fleet that do not have dual permits). This would allow vessels in the fleet to engage in substantial fishing activity that would not contribute to the catch limit.

After the limit is reached in a given year, two factors would be likely to influence – in opposite directions – the behavior of operators of vessels with dual permits. First, once the limit is reached and the prohibitions are put into effect, these vessels would not be allowed to fish in the portion of the EEZ around the Hawaiian Archipelago. This constraint on operational flexibility would be expected to dampen their profitability and thus bring a negative influence on their incentive to fish (relative to the amount of fishing effort they would exert under the No-Action Alternative). A factor likely to act in the opposite direction is that once the limit is reached, the supply of locally caught bigeye tuna, and other longline-caught products, to the Hawaii market would be constrained accordingly. This could be expected to affect prices of bigeye tuna and other longline-caught products in the positive direction, as mentioned above, enhancing profitability and thus bringing a positive influence on dual permit holders’ incentive to fish. Any increase in fishing effort by these vessels would, of course, be constrained for practical reasons – the potential amount of fishing effort per vessel per unit of time is not limitless. However, substantial increases are possible. For example, dual permit vessels could transship their catches at sea to vessels that then steam to port and land the catch (e.g., to vessels that do not have dual permits, whose fishing opportunities would have been more severely constrained than those of dual permit vessels). This would allow the dual permit vessels to spend considerably more time actually fishing than they would under the No-Action Alternative.

It is not possible to predict which of these two countervailing factors would have a stronger influence. Thus, it can only be predicted that fishing effort by individual dual permit vessels prior to the limit being reached, would likely be the same as or greater than under the No-Action Alternative. After the limit is reached, fishing effort by individual dual permit vessels could be greater than, less than, or the same as under the No-Action Alternative, and the spatial distribution of their fishing effort would shift from the EEZ around the Hawaiian Archipelago to other areas (relative to the distribution under the No-Action Alternative).

Assuming that there is some increase in the price of bigeye tuna and other longline-caught species in the Hawaii market once the limit is reached, fishing businesses could be motivated to obtain dual permits for their vessels. The number of dual permit vessels would therefore be expected to increase as a result of implementation of Alternative 5, but there would be constraints to such growth.

As stated in Chapter 3 of this Supplemental EA, there are currently eight American Samoa Longline Limited Access Permits that are unassigned. It is also possible for a vessel owner with an American Samoa Longline Limited Access Permit to transfer the permit to a vessel owner with a Hawaii Longline Limited Access Permit, as described in Chapter 3 and as specified at 50 CFR 665.36, which would allow the transferee to become a dual permit vessel. However, vessel owners and operators must meet the specific requirements outlined in Chapter 3.

Vessel owners and operators with an American Samoa Longline Limited Access Permit could potentially obtain a Hawaii Longline Limited Access Permit and become dual permit vessels. However, the cost of obtaining such a permit could be prohibitive. A vessel owner with a Hawaii Longline Limited Access Permit may also transfer the permit to a vessel owner with an American Samoa Longline Limited Access Permit. However, while foreign-built vessels can participate in the American Samoa longline fleet, foreign-built vessels cannot participate in the Hawaii longline fleet (46 U.S.C. 12108(c)(2)).

As stated in Chapter 3, the current regulatory limit for the number of American Samoa Limited Access Longline Permits is 60 and the current regulatory limit for the number of Hawaii Longline Limited Access Permits is 164. Therefore, the number of dual permits could increase to a maximum of 60, though this would be unlikely due to the requirements and restrictions described above.

#### 4.1.1.3 Summary of Effects to the Affected Vessels

As stated in the RIR (NMFS 2009d), should there be an increase in retained catches of bigeye tuna in the Convention Area under the No-Action Alternative, implementation of the U.S. Longline Rule could result in a maximum of 34% less bigeye tuna being caught in the Convention Area over the three-year period (2009-2011) that the rule would be in effect if the entire Hawaii-based longline fleet ceased fishing once the catch limit is reached. The four identified alternative opportunities available to the entire fleet (shallow-setting (i.e., for swordfish); deep-setting for bigeye tuna in other areas, specifically the EPO; deep-set longline fishing in the Convention Area for species other than bigeye tuna; and receiving transshipments of bigeye tuna from dual permit vessels), indicate that the actual reduction in bigeye tuna catch in the Convention Area as a result of the rule would be less than 34%. The additional opportunities available to dual permit vessels (fishing for bigeye tuna outside of the EEZ surrounding the Hawaiian Archipelago and landing bigeye tuna in Hawaii) would decrease the actual reduction in bigeye tuna catch even further. However, given that even the dual permit vessels would experience operational constraints once the catch limit is reached (i.e., dual permit vessels could not conduct fishing activities for bigeye tuna in the EEZ surrounding the Hawaiian Archipelago), even if the fishing effort of dual permit vessels increases, Alternative 5 would be expected to lead to some reduction in bigeye tuna catch in the Convention Area over the No-Action Alternative.

There may be other unforeseeable opportunities available to individual vessels affected by the U.S. Longline Rule that could lead to additional increases in the amount of bigeye tuna caught in the Convention Area once the limit is reached. Thus, although implementation of the rule would cause some changes to the fishing patterns and behavior of vessels in the Hawaii-based longline fleet, the overall effects to affected vessels would not be expected to be substantial.

### 4.1.2 Effects to Bigeye Tuna and Yellowfin Tuna and Other Principal Target Stocks

Implementation of the U.S. Longline Rule under Alternative 5 would lead to a direct reduction in fishing mortality on WCPO bigeye tuna, because a catch limit would be imposed where one currently does not exist, and thus, there would be some direct beneficial impacts on the stock. However, those impacts are likely to be negligible because: (1) the limit would be in effect for only three years, after which fishing rates and fishing mortality rates contributed by the U.S. longline fisheries on the stock would be expected to rebound to the levels under No-Action; (2) after the limit is reached, all of the longline vessels in the fleet could transfer their effort to other areas, such as the EPO, or to other species, mitigating any diminishing effect of the prohibition on fishing mortality rates (as stated in Chapter 3, Section 3.4 of the original EA, the stock structure of bigeye tuna in the Pacific Ocean is not well known, but there is some degree of mixing between the EPO and the WCPO, so any fishing mortality in the EPO would likely affect the status of the stock in the WCPO and fishing for other species in the Convention Area would result in at least some bigeye tuna being incidentally caught); and (3) dual permit vessels could continue fishing for bigeye tuna in the Convention Area outside of the EEZ surrounding the Hawaiian Archipelago.

Under this alternative, longline vessels would still be used to both deep-set and shallow-set in the Convention Area. The amount of bigeye tuna incidentally caught (and discarded) in the shallow-set fishery would likely be very small. However, given that bigeye tuna is one of the most commonly caught species in the deep-set fishery, it is likely (unless fishing methods are radically modified to reduce catch rates) that substantial amounts of bigeye tuna would be caught in any deep-setting that occurs in the Convention Area after the limit is reached. Moreover, the dual permit vessels could continue targeting bigeye tuna in the Convention Area after the limit is reached.

The opportunity costs of deep-setting for species other than bigeye tuna is not known; that is, it is not known whether it would be an economically viable activity for any of the affected vessels. The opportunity cost of simply shifting to the EPO to deep-set for bigeye would seem to be almost certainly less, so substantial deep-setting in the Convention Area by vessels without dual permits in the Convention Area after the limit is reached would not be expected. However, the dual permit vessels could continue to fish for bigeye tuna in the Convention Area.

Any reduction in deep-setting effort for bigeye tuna would have beneficial impacts on the stock of yellowfin tuna, which is also caught by deep-set longlining. However, yellowfin tuna could continue to be retained, landed, and transshipped under Alternative 5. Moreover, should fishing effort shift to the EPO, this could affect the stock of EPO yellowfin tuna, which is subject to overfishing. Although there is not a distinct boundary between WCPO yellowfin tuna and EPO yellowfin tuna, an increase in effort on EPO yellowfin tuna could lead to additional adverse effects on this stock. However, the overall effects on WCPO bigeye tuna and WCPO yellowfin tuna would be so minor, that any effects to ecosystem function and biodiversity would not be expected.

As stated above, dual permit vessels could constitute about 10% of the Hawaii-based longline fleet. Should these vessels shift all or some of their fishing effort for bigeye tuna to outside the EEZ surrounding the Hawaiian Archipelago so that this catch would not be counted as part of the limit, the rest of the vessels in the fleet would each have a larger share of the catch limit than otherwise, so the catch limit would be reached later in the year than under the other action alternatives analyzed in the original EA. Thus, any potential beneficial impacts on the stocks of bigeye tuna and yellowfin tuna would be less under this alternative than under the other action alternatives.

As stated in the RIR (NMFS 2009d), under the No-Action Alternative, the total retained catches of bigeye tuna from the Convention Area by vessels affected by the U.S. Longline Rule could be up to 5,300 mt in 2009, 5,700 mt in 2010, and 6,200 mt in 2011.[11] Thus, assuming that the retained catch of the dual permit vessels is 10% of the total catch (and Table 1 in Chapter 3 of this Supplemental EA indicates that it is likely less than 10%, comparing the amount of bigeye tuna caught by dual permit vessels through deep-setting in the WCPO to the amount of bigeye tuna caught by the entire Hawaii-based longline fleet through deep-setting in the WCPO), should all of the catch of bigeye tuna for the dual permit vessels take place outside the EEZ surrounding the Hawaiian Archipelago, 530 mt of bigeye tuna that is not subject to the catch limit could be caught and retained by dual permit vessels in 2009; 570 mt of bigeye tuna that is not subject to the catch limit could be retained in 2010; and 620 mt of bigeye tuna that is not subject to the catch limit could be retained in 2011.[12]

Should the number of dual permit vessels increase as a result of this alternative or the fishing effort of dual permit vessels increase to meet market demand, these numbers could increase accordingly. If the number 60 is used as the maximum number of possible dual permit vessels under the current regulatory regime, dual permit vessels could constitute about 50% of the Hawaii-based longline fleet. If dual permit vessels conduct all of their fishing operations outside the EEZ surrounding the Hawaiian Archipelago, using the projected numbers for bigeye tuna catch under the No-Action Alternative, 2,650 mt of bigeye tuna that is not subject to the catch limit could be caught and retained by dual permit vessels in 2009, 2,850 mt of bigeye tuna that is not subject to the catch limit could be caught and retained in 2010, and 3,100 mt of bigeye tuna that is not subject to the catch limit could be caught and retained in 2011. However, it is unlikely that these numbers for additional bigeye tuna catch would be reached for the following two reasons: (1) due to the restrictions and costs of becoming a dual permit vessel, discussed in Section 3.1 and Section 4.1.1.2 of this Supplemental EA, it is improbable that the number of dual permit vessels would reach the maximum possible number of 60; and (2) these numbers indicate that the total bigeye tuna catch would be greater than the amount projected under the No-Action Alternative, which would not be favored by market conditions. Moreover, it is already the fourth quarter of 2009, so the maximum amount of bigeye tuna catch in the Convention Area is already less for 2009 than the amount predicted under the No-Action Alternative.

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[11] The RIR as revised (NMFS 2009d) described two No-Action Alternative scenarios. Under the less conservative No-Action Alternative scenario, the increasing trend in bigeye tuna catch for the Hawaii-based longline fishery that has been observed in recent years would continue. The projected numbers for bigeye tuna catch under the less conservative No-Action Alternative are used for the purposes of this analysis.

[12] This information is presented solely to provide a projection for the additional retained catch of bigeye tuna under Alternative 5 ("additional" as compared to the amount that would retained if all vessels ceased fishing once the catch limit is reached). It is unlikely that the dual permit vessels would shift all of their fishing effort to fishing grounds outside of the EEZ surrounding the Hawaiian Archipelago for the entire duration of the catch limit. Moreover, this Supplemental EA is being issued in the fourth quarter of 2009.

It is reasonable to conclude that the maximum increase in bigeye tuna catch over the catch limit under this alternative would be an amount making the total bigeye tuna catch for the affected fleets no more than the amount under the No-Action Alternative (or an increase over that catch limit of 1,537 mt or less for 2009, 1,937 mt or less for 2010, and 2,437 or less for 2011). The increase in bigeye tuna catch over the catch limit under this alternative would be greater than the increase under the other action alternatives analyzed in the original EA. For the other action alternatives, incidental catch of bigeye tuna from shallow-setting for swordfish in the Convention Area and deep-setting for other species, as well as any shift in fishing effort to targeting bigeye tuna in the EPO would contribute to the increase. Under Alternative 5, the fishing activities of dual permit vessels outside the EEZ surrounding the Hawaiian Archipelago would also contribute to the increase. However, the overall bigeye tuna catch would likely be less than the amount under the No-Action Alternative, due to the costs, restrictions, and requirements involved in shifting to other opportunities or having additional vessels become dual permit vessels and the operational constraints imposed on the dual permit vessels under this alternative (e.g., bigeye tuna must be caught outside of the EEZ surrounding the Hawaiian Archipelago), as discussed above. As discussed in Chapter 3 of the original EA, overfishing of the WCPO bigeye tuna stock is likely occurring, meaning that if it continues, the stock size can be expected to decline to levels smaller than those needed to produce MSY. Thus, Alternative 5 could lead to some minor beneficial effects on bigeye tuna that would not be experienced under the No-Action Alternative.

The other principal target stock for U.S. longline fleets in the Convention Area is swordfish. As stated in Chapter 3 of the original EA, the stock status of North Pacific swordfish is currently neither overfishing nor overfished, so it is unlikely that any shift in fishing effort to targeting swordfish after the prohibition is in effect would cause detrimental impacts to the stock. The International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific (ISC) issued a recent report consistent with NMFS' stock status determination for North Pacific swordfish. The report identifies two stock divisions within the North Pacific stock – the WCPO and EPO stocks – and states that "these stocks of swordfish are healthy and well above the level required to sustain recent catches" (ISC 2009). Moreover, as shown in Figure 12 in Chapter 4 of the original EA, in the Convention Area for the years 2005-2008, the majority of swordfish was landed by the fleets in the beginning of the calendar year. Therefore, since the catch limit would likely be reached toward the end of the calendar year, it is unlikely that any shift in effort to the shallow-set sector would cause large increases in swordfish mortality.

### 4.1.3 Effects to Secondary Target Stocks

Alternative 5 would not be expected to cause large changes to the overall amount of secondary target stocks caught by the U.S. longline fleets operating in the Convention Area (relative to catch amounts under the No-Action Alternative). Both the deep-set and shallow-set sectors of the fishery would remain open, and any transfer of effort would be expected to result in catch rates of secondary target stocks that are similar to existing conditions. Should vessels cease fishing during the prohibition, effects to secondary target stocks would be beneficial.

The U.S. longline fleets that would be directly affected by the U.S. Longline Rule (the Hawaii and west coast-based fleets) do not currently target albacore, although the American Samoa fleet does. The stock status (with respect to the status determination criteria established under the MSA, and as determined by NMFS) of North Pacific albacore is currently unknown, while the stock status of South Pacific albacore is neither overfished nor subject to overfishing. The American Samoa fleet targets South Pacific albacore, while the Hawaii-based fleet does not target but takes some North Pacific albacore. As stated above, should the dual permit vessels shift their fishing effort to locations closer to American Samoa as a result of the rule, there could be some increased fishing effort towards targeting South Pacific albacore. Should vessels cease fishing as a result of the rule, effects to North Pacific albacore would likely be beneficial. However, as stated in the original EA, the U.S. Longline Rule could cause vessels to shift their fishing effort from targeting bigeye tuna to targeting North Pacific albacore tuna. Due to the other opportunities available to affected vessels, as discussed above, any such shift to targeting albacore likely would be minor.

### 4.1.4 Effects to Protected Resources

Alternative 5 could lead to a shift of fishing effort to other areas and to other species. If this transfer of fishing effort leads to an increase in fishing activity in areas where there is a greater incidence of protected resources, the potential for the fleet to interact with protected resources could be increased. However, any effects in terms of catches and fishing mortality rates to protected species are expected to be small compared to, for example, typical year-to-year variations in catches among species driven by changing oceanic and economic conditions. Thus, any effects that may occur as a result of Alternative 5 would be minor. To the extent that there could be a slight reduction in fishing effort, any effects to ESA-listed species or critical habit of these species would be beneficial, since there would be a reduced risk of interaction with the protected resource.

NMFS has completed several previous ESA consultations for the U.S. longline fisheries in the Convention Area. They are as follows:

(1) Biological Opinion on adoption of (1) proposed HMS FMP; (2) continued operation of HMS fishery vessels under permits pursuant to the HSFCA; and (3) ESA regulation on the prohibition of shallow longline sets east of the 150° West longitude (NMFS 2004).

(2) Biological Opinion for the FMP for U.S. west coast fisheries for HMS and its effect on the endangered short-tailed albatross (*Phoebastria albatrus*) and the endangered brown pelican (*Pelecanus occidentalis*) (USFWS 2004).

(3) Biological Opinion on continued authorization of the Hawaii-based pelagic, deep-set, tuna longline fishery based on the FMP for pelagic fisheries of the western Pacific region (NMFS 2005).

(4) Biological Opinion on management modifications for the Hawaii-based shallow-set longline swordfish fishery – implementation of Amendment 18 to the FMP for pelagic fisheries of the western Pacific region (NMFS 2008).

(5) Biological Opinion for the effects of the Hawaii-based domestic longline fleet on the short-tailed albatross (*Phoebastria albatrus*) (USFWS 2002).[13]

The U.S. Longline Rule under Alternative 5 would not cause any impacts to ESA-listed threatened or endangered species that have not been addressed in prior or ongoing consultations.

As stated in Chapter 3 of the original EA, pursuant to the regulations implementing the Marine Mammal Protection Act (MMPA; 16 U.S.C. § 1361, et seq.) at 50 CFR Part 229, the Hawaii longline fishery is classified as a Category I fishery. This means that the fishery has the potential for frequent incidental mortality and serious injury to marine mammals. However, it is unlikely that the proposed action would affect the number of interactions between the fishery and marine mammals. As discussed above, any effects in terms of catches and fishing mortality rates to protected species from shifts in fishing effort from the Alternative 5 are expected to be small compared to, for example, typical year-to-year variations in catches among species driven by changing oceanic and economic conditions.

Alternative 5 would not cause any impacts to the National Wildlife Refuges (NWRs) or National Monuments described in Chapter 3, Section 3.6.3 of the original EA. Any geographical shifts in fishing effort likely would be minor and would not be expected to affect these areas.

The U.S. Longline Rule under Alternative 5 would not cause any adverse impacts to areas designated as Essential Fish Habitat (EFH) or Habitat Areas of Particular Concern (HAPC), as described in Chapter 3, Section 3.6.2 of the original EA, or to ocean and coastal habitats. Any changes to fishing practices and any geographical shifts in fishing effort likely would be minor and unlikely to affect these areas.

Indeed, there could be a shift of 4.6% of the Hawaii-based longline fleet's overall fishing effort from within the EEZ surrounding the Hawaiian Archipelago to outside the EEZ surrounding the Hawaiian Archipelago, as stated in Section 4.1.1.2 (the amount of shift could increase if the number of dual permit vessels increases), which could lead to a reduction in fishing effort near NWRs, National Monuments, or areas designated as EFH or HAPC that are within the EEZ surrounding the Hawaiian Archipelago.

[13] The Incidental Take Statement in this biological opinion expired on December 31, 2006; USFWS and NMFS are currently consulting regarding impacts of the longline fishery to the short-tailed albatross and expect this consultation to be completed by the end of 2009. See Informal Consultation for the Western and Central Pacific Fisheries Convention Implementation Act Proposed Rulemaking, Letter from USFWS to NMFS, January 28, 2009.

### 4.1.5 Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," states that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." As discussed above, the overall environmental effects from implementation of the U.S. Longline Rule would be minor and beneficial and generally would be distributed evenly among the affected vessels. However, the economic impacts on the dual permit vessels would be less than on the other vessels in the affected fleets (please see the RIR). Overall, though, because the environmental effects from implementation of the U.S. Longline Rule under Alternative 5 would be minor and beneficial, this rule would not lead to substantial adverse human health or environmental effects on any population – minority, low income, or otherwise.

### 4.1.6 Transferred Effects

As stated in Chapter 1 of this Supplemental EA, comments to the original EA indicated that potential market transferred effects from implementation of the U.S. Longline Rule under any of the action alternatives should have been analyzed in the original EA. Thus, this Supplemental EA includes this separate section to analyze the potential market transferred effects that could arise from implementation of the U.S. Longline Rule under Alternative 5 or any of the other action alternatives.

As discussed in Chapter 3, Section 3.2, market transferred effects can arise from actions such as implementation of the U.S. Longline Rule under any of the action alternatives. The RIR (NMFS 2009) discusses the possibility of increased imports of bigeye tuna from the Asia-Pacific market if the supply of bigeye tuna from the Hawaii-based longline fleet is substantially constrained as a result of the catch limit being reached. Should the U.S. Longline Rule lead to an increase of imports of bigeye tuna to meet market demand from fisheries that have less stringent environmental regulations or that function in an area that could cause more environmental impacts (e.g., more interactions with protected species), adverse transferred effects, such as impacts to protected resources could result. As indicated in Chapter 3, Section 3.2, the closure of the swordfish sector of the Hawaii longline fishery led to an increase in foreign fishing activity to provide imports of fresh swordfish to the United States, which in turn caused additional sea turtle interactions.

While quantification of any transferred effects is not possible at this time, any adverse transferred effects stemming from the U.S. Longline Rule likely would be minor. The specific behavior of the fleets that would be affected by the U.S. Longline Rule cannot be predicted with certainty, but as discussed above and in the original EA, it is likely that dual permit vessels would continue fishing for bigeye tuna in the Convention Area to meet the demand for bigeye tuna in the Hawaii market, and it is also likely that other affected vessels would fish for bigeye tuna in the EPO and continue to supply the Hawaii market. This would decrease the likelihood for increased imports of bigeye tuna in the

Hawaii market. Moreover, due to the projected limited time that the prohibition for longline vessels would be in place (approximately three months or less for each of the years 2009, 2010, and 2011, as stated in Chapter 1 of the original EA), any potential environmental impacts from transferred effects likely would be small compared to typical year-to-year variations in fishing effort driven by changing oceanic and economic conditions.

### 4.1.7 Cumulative Impacts

This section presents the cumulative impacts analysis for the implementation of the U.S. Longline Rule under Alternative 5. This section is similar to Chapter 5 of the original EA, but includes additional information regarding other actions that was not available at the time of the writing of the original EA.

A cumulative impact is defined by the CEQ's regulations at 40 CFR 1508.7 as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." And further: "cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

Before beginning a cumulative impacts analysis, the geographic area of the analysis and the time frame for the analysis must be identified to determine the appropriate scope for the analysis (CEQ 1997). The geographic area of the analysis here is the Pacific Ocean area as described in Chapter 3 of this Supplemental EA, Chapter 3 of the original EA, and Section 5.1.1 of the original EA. The time frame for this analysis is from the present to some years into the future.

#### 4.1.7.1 Past, Present, and Reasonably Foreseeable Future Actions

This section describes the other actions that have the potential to affect the same resources as the U.S. Longline Rule. The analysis of cumulative impacts is presented in the following section. For the purposes of this cumulative impacts analysis, the past actions are all the fishery management actions and the actions of the fleets that have been taken in the affected environment to date, which together have resulted in the current management regime, current fishing patterns, and have affected the current status of the stocks. The effects of those actions are reflected in the baseline, as described in Chapter 3 of this Supplemental EA, Chapter 3 of the original EA, and Section 5.1.1 of the original EA.

##### *4.1.7.1.1 Other Present Actions*

The other present actions would include specific actions being taken to manage the fisheries in the Convention Area and are described below.

The U.S. Purse Seine Rule that was analyzed in the original EA went into effect on August 3, 2009.[14] This rule implements fishing restrictions and observer requirements in 2009-2011 and turtle mitigation requirements for the U.S. WCPO purse seine fishery.

The WPRFMC is considering several amendments to the FMP for the Pelagic Fisheries of the Western Pacific Region at this time that would manage fishing activities. In particular, Amendment 18 to the FMP for Pelagic Fisheries in the Western Pacific Region, Management Modifications for the Hawaii-based Shallow-set Longline Swordfish Fishery that Would Remove Effort Limits, Eliminate the Set Certificate Program, and Implement New Sea Turtle Interaction Caps (Amendment 18), aims to provide increased opportunities for sustainable harvest of swordfish and other fish species, while continuing to avoid jeopardizing the existence and/or recovery of threatened and endangered sea turtles or their habitat.

NMFS is also in the process of developing a rule to implement specific provisions of the Convention (see the proposed rule at 74 FR 23965 (May 22, 2009)). The rule would impose specific regulatory requirements on U.S. HMS fleets operating in the Convention Area. The proposed requirements include the following: obtaining fishing authorizations; submitting vessel information; carrying and using VMS units; accepting observers; accepting transshipment inspectors; accepting boarding and inspection; vessel marking; maintaining and submitting information about fishing effort and catch; and at-sea transshipments of HMS from purse seine vessels.

#### *4.1.7.1.2 Reasonably Foreseeable Future Actions*

The categories of reasonably foreseeable future actions identified here are: (1) future fishery management actions, or actions taken by fishery managers; (2) actions that contribute to changes in oceanic conditions, or natural reactions to anthropogenic actions; and (3) potential changes to current fishing operations, or actions taken by fishermen.

It is reasonably foreseeable that WCPFC Commission Members, Cooperating Non-Members, and Participating Territories (CCMs) will implement requirements similar to those in the U.S. Longline Rule and the U.S. Purse Seine Rule to implement the recent decisions of the WCPFC. Given that the U.S. Longline Rule and U.S. Purse Seine Rule are for a limited duration (three years) it is also reasonably foreseeable that the WCPFC would adopt CMMs similar (in the sense that fishing mortality on these stocks would somehow be constrained) to CMM 2008-01 for bigeye tuna and yellowfin tuna that would require implementation for 2012 and beyond.[15]

[14] The sea turtle mitigation requirements went into effect on October 5, 2009.

[15] Paragraph 46 of CMM 2008-01 specifically states that the effectiveness of the measure will be reviewed annually and that alternative measures could be adopted in order to achieve the WCPFC's conservation goals.

Other future fishery management actions in the first category include actions taken by the United States and other nations to manage their fisheries in the Convention Area, and to some extent, Pacific Ocean as a whole, particularly HMS fisheries. In the United States, such actions will be driven by a variety of factors, including a number of different statutes with different mandates (e.g., the MSA for federal fisheries generally, the ESA with respect to threatened and endangered marine species, the South Pacific Tuna Act to implement the South Pacific Tuna Treaty or terms and conditions as a result of a renegotiated Treaty – after 2013, the WCPFCIA to implement the decisions of the WCPFC, and the Tuna Conventions Act to implement the decisions of the Inter-American Tropical Tuna Commission (IATTC)). Internationally and as a whole, such actions would be driven largely by, in addition to local issues and mandates, internationally agreed measures, including those adopted by the WCPFC and the IATTC.

It is not possible to predict what other specific management measures will be implemented by other nations or what additional management measures will be implemented by the United States, but for the most part, given the biological status of many of the target stocks of HMS in the Pacific Ocean, they can be reasonably expected to be conservative in the sense that they will constrict fishing capacity, effort, and/or catch. The consequence of these measures being implemented in the fisheries in the WCPO and the Pacific Ocean would be, generally, to improve the status of affected resources (not necessarily relative to their current status, but relative to their future status under the baseline). What is not clear is how the benefits of conservation and management measures imposed by the various regulatory institutions will accrue to the various users of fleets. Ideally conservation benefits would be broadly based. However, at this time, this is difficult to predict.

One specific action that may be undertaken under the MSA is Amendment 20 to the FMP for the Pelagic Fisheries of the Western Pacific Region. The WPRFMC took action on it in October 2009, and if approved and implemented by NMFS, the amendment would establish annual longline bigeye tuna catch limits of 2,000 mt for each of American Samoa, Guam, and the CNMI, which is consistent with the provisions of CMM 2008-01 with respect to Participating Territories. It would also establish criteria to determine whether a vessel operating under a charter agreement with one of the territories is integral to the territory's domestic fleet. If a chartered vessel is deemed to be integral, its catches would be assigned to the territory's fishery for the purpose of reporting to the WCPFC, in accordance with CMM 2008-01. Amendment 20 would not be consistent with the catch attribution scheme established in the U.S. Longline Rule; in other words, certain aspects of the U.S. Longline Rule would have to be modified in order to accommodate the provisions of Amendment 20.

The second category of future actions are actions that contribute to changes in oceanographic conditions. As discussed in Chapter 3, Section 3.1.1 of the original EA, there is substantial evidence that changing climate conditions may be causing observed changes in marine systems. Any changes in climate patterns would likely be associated with changes in oceanographic patterns that would have the potential to impact fishery and other biological resources. The target and non-target species that interact with the fisheries subject to this action tend to be highly migratory, wide-ranging organisms that are biologically tied to temperature regimes. Such species would be expected to respond to global or regional changes in climate and oceans in various aspects of their physiology and behavior. Examples include shifts in their geographic ranges, in the spatial (both horizontal and vertical) and temporal aspects of their migration patterns, and in their reproductive patterns. There could be interactive effects among species, such as local depletion of a given species resulting in less forage available for its predators. Species that nest on land, including seabirds and turtles, could be subject to impacts resulting from other types of climate-driven changes, such as sea level. Sea turtles, for example, as a species that exhibits temperature-dependent sex determination, might experience changes in hatchling sex ratios as a result of changes in atmospheric and oceanic temperatures. Sea turtle populations might also lose nesting habitat due to sea level rise.

Roessig, Woodley, Cech et al. (2004) discussed the potential impacts of climate change on marine and estuarine fishes and fisheries as follows:

> Possible oceanic condition scenarios would produce three expected responses by motile fish: (1) areas where favorable conditions exist will increase in size, allowing a species to expand its range and/or proliferate; (2) areas where favorable conditions exist may move, causing a population's numbers to decline in certain areas and increase in others, effectively shifting the population's range; and (3) favorable conditions for a species may disappear, leading to a population crash and possible extinction. Each species has its physiological tolerance limits, optima, and ecological needs, thus within a community you can expect different responses from different organisms. Because marine and estuarine systems are complex, and our knowledge of how they work is in its infancy, we can only speculate at the possible consequences of global climate change on their fishable stocks and the people who depend on them.

The third category of future actions are potential changes to current fishing operations as a result of changing environmental, market, or other conditions.

#### 4.1.7.2 Discussion of Impacts

As discussed throughout this chapter, the overall effects to fisheries, target and secondary target stocks, and protected resources from the U.S. Longline Rule under Alternative 5 are expected to be minor and could be beneficial. The objective of the rule is to implement a catch limit from a conservation and management measure. As discussed above, the other present actions and the first category of reasonably foreseeable future management actions have the same objective and would be expected to cause beneficial impacts to the affected environment. Specifically, should other CCMs implement the provisions of the CMMs that will be implemented in the proposed rules or the WCPFC adopt other similar CMMs that are implemented, the beneficial impacts to resources from the proposed rules would be enhanced (i.e., there could be a greater likelihood that the objectives of the CMMs could be attained, such as the 30% reduction in bigeye tuna fishing mortality). The IATTC adopted a resolution for bigeye tuna in June 2009 that established specific catch limits for bigeye tuna in the EPO. When and if this resolution is implemented by the United States and other nations, the effects of any shift in fishing effort to the EPO from the proposed U.S. Longline Rule would be reduced and the beneficial effects on bigeye tuna would be increased. As discussed in Chapter 3 of the original EA, the stock structure of bigeye tuna in the Pacific Ocean is not well known, but there is some degree of mixing between the EPO and WCPO, so any fishing mortality in the EPO would likely affect the status of the stock in the WCPO.

On the other hand, if and when Amendment 18 is implemented, longline vessels affected by the proposed U.S. Longline Rule may have greater incentive to target swordfish, since the current annual shallow-set effort limits would be removed and the sea turtle interactions caps would be increased. However, as discussed above, any shift in fishing effort to target swordfish that would be caused by the U.S. Longline Rule under Alternative 5 is unquantifiable and would likely be minor in comparison to typical variations in fishing effort caused by ocean and market conditions.

One of the possible effects of Amendment 20 is that if vessels in the Hawaii fleet are chartered to a territory and deemed to be integral to the territory's fleet, some or all of their bigeye tuna catches that would otherwise be subject to the limits established by the U.S. Longline Rule would no longer be subject to the limits. A possible consequence of that would be a lessening of the constraining effect of the U.S. Longline Rule on bigeye tuna mortality – in other words, the beneficial effect of the U.S. Longline Rule for WCPO bigeye tuna would be lessened.

The second category of reasonably foreseeable future actions (changes in ocean conditions, including climate change) could cause substantial adverse impacts to the resources in the affected environment but could cause some beneficial impacts as well. As discussed in Chapter 3, Section 3.1.1 of the original EA, changes to oceanographic conditions have been documented to affect fishing effort and catch.

The third category of future actions, potential changes to current fishing operations due to changing environmental, market, or other conditions, could lead to effects – both adverse and beneficial – on living marine resources. For example, should the fisheries of American Samoa, Guam, and the CNMI expand and effort on bigeye tuna be increased, this could lead to greater overall fishing effort on the WCPO stock of bigeye tuna as well as deplete local abundance of the stock. This in turn could affect local fishing opportunities and also lead to an increased risk of interactions with protected resources. However, any such adverse effects are difficult to quantify and would in most cases be counteracted by the first category (i.e., fishery management actions) of reasonably foreseeable future actions.

Therefore, the overall cumulative, or additive, impacts on the affected environment from the U.S. Longline Rule, other present actions, and all reasonably foreseeable future actions would likely be beneficial, but would be counteracted by any detrimental impacts caused by changes in ocean conditions and potential changes to current fishing operations. Thus, this Supplemental EA concludes that the U.S. Longline Rule under Alternative 5 could provide a small, beneficial contribution to the cumulative environmental impacts experienced by the affected environment.

## *4.2 Comparison of Alternative 5 to the Alternatives Analyzed in the Original EA*

As described in Chapter 2 of this Supplemental EA, the original EA analyzed three action alternatives for the U.S. Longline Rule, as well as the No-Action Alternative. Chapter 6 of the original EA includes a comparison of these four alternatives. Below, is an updated version of this discussion from Chapter 6 of the original EA, including Alternative 5.

Implementation of the U.S. Longline Rule under any of the alternatives could have some minor beneficial effects to WCPO bigeye tuna as well as other fish stocks present in the WCPO. The rule would implement the WCPFC's established catch limit for WCPO bigeye tuna for the years 2009-2011, which could cause some beneficial effects on the stocks. Each of the action alternatives could cause some shift in fishing effort from targeting bigeye tuna in the WCPO, which could cause effects to other fish stocks in both the WCPO and EPO. Such shifts in fishing effort could also cause effects to protected resources, but these effects would be minor, since the shift in fishing effort would likely be less than that caused by typical year-to-year variations in catches among species driven by changing oceanic and economic conditions. Thus, because the duration of the rule would be limited to three years and because the rule would not cause substantial changes to the fishing practices and patterns of the affected fleets, the overall direct and indirect impacts from implementation of the rule under any of the action alternatives would be minor.

In terms of cumulative effects, the effects of the U.S. Longline Rule under any of the action alternatives, in combination with the effects of similar actions taken by other WCPFC members, as well as possible future actions to implement any future WCPFC decisions with respect to bigeye tuna and yellowfin tuna, could have beneficial effects on the stocks. These effects would be greater than if the proposed U.S. Longline Rule were implemented in isolation. The contribution of the U.S. Longline Rule to cumulative effects under any of the action alternatives would be essentially the same under all the action alternatives.

**Table 8 Summary of direct and indirect effects for the U.S. Longline Rule alternatives**

| Alternative | Restrictiveness Ranking[1] | Effects to WCPO Bigeye Tuna | Effects to WCPO Yellowfin Tuna | Effects to WCPO Swordfish | Effects to other Secondary Target Stocks | Effects to Protected Resources |
|---|---|---|---|---|---|---|
| Alternative 1 (No-Action) | No restrictions | Direct: None<br><br>Indirect: Increased Potential for Long-Term negative | Direct: None<br><br>Indirect: Increased Potential for Long-Term negative | Direct: None<br><br>Indirect: Increased Potential for Long-Term negative | Direct: None<br><br>Indirect: Increased Potential for Long-Term negative | Direct: None<br><br>Indirect: Increased Potential for Long-Term negative |
| Alternative 2 (Closure of Deep-Set Fishery) | More restrictive than Alternatives 3 and 5; Less restrictive than Alternative 4 | Direct: Minor beneficial<br><br>Indirect: Minor beneficial or None | Direct: Minor beneficial<br><br>Indirect: Minor beneficial or None | Direct: Minor detrimental or None<br><br>Indirect: Minor detrimental or None | Direct: Minor detrimental or beneficial or None<br><br>Indirect: Minor detrimental or beneficial or None | Direct: Minor<br><br>Indirect: Minor |

**Table 9 Summary of direct and indirect effects for the U.S. Longline Rule alternatives**

| **Alternative** | **Restrictiveness Ranking**[1] | **Effects to WCPO Bigeye Tuna** | **Effects to WCPO Yellowfin Tuna** | **Effects to WCPO Swordfish** | **Effects to other Secondary Target Stocks** | **Effects to Protected Resources** |
|---|---|---|---|---|---|---|
| Alternative 3 (No Retention, Landing, or Transshipment of Bigeye Tuna) | More restrictive than Alternative 5; Less restrictive than Alternatives 2 and 4 | Direct: Minor beneficial<br><br>Indirect: Minor beneficial or None | Direct: Minor detrimental or None<br><br>Indirect: Minor detrimental or None | Direct: Minor detrimental or None<br><br>Indirect: Minor detrimental or None | Direct: Minor detrimental or beneficial or None<br><br>Indirect: Minor detrimental or beneficial or None | Direct: Minor<br><br>Indirect: Minor |
| Alternative 4 (Closure of Fishery) | Most restrictive | Direct: Minor beneficial<br><br>Indirect: Minor beneficial or None | Direct: Minor beneficial<br><br>Indirect: Minor beneficial or None | Direct: Minor beneficial<br><br>Indirect: Minor beneficial or None | Direct: Minor detrimental or beneficial or None<br><br>Indirect: Minor detrimental or beneficial or None | Direct: Minor<br><br>Indirect: Minor |
| Alternative 5 (No Retention, Landing, or Transshipment of Bigeye Tuna with Dual Permit Vessel Exception) | Least restrictive | Direct: Minor beneficial<br><br>Indirect: Minor beneficial or None | Direct: Minor detrimental or None<br><br>Indirect: Minor detrimental or None | Direct: Minor detrimental or None<br><br>Indirect: Minor detrimental or None | Direct: Minor detrimental or beneficial or None<br><br>Indirect: Minor detrimental or beneficial or None | Direct: Minor<br><br>Indirect: Minor |

[1] More restrictive reflects the degree of constraints on fishermen, which generally would result in more beneficial impacts on living marine resources.

Table 8 indicates that the overall effects from the alternatives would be similar and minor. However, each of the action alternatives would cause some slightly disparate effects to the resources in the area. As stated in Chapter 4 of the original EA, additional management measures that lead to a reduction in the fishing mortality of bigeye tuna and that ensure no increase in the fishing mortality of yellowfin tuna are needed to sustain

WCPO tuna stocks at or greater than their MSY levels. Thus, the No-Action Alternative would have increased potential for long-term negative impacts on these fish stocks over the action alternatives.

Alternative 3 is the least restrictive of the action alternatives analyzed in the original EA. Under this alternative, once the limit for WCPO bigeye tuna established by the WCPFC is reached, U.S. longline vessels would be prohibited from retaining on board, landing, or transshipping any bigeye tuna captured in the limit's area of application for the remainder of the calendar year, except that any bigeye tuna already on board a vessel at the time of the closure may be retained on board and landed. Under this alternative, vessels could continue to fish in both the shallow-set and deep-set sectors of the fishery, provided that no bigeye tuna are kept. As a result, there could be a shift in effort to the shallow-set sector, to deep-setting for bigeye tuna in the EPO, or to deep-setting for species other than bigeye tuna in the WCPO. Thus, to the extent that deep-setting for species other than bigeye tuna in the WCPO does occur after the limit is reached, the beneficial impacts to WCPO bigeye tuna would be less than under the other action alternatives analyzed in the original EA, since WCPO bigeye tuna would likely be caught and discarded in the course of such fishing activities (to an unknown degree).[16]

Alternative 2 is more restrictive than Alternative 3, but less restrictive than Alternative 4. Under this alternative, once the WCPO bigeye tuna limit is reached, vessels would be prohibited from deep-setting in the limit's area of application. This could lead vessels to shift their effort to deep-setting for bigeye tuna in the EPO or to shallow-setting in the WCPO, although, as discussed in Chapter 4 of the original EA the degree of such shifts in effort cannot be predicted with certainty or estimated quantitatively at this juncture. Because no deep-setting would be allowed in the limit's area of application, this alternative could have some beneficial effects on both WCPO bigeye tuna and to a lesser degree WCPO yellowfin tuna. However, this alternative could cause increased fishing in the shallow-set sector, leading to increased fishing mortality on swordfish and other species caught in that sector, including sea turtles (but any such increase would be slight, as it would be constrained by the existing annual limits on shallow-set effort and on interactions with loggerhead and leatherback turtles). Under this alternative, the overall beneficial impacts to WCPO bigeye tuna could be greater than under Alternative 3; because deep-setting would be prohibited in the WCPO, there would be less WCPO bigeye tuna being caught and discarded (but only to the extent that under Alternative 3 deep-setting for species other than bigeye tuna in the WCPO would occur and bigeye tuna would be caught after the limit is reached).

[16] The discussion of the action alternatives for the U.S. Longline Rule in this section focuses on comparing the impacts of the alternatives on WCPO bigeye tuna – to which the WCPFC's established catch limited directly applies. As stated in Chapter 3, Section 3.4 of the original EA, the stock structure of bigeye tuna in the Pacific Ocean is not well known, but there is some degree of mixing between the EPO and WCPO, so any fishing mortality in the EPO would likely affect the status of the stock in the WCPO as well as in the EPO. Consequently, though the direct effects to WCPO bigeye tuna under the alternatives would differ, the overall effects from any of the alternatives to WCPO bigeye tuna would be similar.

Alternative 4 is the most restrictive of the action alternatives. Under this alternative, once the limit for WCPO bigeye tuna established by the WCPFC is reached, U.S. fishing vessels would be prohibited from longline fishing in the limit's area of application. This could cause vessels to shift their effort to deep-setting in the EPO, although, as discussed in Chapter 4 of the original EA the likely degree of such a shift cannot be predicted. Under this alternative, the overall beneficial impacts to WCPO bigeye tuna could be greater than under the other action alternatives; because the entire fishery would be closed, no WCPO bigeye tuna would be caught by longlining in the limit's area of application.

Alternative 5 is less restrictive than the action alternatives analyzed in the original EA. This alternative would be similar to Alternative 3, in that U.S. longline vessels would be prohibited from retaining on board, landing, or transshipping any bigeye tuna captured in the limit's area of application for the remainder of the calendar year, except that any bigeye tuna already on board a vessel at the time of the closure may be retained on board and landed. Under this alternative, vessels could continue to fish in both the shallow-set and deep-set sectors of the fishery, provided that no bigeye tuna are kept. As a result, there could be a shift in effort to the shallow-set sector, to deep-setting for bigeye tuna in the EPO, or to deep-setting for species other than bigeye tuna in the WCPO. Thus, to the extent that deep-setting for species other than bigeye tuna in the WCPO does occur after the limit is reached, the beneficial impacts to WCPO bigeye tuna would be less than under Alternatives 2 or 4, since WCPO bigeye tuna would likely be caught and discarded in the course of such fishing activities (to an unknown degree).

Also, under this alternative, the dual permit vessels would be able to continue fishing for bigeye tuna in the Convention Area outside of the portion of the EEZ surrounding the Hawaiian Archipelago and land their catch in Hawaii after the limit is reached, and their catches made outside of the EEZ surrounding the Hawaiian Archipelago would not be counted towards the limit prior to the limit being reached. As stated in Section 4.1.2 above, 530 mt of bigeye tuna that is not subject to the catch limit could be caught and retained by dual permit vessels in 2009; 570 mt that is not subject to the catch limit could be caught and retained in 2010; and 620 mt of bigeye tuna that is not subject to the catch limit could be caught and retained in 2011; should the number of dual permit vessels increase, these numbers could increase accordingly. Thus, Alternative 5 would be more similar than any of the other action alternative would be to the No-Action Alternative, and under this alternative, the catch limit would be reached later in the year than under any of the other action alternatives.

**Chapter 5**

# Chapter 5 Comment Summary and Response

This chapter sets forth the comments received on the original EA that refer to specific aspects of the U.S. Longline Rule and provides responses to each comment. As stated in Chapter 1 of this Supplemental EA, NMFS received two comment letters during the comment period for the proposed U.S. Purse Seine Rule. One of those comment letters included comments on the analysis in the EA for the U.S. Longline Rule, which are included below. NMFS received six comment letters during the comment period for the proposed U.S. Longline Rule. Two of those comment letters included comments on the analysis in the EA for the U.S. Longline Rule and are included below.

**Comment 1**: Under the proposed U.S. Longline Rule, bigeye tuna harvested in the EEZ around the Hawaiian Archipelago and landed in the U.S. Participating Territories would be counted as part of the bigeye tuna catch limit for the United States. This is a change from current practice where NMFS typically attributes catch to areas where landings occur. However, NMFS is not proposing to change its practice when it comes to landing bigeye tuna in Hawaii – all bigeye tuna landed in Hawaii, even if it is caught outside of the EEZ around the Hawaiian Archipelago, will be attributed as U.S. catch.

Currently, the major regional U.S. bigeye tuna market is Honolulu, and to attribute all bigeye tuna landings in Hawaii to the catch limit for the United States would prevent U.S. Participating Territories from entering into domestic charter arrangements with Hawaii longline limited access permitted vessels and eliminate needed funding opportunities for responsible fisheries development. NMFS offers no justification as to why it is relying on its current policy practice of attributing all landings in Hawaii in this manner. This major policy decision may be limiting the legitimate rights of the U.S. Participating Territories in the WCPFC, and NMFS is doing so without discussion. NMFS' policy, by default, is having a regulatory effect, and therefore, at a minimum should have been thoroughly analyzed in detail in the original EA.

NMFS should modify its proposed rule to be consistent with established practices where catch is attributed to the permit program for the vessel, not the landing location. In the case of a vessel landing bigeye tuna and other fish species in Hawaii that has both a Hawaii limited access permit and American Samoa limited access permit or any future territorial permits, the catch should be assigned based on a determination of which permit program the vessel was attributing its catches with respect to the landing involved.

**Response**: The original EA thoroughly analyzed the potential environmental impacts that would arise from implementation of the proposed rule. Alternative 5, NMFS' new alternative, as described in detail in Chapter 2 of this Supplemental EA, allows vessels that have both an American Samoa Longline Limited Access Permit and a Hawaii Longline Limited Access Permit to land their catch in Hawaii and attribute this catch to American Samoa. Detailed discussion for the development of Alternative 5, as well as an in-depth response to this comment, including discussion of agency practices regarding the assignment of catch, are included in the preamble to the final rule.

**Comment 2**: The EA does not effectively analyze or consider the transferred effects that would result from the implementation of the U.S. Longline Rule. Demand for bigeye tuna will continue regardless of the limits placed on the Hawaii fleet, and bigeye tuna will be imported from countries in Southeast Asia and the Pacific Islands. In effect, every pound of bigeye not caught by the model Hawaii longline fishery is a pound that will be caught by less stringently regulated fleets. The net result will be no reduction in bigeye tuna mortality and potentially the expansion of fleets that have greater bycatch and protected species interactions.

**Response**: Please see Chapter 3, Section 3.2 and Chapter 4, Section 4.1.6 for discussion and analysis of potential transferred effects that could result from the implementation of the U.S. Longline Rule.

**Comment 3**: Detailed economic information on the impact of a hard bigeye closure on the Hawaii longline fleet is clearly lacking.

**Response**: As stated in Chapter 4, Section 4.2 of the original EA, the general information regarding economic impacts in the original EA was provided solely to help compare the alternatives analyzed and to determine whether the economic impacts are interrelated with environmental impacts. Please see the RIR (NMFS 2009d), IRFA, and FRFA for the detailed analysis of the economic impacts of the U.S. Longline Rule. This Supplemental EA incorporates these documents by reference.

**Comment 4**: The sections of the EA that deal with protected resources impacts are poorly written, out of date and omit important information on the extensive mitigation measures for turtles and seabirds in the Hawaii longline fishery. There appears to have been no consultation or review of these sections of the EA by the NMFS Protected Resources Division. Moreover, the WPRFMC is surprised that it was not consulted to verify the accuracy of the information in these sections of the document, given its extensive experience with protected resource issues and their mitigation. This is not simply gratuitous nitpicking but is directly connected to the issue of transferred effects, as mentioned above, which have been well documented. Reduction of domestic supply of pelagic fish to the U.S. market by Hawaii-based longline vessels results in greater volumes of imports from less stringently regulated longline fisheries, with concomitant greater impacts to protected species such as turtles.

**Response**: Section 3.6 of the original EA describes the protected resources in the affected environment. This section includes current information and focuses primarily on information pertinent to the analysis in Chapter 4 of the original EA. Since the release of the original EA more current scientific information has been published. Chapter 3 of this Supplemental EA in Section 3.3 included updated and current information on specific protected resources and their interactions with the U.S. longline fleets. As stated above, Section 3.2 and Chapter 4, Section 4.1.6 of this document provide information and analysis of potential transferred effects.

NMFS consulted with all appropriate parties during preparation of the original EA. NMFS issued the original EA in draft form during the public comment periods for both the proposed U.S. Purse Seine Rule and the proposed U.S. Longline Rule specifically to gather input from parties such as the WPRFMC.

**Comment 5**: One of the alternatives analyzed would directly close both the deep-set and shallow-set fishery. All of these alternatives are likely to destroy or damage domestic Pacific longline fisheries, and to promote other foreign fisheries that are able to provide an uninterrupted supply of fresh fish to markets now served by U. S. Pacific longline fisheries. However, there is no analysis of potential transferred effects resulting from these actions, and the consequences for protected species.

**Response**: Please see Chapter 3, Section 3.2 for a description on transfer effects for the action area.

**Comment 6**: Because closures of domestic Pacific longline fisheries, and related market shifts to foreign fisheries, have been shown to have significant adverse impacts on endangered and threatened sea turtles, and may have additional adverse impacts on other protected marine mammals and seabirds, NMFS must prepare an environmental impact statement (EIS) for the U.S. Longline Rule. Even if the consequences of transferred effects are uncertain, which they are not, uncertainty is a critical factor in determining the significance of an action for purposes of preparing an EIS. If, as NMFS states, it is uncertain whether a shift from the low impact highly regulated domestic fishery to higher impact foreign fisheries will occur, or what consequences might result, then NMFS is compelled by NEPA to fully analyze the issue in an EIS rather than to entirely ignore the issue in its EA.

**Response**: Please see Chapter 4, Section 4.1.6 of this Supplemental EA for the analysis of potential transferred effects that could result from the implementation of the U.S. Longline Rule. Based on the analysis in the original EA and this Supplemental EA, NMFS has determined that the proposed action does not raise significant environmental impacts and that an EIS is not needed.

**Comment 7**: The misstatements in the EA reflect a persistent and incorrect interpretation on CMM 2008-01 in the discussion of how WCPFC catch limits apply to Participating Territories.

**Response**: As stated in Chapter 1 of this Supplemental EA, under CMM 2008-01, the longline fisheries of Participating Territories are subject to separate bigeye tuna catch limits of 2,000 mt per year for 2009-2011. However, if these Participating Territories are undertaking responsible development of their domestic fisheries, the bigeye tuna catch limits do not apply.

**Comment 8**: The discussion of the alternatives for the U.S. Longline Rule initially considered but excluded from detailed analysis is inadequate.

**Response**: Please see Chapter 2, Section 2.4 of this Supplemental EA for additional discussion of the U.S. Longline Rule alternatives initially considered but excluded from detailed analysis.

**Comment 9**: Neither the description of the Hawaii-based longline fisheries, nor the description of protected species, is complete or accurate. The best available information – readily accessible in other recent documents – is not referenced. For example:

> a. The Hawaii longline shallow-set and deep-set fisheries are erroneously described as a single fishery. This creates considerable basis for confusion and contradicts every other management planning document developed in the past 5 years. Although the discussion refers in places to the shallow-set and deep-set fisheries, it is fundamentally inaccurate to describe them as a single fishery for many reasons, not the least of which is that one of these fisheries targets bigeye tuna and the other does not. The description here is an over-simplification of the reality of two separately managed fisheries, fishing in different areas, using different techniques and subject to different management measures.

**Response**: The discussion of the Hawaii longline fishery throughout the original EA clearly distinguishes between the deep-setting and shallow-setting sectors of the fishery. Indeed, in describing the Hawaii longline fleet, Section 3.3.1.1 of the original EA states, "The fleet has historically operated, and continues to operate, in two distinct modes based on gear deployment: deep-set longline by vessels that target primarily bigeye tuna and shallow-set longline by those that target swordfish." To the extent the EA refers to the deep-setting and shallow-setting sectors as one fishery, it does so for ease of reference, which does not affect the analysis or conclusions in the original EA.

b. The discussion of leatherback and loggerhead sea turtles is not based upon the most current information, and is inaccurate.

**Response**: Please refer to Chapter 3, Section 3.3 for a more current discussion on leatherback and loggerhead sea turtles.

c. There is no mention of sea turtle mitigation measures undertaken by the United States to offset sea turtle takes in the longline fisheries, or other conservation measures.

**Response**: Please refer to Chapter 3, Section 3.3 and Table 7 Sea turtle mitigation measures required for the Hawaii longline fishery (50 CFR 665.32) in the Supplemental EA for a detailed description of sea turtle mitigation measures undertaken by the United States.

d. The discussion of longline fishery impacts on sea turtles is extremely cursory and dated, limited only to a table showing 2008 observed takes, and with no differentiation between shallow-set and deep-set interaction rates and species. Also there is no discussion of existing management/mitigation measures in the longline fisheries, the success that has been achieved, and the related conservation measures that have been adopted.

**Response**: Please refer to Chapter 3, Section 3.3 and Table 7 Sea turtle mitigation measures required for the Hawaii longline fishery (50 CFR 665.32) in the Supplemental EA for a detailed description of sea turtle mitigation measures undertaken by the United States.

e. The original EA reports both the ESA listing status of protected species and the International Union for the Conservation of Nature (IUCN) status. The IUCN status of species listed in the EA is legally irrelevant, is based upon different and conflicting criteria than the ESA and can only confuse the reader.

**Response**: Section 3.6 in the original EA reports both the ESA and the IUCN listing status for protected species in the affected environment. The listing status assigned by the IUCN was included in the original EA for informational purposes only. NMFS and the U.S. Fish and Wildlife Service (USFWS) share responsibility for implementing the ESA. Section 3.6 of the original EA clearly distinguishes the species over which NMFS has jurisdiction versus the species over which USFWS has jurisdiction and Section 4.5.4 of the original EA discusses the ESA consultation history for the U.S. longline fishery operating in the WCPO.

f. The original EA provides inaccurate information regarding the abundance of the Central North Pacific stock of ESA-listed humpback whales.

Response: Please refer to Chapter 3, Section 3.3 for a more detailed discussion on the Central North Pacific stock of ESA-listed humpback whales.

g. The original EA contains misleading discussion of longline interactions with marine mammals, particularly with false killer whales.

**Response**: Section 3.6.1.2.3.2 of the original EA discusses the marine mammal interactions with the U.S. pelagic longline fisheries. NMFS agrees that the last sentence in this section may not be as clear as intended. This sentence has been amended to read as follows. “It should be noted that the pelagic stock of false killer whale is a “strategic stock” under the 1994 amendments to the MMPA because interactions in the deep-set component of the Hawaii-based longline fishery around Hawaii have exceeded the level of potential biological removal.”

h. The discussion of seabirds in the original EA is confusing. The discussion contains disorganized and unclear distinction between sections addressing seabird interactions with the purse seine fishery versus the longline fisheries and does not include detailed discussion of the Black-footed albatross or the Laysan albatross, the two species with which the Hawaii-based longline fisheries interact.

**Response**: Please refer to Chapter 3, Section 3.3 for a more detailed description of seabirds and their interactions with the longline fisheries.

**Comment 10**: The discussion of indirect and direct effects in Chapter 4 of the original EA is cursory and consists almost entirely of conclusions stated without any actual analysis. The indirect impact of transferred effects is entirely ignored.

**Response**: NFMS believes that Chapter 4 of the original EA presents a thorough analysis of the potential environmental impacts that could be caused by implementation of the U.S. Longline Rule under any of the alternatives analyzed in the original EA. Please refer to Chapter 3, Section 3.2 and Chapter 4, Section 4.1.6 of this Supplemental EA for the discussion of transferred effects.

**Comment 11**: The cumulative impacts chapter of the original EA conveys almost no actual information and is devoid of analysis. The chapter states, without explanation, that it is "reasonably foreseeable" that the WCPFC's CMMs will be implemented by other signatory countries by imposing similar requirements on their purse seine and longline fisheries. The chapter also states that although it is not possible to predict what other management measures may be implemented by other nations, NMFS assumes that they will be "conservative in the sense that they will constrict fishing capacity, effort, and/or catch." There is no basis for these statements and it appears that the author literally made these statements up.

**Response**: Chapter 5 of the original EA presents a detailed discussion of the potential cumulative impacts for the U.S. Purse Seine Rule and the U.S. Longline Rule. As indicated there, NMFS believes it is reasonably foreseeable that other Members of the WCPFC may implement management measures to which they have agreed to be bound through international negotiating processes. The current biological status of many of the target stocks of HMS in the Pacific Ocean suggests that the other management measures that may be implemented by other nations would be conservative in order to reduce or control fishing mortality on these stocks.

**Comment 12**: The EA should consider a bigeye tuna catch limit for the swordfish sector of the longline fishery, which averages about 17 bigeye tuna incidentally caught per set [the commenter subsequently clarified this to mean 17 bigeye tuna per trip], which are brought to shore and sold. Such a catch limit would reduce bycatch, avoid waste, and promote optimum yields.

**Response**: The bigeye tuna catch limit established by the WCPFC and implemented through this rule applies to bigeye tuna captured by all fishing activities of the Hawaii and west-coast based longline fleets. Bigeye tuna caught and retained in both the shallow-set (swordfish-directed) and deep-set sectors would be counted against the limit, and the activities of both sectors would be similarly restricted after the limit is reached.

**Comment 13**: The EA should include an alternative to the bigeye tuna catch limit for the longline fishery that would utilize the three-year rolling management period that has been proposed for the purse seine fishing effort limits in the rule to implement the provisions of CMM 2008-01 for purse seine fisheries.

**Response**: During the promulgation of the U.S. Purse Seine Rule, NMFS determined that the CMM 2008-01 allows for a management scheme for the U.S. WCPO purse seine fishery that can include multi-year and non-calendar year time periods for the application of the allotted pool of fishing days. As stated in Chapter 1 of this Supplemental EA, the purpose of the U.S. Longline Rule is to ensure the timely implementation by the United States of the bigeye tuna catch limit established by the WCPFC in CMM 2008-01, which specified catch limits for bigeye tuna captured by longline fisheries for each of the years 2009, 2010, and 2011. The need for the rule is to satisfy the international obligations of the United States as a Contracting Party to the Convention, pursuant to the WCPFCIA, and to make effective a CMM provision that requires immediate implementation. Although outside the limited scope of the proposed rule, NMFS is not foreclosed from considering an alternative that includes a multi-year bigeye tuna catch limit as part of a future rulemaking.

**Comment 14**: The cumulative impacts section of the EA is inadequate. A major discrepancy is the lack of discussion of the well documented transfer effects that occur when U.S. seafood production is curtailed and domestic consumption of imported seafood increases in response. If the longline fishery is closed when the bigeye tuna catch limit for that fishery is reached, the demand for bigeye tuna will be met by longline caught tuna imported from other countries, which have less stringent regulations to mitigate environmental impacts, such as interactions with seabirds and sea turtles.

**Response**: Please see Chapter 3, Section 3.2 and Chapter 4, Section 4.1.6 of this Supplemental EA for a discussion of the potential transferred effects that could arise from the implementation of the U.S. Longline Rule. These potential transferred effects are indirect effects, or effects that “are caused by the action and are later in time or farther removed in distance” (40 CFR 1508.8), rather than cumulative impacts.

## List of Preparers

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## References

Allen, B.M. and R.P. Angliss. 2009. Draft Alaska marine mammal stock assessments. Seattle, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Alaska Fisheries Science Center, National Marine Mammal Laboratory.

Arata, J.A., Sievert, P.R., and Naughton, M.B. 2009. Status assessment of Laysan and black-footed albatrosses, North Pacific Ocean, 1923–2005: U.S. Geological Survey Scientific Investigations Report 2009-5131. United States Department of Interior, United States Geological Survey.

Forney, K.A. and D.R. Kobayashi. 2007. Updated estimates of mortality and injury of cetaceans in the Hawaii-based longline fishery, 1994-2005. NOAA Report TM-NMFS-SWFSC-412. Long Beach, California, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center.

International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific. 2009. Report of the Ninth Meeting of the International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean. Kaohsiung, Taiwan. Plenary Session: 15-20 July.

McCracken, M. and K.A. Forney. 2008. Preliminary estimates of cetacean injury and mortality in Hawaii-based longline fisheries during 2007. Internal document (PSRG-2008-11) submitted to the United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Scientific Review Group.

National Marine Fisheries Service. 2004. Environmental assessment - U.S. South Pacific albacore troll fishery. Long Beach, California, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Region.

National Marine Fisheries Service. 2005. Biological opinion on continued authorization of the Hawaii-based pelagic, deep-set, tuna longline fishery based on the Fishery Management Plan for pelagic fisheries of the western Pacific region. Honolulu, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Islands Regional Office.

National Marine Fisheries Service. 2008. Biological opinion on management modifications for the Hawaii-based shallow-set longline swordfish fishery – implementation of Amendment 18 to the FMP for pelagic fisheries of the western Pacific region. Honolulu, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Islands Regional Office.

National Marine Fisheries Service. 2009a. 2009 Annual report to the Western and Pacific Fisheries Commission part 1: Information on fisheries, research, and statistics. Honolulu, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Islands Regional Office.

National Marine Fisheries Service. 2009b. Hawaii longline shallow-set and deep-set Annual Status Reports. Honolulu, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Islands Regional Office.

National Marine Fisheries Service. 2009c. Pacific islands fishing permit reports. Honolulu, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Islands Regional Office.

National Marine Fisheries Service. 2009d. Regulatory Impact Review for a rule to implement 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: Bigeye tuna catch limits in longline fisheries in 2009, 2010, and 2011. Revised October 2009. Honolulu, United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Islands Regional Office.

Pan, M. and S.G. Pooley, 2004. Tuna price in relation to economic factors and sea surface temperature in fresh tuna market. *IIFET 2004 Japan Proceedings*.

Rausser, G., Hamilton, S., Kovach, M., and Stifter, R. 2009. Unintended consequences: The spillover effects of common property regulations. *Marine Policy* 33:24-39.

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.

Sagapolutele, F. 2009. Governor calls minimal wage issue main obstacle in luring business. American Samoa. *Samoa News*.

Sarmiento, C. 2006. Transfer function estimation of trade leakages generated by court rulings in the Hawaii longline fishery. *Applied Economics* 38:2, 183-190.

United States Fish and Wildlife Service. 2002. Biological opinion for the effects of the Hawaii-based domestic longline fleet on the short-tailed albatross (*Phoebastria albatrus*). FWS Report 1-2-99-F-02. Honolulu, United States Fish and Wildlife Service, United States Department of the Interior.

United States Fish and Wildlife Service. 2004. Biological opinion for the effects of the FMP for the U.S. west coast fisheries for HMS and its effect on the endangered short-tailed albatross (*Phoebastria albatrus*) and the endangered brown pelican (*Pelecanus occidentalis*).USFWS Report AFWO 1-14-2003-F-1479.1. Portland, Oregon, United States Fish and Wildlife Service, United States Department of the Interior.

Western Pacific Regional Fishery Management Council. 2009. Pelagic fisheries of the western Pacific region: 2007 annual report (updated April 6, 2009). Honolulu, Western Pacific Regional Fishery Management Council.

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# Finding of No Significant Impact

## Bigeye Tuna Catch Limits for Longline Fisheries in 2012

This Finding of No Significant Impact (FONSI) was prepared according to the guidelines established in National Marine Fisheries Service (NMFS) Instruction 30-124-1 and the requirements set forth in the National Oceanic and Atmospheric Administration's Administrative Order (NAO 216-6, May 20, 1999). The FONSI is based on the Supplemental EA prepared pursuant to the requirements of the National Environmental Policy Act (NEPA; 42 U.S.C. 4321 et seq.) to analyze the potential impacts on the human environment from promulgation of the rule (RIN 0648-BC14), "Bigeye Tuna Catch Limits for Longline Fisheries in 2012."

**Background**

In December 2008, the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (hereafter Commission or WCPFC) adopted "Conservation and Management Measure for Bigeye and Yellowfin Tuna in the Western and Central Pacific Ocean" (CMM 2008-01). CMM 2008-01 set forth specific provisions to reduce fishing mortality on western and central Pacific Ocean (WCPO) bigeye tuna (*Thunnus obsesus*) and control fishing mortality on WCPO yellowfin tuna (*Thunnus albacares*). CMM 2008-01 had the stated objective of reducing, over the period 2009-2011, the fishing mortality rate for bigeye tuna in the WCPO by at least 30% from the annual average during the period 2001-2004 or 2004 and ensuring that there was no increase in fishing mortality for yellowfin tuna beyond the annual average during the period 2001-2004 or 2004. In March 2011, the Commission adopted "Conservation and Management Measure for Temporary Extension of CMM 2008-01" (CMM 2011-01), which extends the majority of the provisions of CMM 2008-01 until February 28, 2013. The Commission is scheduled to discuss a follow-on measure to CMM 2008-01 at its next regular session in December 2012.

National Marine Fisheries Service (NMFS) promulgated regulations to implement specific provisions of CMM 2008-01 for U.S. fleets operating in the WCPO, which expired at the end of 2011 (see 74 FR 38544; 74 FR 63999). The regulations included bigeye tuna catch limits for U.S. longline fisheries and five specific requirements for the U.S. purse seine fleet operating in the WCPO: (1) fishing effort limits; (2) prohibition periods for the use of fish aggregating devices (FADs); (3) catch retention requirements; (4) observer requirements; and (5) closure of certain areas of the high seas to fishing.

NMFS prepared an Environmental Assessment (EA) that analyzed the effects on the human environment that could result from the promulgation of the two rules to implement certain decisions made by the Commission at its Fifth Regular Session, in Busan, Republic of Korea, in December 2008. One rule implemented specific management measures for the U.S. purse seine fleet operating in the WCPO (hereafter "U.S. Purse Seine Rule"), including specific provisions of CMM 2008-01. The other rule implemented the bigeye tuna catch limits specified in CMM 2008-01 for the U.S. longline fleets in the WCPO (hereafter "U.S. Longline Rule").

NMFS issued the 2009 EA (*Environmental Assessment for the Implementation of the Decisions of the Fifth Regular Annual Session of the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean: Fishing Restrictions and Observer Requirements in Purse Seine Fisheries for 2009-2011 and Turtle Mitigation Requirements in Purse Seine Fisheries and Bigeye Tuna Catch Limits in Longline Fisheries in 2009, 2010, and 2011*) in conjunction with the issuance of the proposed U.S. Purse Seine Rule on June 1, 2009 for public review and comment.

NMFS issued the proposed U.S. Longline Rule on July 8, 2009, for public review and comment, and also reissued the 2009 EA. In order to respond to comments received on the U.S. Longline Rule, NMFS issued a Supplemental EA (2009 SEA), titled *Supplemental 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: Specific Analysis on Bigeye Tuna Catch Limits in Longline Fisheries in 2009, 2010, and 2011*, on December 7, 2009.

NMFS has prepared a Supplemental EA (2012 SEA) to provide information and analyses to take into consideration significant new information and changed circumstances relevant to the proposed action and the assessment of its potential environmental impacts. The 2012 SEA analyzes the effects of an interim final rule that would extend the bigeye tuna catch limits specified for U.S. longline fisheries for 2012.

The 2009 EA analyzed three action alternatives for implementing the catch limit, as well as the No-Action or baseline alternative. The 2009 SEA analyzed a new alternative, Alternative 5. The U.S. Longline Rule implemented the catch limit in the manner specified by Alternative 5.

The 2012 SEA analyzes an additional alternative, Alternative 6, which takes into consideration the enactment of Section 113 of the Consolidated and Further Continuing Appropriations Act, 2012 (CFCAA). Given the changed circumstances created by Section 113, NMFS could not implement any of the other action alternatives analyzed in the 2009 EA and 2009 SEA for 2012. However, the 2012 SEA compares Alternative 6 to the action alternatives analyzed in the 2009 EA and 2009 SEA in order to build upon the analyses previously done and to provide the reader with information regarding the potential differences in environmental impacts between the action alternatives originally analyzed and Alternative 6.

All of the action alternatives analyzed in the 2009 EA, 2009 SEA, and 2012 SEA would have similar and minor environmental impacts. However, the action alternatives analyzed in the 2009 EA and 2009 SEA would likely have slightly greater beneficial impacts than Alternative 6 on bigeye tuna and other living marine resources in the WCPO.

**Description of Alternative 6**

The annual limit for the United States for 2012 would be 3,763 metric tons (mt). Under CMM 2008-01, and as extended by CMM 2011-01, the fisheries of Participating Territories, including American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands (CNMI), are generally subject to an annual catch limit of 2,000 mt of bigeye tuna. However, if these Participating Territories are undertaking responsible development of their domestic fisheries, the bigeye tuna catch limits do not apply.

For the purpose of implementing the bigeye tuna catch limits of CMM 2008-01 for 2012, NMFS would distinguish catch attributed to the three U.S. Participating Territories from the catch attributed to the United States, based upon a combination of the types of Federal longline fishing permits registered to the fishing vessel, where the bigeye tuna are landed, and whether the bigeye tuna is subject to attribution under arrangements under the authorization of Section 113(a) of the CFCCA.

Bigeye tuna landed in any of the three U.S. Participating Territories, with certain provisos, would be treated as fish that are harvested in support of the development of the Participating Territory's domestic fisheries and would be attributed to the longline fishery of that Participating Territory. As well, bigeye tuna that are caught and retained by a fishing vessel registered for use under a valid American Samoa Longline Limited Access Permit, with certain provisos, would be treated as fish that are harvested in support of the development of American Samoa's domestic fisheries and would be attributed to the longline fishery of American Samoa. The provisos in both these cases are that the bigeye tuna must not have been caught in the portion of the U.S. Exclusive Economic Zone (EEZ) around the Hawaiian Archipelago, and they must be landed by a U.S. fishing vessel operated in compliance with a permit issued under 50 CFR 660.707 or 665.801. Any bigeye tuna attributed to the longline fisheries of any of the three Participating Territories as described above would not be subject to the limit.

Vessels operating under an agreement under the authorization of Section 113 of the CFCAA would have catch of bigeye tuna attributed to the Participating Territory with which the agreement is made. The retained catch of bigeye tuna would be attributed to the particular Participating Territory, regardless of where in the Convention Area the fish are caught and where they are landed.

All other bigeye tuna captured by longline gear in the Convention Area by U.S. longline vessels and retained would be subject to the limit.

Once NMFS determines that the 2012 limit is expected to be reached by a specific future date, NMFS would publish a notice in the *Federal Register* announcing that specific restrictions will be effective on that specific future date until the end of the calendar year. NMFS would publish the notice at least seven calendar days before the effective date of the restrictions to provide fishermen advance notice of the restrictions. NMFS would also endeavor to make publicly available, such as on a Web site, regularly updated estimates and/or projections of retained catches of bigeye tuna or forecasts of the date the limit would be expected to be reached in order to help fishermen plan for the possibility of the limit being reached.

Under Alternative 6, starting on the announced date and extending through the last day of that calendar year, it would be prohibited to use a U.S. fishing vessel to retain on board, transship, or land bigeye tuna captured in the Convention Area by longline gear, except any bigeye tuna already on board a fishing vessel upon the effective date of the restrictions may be retained on board, transshipped, and/or landed, provided that they are landed within 14 days after the restrictions become effective. In the case of a vessel that has declared to NMFS pursuant to 50 CFR 665.803(a) that the current trip type is shallow-setting, the 14-day limit would be waived, but the number of bigeye tuna retained on board, transshipped, or landed must not exceed the number on board the vessel upon the effective date of the restrictions, as recorded by the NMFS observer on board the vessel. Furthermore, bigeye tuna captured by longline gear may be retained on board, transshipped, and/or landed if they are captured by a fishing vessel registered for use under a valid American Samoa Longline Limited Access Permit or if they are landed in American Samoa, Guam, or the CNMI. However, the bigeye tuna must not have been caught in the portion of the U.S. EEZ surrounding the Hawaiian Archipelago, and, they must be landed by a U.S. fishing vessel operated in compliance with a valid permit issued under 50 CFR 660.707 or 665.801. Bigeye tuna caught by a fishing vessel operating under an agreement under the authorization of Section 113 of the CFCAA may be retained on board, transshipped, and/or landed regardless of where in the Convention Area they are caught and where they are landed.

Starting on the announced date and extending through the last day of that calendar year, it would also be prohibited to transship bigeye tuna caught in the Convention Area by longline gear to any vessel other than a U.S. fishing vessel operated in compliance with a valid permit issued under 50 CFR 660.707 or 665.801.

These restrictions do not apply to bigeye tuna caught by longline gear outside the Convention Area, such as in the eastern Pacific Ocean (EPO). However, to help ensure compliance with the restrictions related to bigeye tuna caught by longline gear in the Convention Area, under Alternative 6, two additional, related, prohibitions would be in effect starting on the announced date and extending through the last day of that calendar year. First, it would be prohibited to fish with longline gear both inside and outside the Convention Area during the same fishing trip, with the exception of a fishing trip that is in progress at the time the announced restrictions go into effect. In that exceptional case, the vessel, unless on a declared shallow-setting trip, will still be required to land any bigeye tuna taken within the Convention Area within 14 days of the effective date of the restrictions, as described above. Second, if a vessel is used to fish using longline gear outside the Convention Area and the vessel enters the Convention Area at any time during the same fishing trip, the longline gear on the fishing vessel must be stowed in a manner so as not to be readily available for fishing while the vessel is in the Convention Area. These prohibitions would not apply to vessels that land catch in the Participating Territories or that are operating under a valid American Samoa Longline Limited Access Permit, subject to the provisos described above, or to vessels that are operating under an arrangement under the authorization of Section 113 of the CFCAA.

**Significance Analysis**

NAO 216-6 contains criteria for determining the significance of the impacts of a proposed action. In addition, the Council on Environmental Quality regulations for implementing NEPA at 40 C.F.R. 1508.27 state that the significance of an action should be analyzed both in terms of "context" and "intensity." Each criterion listed below is relevant to making this FONSI and has been considered individually, as well as in combination with the others.

The significance of this action is analyzed based on the NAO 216-6 criteria and CEQ's context and intensity criteria. These include:

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

Response: No. The target species of the U.S. WCPO longline fisheries are bigeye tuna, swordfish (*Xiphias gladius*), and albacore (*Thunnus alalunga*) with yellowfin tuna being an incidentally caught target species. As stated in Section 4.1.2 of the 2012 SEA, implementation of Alternative 6 could lead to some beneficial impact on the WCPO stocks of bigeye tuna and yellowfin tuna by reducing the fishing mortality on the stocks once the catch limit is reached. However, those impacts are likely to be negligible because: (1) the limit would be in effect for only at the most several months in 2012, if at all; (2) after the limit is reached, all of the affected longline vessels in the fleet could transfer their effort to other areas, such as the EPO, or to other species, mitigating any diminishing effect of the prohibition on fishing mortality rates (as stated in Chapter 3, Section 3.4 of the 2009 EA, the stock structure of bigeye tuna in the Pacific Ocean is not well known, but there is some degree of mixing between the EPO and the WCPO, so any fishing mortality in the EPO would likely affect the status of the stock in the WCPO and fishing for other species in the Convention Area would result in at least some bigeye tuna being incidentally caught); (3) dual permit vessels could continue fishing for bigeye tuna in the Convention Area outside of the U.S. EEZ surrounding the Hawaiian Archipelago; and (4) vessels operating under arrangements under the authorization of Section 113 of the CFCAA could continue fishing for bigeye tuna in the Convention Area regardless of where the fish are caught and landed.

Any reduction in deep-setting effort for bigeye tuna would have beneficial impacts on the stock of yellowfin tuna, which is also caught by deep-set longlining. However, yellowfin tuna could continue to be retained, landed, and transshipped by vessels affected by the prohibitions under Alternative 6. In addition, the overall effects on WCPO bigeye tuna and WCPO yellowfin tuna would be so minor, that any effects to ecosystem function and biodiversity would not be expected.

The other principal target species for U.S. longline fleets in the Convention Area are albacore and swordfish. Albacore is targeted by vessels in the American Samoa longline fleet, which would not be subject to the catch limit or the prohibitions. It is unlikely that the vessels that would be affected by the catch limit would switch to targeting albacore once the prohibitions go into effect, given that other opportunities – targeting bigeye tuna in the EPO – are likely more cost effective. Therefore, albacore mortality would likely be unaffected by the interim final rule. The American Samoa fleet targets South Pacific albacore, while the Hawaii-based fleet does not target but takes some North Pacific albacore. Should vessels cease fishing as a result of the rule, effects to North Pacific albacore would likely be beneficial.

As shown in Figure 12 in Chapter 4 of the 2009 EA, for the years 2005-2008, and in Figure 4 of the 2012 Regulatory Impact Review prepared for the interim final rule for the years 2005-2011, the majority of swordfish was landed by the fleets in the beginning of the calendar year. Therefore, since the catch limit would likely be reached toward the end of the calendar year, if at all, it is unlikely that any shift in effort to the shallow-set fishery, which targets swordfish, would cause large increases in swordfish mortality.

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

Response: No. Section 4.1.3 of the 2012 SEA discusses the potential impacts to secondary target species from implementation of Alternative 6. Alternative 6 would not be expected to cause large changes to the overall amount of secondary target stocks caught by the U.S. longline fleets operating in the Convention Area (relative to catch amounts under the No-Action Alternative). Should the catch limit be reached and the prohibitions be put into effect, both the deep-set fishery and shallow-set fishery would remain open and any transfer of effort would be expected to result in catch rates of non-target species that are similar to existing conditions.

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

Response: No. As stated in Chapter 4, Section 4.1.4 of the 2012 SEA, implementation of Alternative 6 would not cause any adverse impacts to areas designated as EFH or Habitat Areas of Potential Concern under MSA provisions, or to ocean and coastal habitats. Any changes to fishing practices and any geographical shifts in fishing effort likely would be minor and unlikely to affect these areas.

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

Response: No. As indicated in the 2012 SEA in Section 4.1.1.1, the only identified potential impact to public health and safety from implementation of Alternative 6 would be from the "race to fish" effect that would be expected at the beginning of the calendar year (because the limit would be set on a calendar year basis) and in the time period between when the announcement of the prohibition is made and when the prohibition takes place. This "race to fish" effect could cause vessel operators to forego vessel maintenance or to fish in unsafe weather or ocean conditions in order to compete for their share of the limit. However, due to the limited time period that the prohibition would be in effect and the other opportunities available to the affected vessels, it is unlikely that any race to fish effect would be pronounced. Catch patterns in 2009-2011 do not reveal any obvious evidence of a race to fish, and in 2010, in the period between the announcement being made the prohibitions going into effect, there appears to have been the opposite effect – many vessels ceased retaining bigeye tuna and headed to port soon after the announcement, presumably – at least for some – so that they could prepare for a trip to the EPO during the closure.

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

Response: No. As stated in Section 4.1.4 of the Supplemental EA, implementation of Alternative 6 would not be expected to adversely affect species listed as endangered or threatened under the Endangered Species Act (ESA), their critical habitat or marine mammals. To the extent that there could be a slight reduction in fishing effort, there would be a reduced risk of interaction with the protected resource. Moreover, implementation of Alternative 6 would not cause any impacts to ESA-listed threatened or endangered species that have not been addressed in prior or ongoing consultations.

Pursuant to the regulations implementing the Marine Mammal Protection Act at 50 CFR Part 229, the Hawaii deep-set longline fishery targeting tuna is classified as a Category I fishery. This means that the fishery has the potential for frequent incidental mortality and serious injury to marine mammals. The Hawaii shallow-set fishery targeting swordfish is classified as a Category II fishery. This means that the fishery has occasional incidental mortality or serious injury of marine mammals. However, it is unlikely that the proposed action would affect the number of interactions between either of these fisheries and marine mammals. Any effects in terms of catches and fishing mortality rates to protected species from shifts in fishing effort from Alternative 6 are expected to be small compared to, for example, typical year-to-year variations in catches among species driven by changing oceanic and economic conditions.

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

Response: No. The purpose of Alternative 6 is to implement a catch limit to reduce fishing mortality on WCPO bigeye tuna. As discussed in Chapter 3, Section 3.5.2 and Section 4.3 of the 2009 EA, both adult bigeye tuna and adult yellowfin tuna are considered among the top predators of the tropical or warm pool marine ecosystem. Changes to WCPO stocks of these species could lead to trophic interactive effects, including increased competition for prey species with other top predators. Larval and juvenile bigeye tuna and yellowfin tuna are also sources of food for other marine species, such as fish, seabirds, porpoises, marine mammals, and sharks. Thus, increases in larval and juvenile tuna could increase the food available for these other species. However, the overall effects from the implementation of Alternative 6 on WCPO bigeye tuna and WCPO yellowfin tuna would be so minor, that any effects to ecosystem function and biodiversity would not be expected.

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

Response: No. As discussed in Section 4.1.1 of the 2012 SEA, if and when the maximum allowable amount of bigeye tuna landings is reached in a given year, affected fishing businesses would be expected to cease fishing for the remainder of the calendar year or shift from deep-setting for bigeye tuna in the WCPO to the next best opportunity. Vessels with both Hawaii longline and American Samoa longline limited access permits would be able to continue to fish for bigeye tuna in the Convention Area outside of the U.S. EEZ surrounding the Hawaiian Archipelago and land their catch in Hawaii. Vessels operating under an arrangement under the authorization of Section 113 of the CFCAA would have their catch attributed to the Participating Territory with which the agreement is made and would not be subject to the prohibitions established once the limit is reached. Other opportunities for all affected vessels include deep-setting for bigeye tuna in other areas, specifically the EPO. Engaging in these opportunities would require the affected fishing operations to absorb some additional costs, but the magnitude of those costs cannot be projected. Overall, the environmental effects stemming from those economic impacts would be minor.

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

Response: No. As stated in Section 4.2 of the 2012 SEA, the rule would not cause substantial changes to the fishing practices and patterns of the affected fleets, which have been evaluated over the course of many years. The environmental effects caused by the implementation of Alternative 6 would be minor or neutral and the interim rule would be effective for a limited period – a few months of 2012. Thus, it is unlikely that there would be any controversy regarding the size, nature, or effects of the action (i.e., the effects of the action on the quality of the human environment).

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

Response: No. As described in Section 3.5.4 of the 2012 SEA, there are several National Wildlife Refuges and National Monuments in the affected environment. However, as stated in Section 4.1.4 of the Supplemental EA, any geographical shifts in fishing effort caused by implementation of Alternative 6 would be minor and would not be expected to adversely affect those areas.

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

Response: No. As stated throughout the 2012 SEA, although the magnitude of the effects on the human environment cannot be quantified with certainty, the types of effects and the direction of those effects can be predicted. The rule would implement the WCPFC's established catch limit for WCPO bigeye tuna for 2012, which could cause some beneficial effects on the stocks. The rule could cause some shift in fishing effort from targeting bigeye tuna in the WCPO, which could cause effects to other fish stocks in both the WCPO and EPO. Such shifts in fishing effort could also cause effects to protected resources, but these effects would be minor, since the shift in fishing effort would likely be less than that caused by typical year-to-year variations in catches among species driven by changing oceanic and economic conditions. Moreover, the duration of the rule would be limited to a few months, and vessels operating under an arrangement under the authorization of Section 113 of the CFCAA would be able to continue fishing for bigeye tuna in the Convention Area after the limit is reached, regardless of where the fish is caught and landed. Thus, the overall direct and indirect impacts from implementation of the rule under any of the action alternatives would be minor. Indeed, should the majority of vessels that would otherwise be affected by this interim final rule enter into such arrangements, as is likely, this alternative could essentially be the same as the No-Action Alternative.

In terms of cumulative effects, the effects of the implementation of Alternative 6 in combination with the effects of similar actions taken by other WCPFC members, as well as possible future actions to implement any future WCPFC decisions with respect to bigeye tuna, could have beneficial effects on the stocks. These effects would be greater than if Alternative 6 were implemented in isolation. However, on the whole, the contribution of Alternative 6 to cumulative effects on the affected environment would be de minimis.

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

Response: No. As discussed in Section 4.1.7 of the 2012 SEA, implementation of the interim final rule under Alternative 6 has independent utility and there are no other actions that would depend on the implementation of this rule. Thus, there are no actions that are connected actions for the purposes of 40 CFR 1508.25(a)(1). The overall effects to fisheries, target stocks and non-target species, and protected resources from the interim final rule under Alternative 6 are expected to be neutral, minor, generally beneficial, and not significant, because the objective of the rule is to implement a catch limit from a conservation and management measure for a brief period of time. Due to the small size of any effects to the affected environment under Alternative 6 (the minor effects as described throughout Chapter 4 of the 2012 SEA would be present for at most a few months of 2012, if at all), the synergistic or interactive effects of implementation of the interim final rule and any reasonably foreseeable management measures and other actions in the affected environment would not be substantial, and thus, the proposed action is not expected to have individually or cumulatively significant impacts on the environment.

Alternative 6, under present circumstances, is anticipated to be effective only through December 31, 2012, less than one year. Implementation of Alternative 6 might lead to a direct reduction in fishing mortality on WCPO bigeye tuna, because a catch limit would be imposed where one currently does not exist, and thus, there could be a direct negative impact on the stock's fishing mortality rate and a consequent positive impact on its stock size. However, those impacts are likely to be negligible because: (1) the prohibitions after reaching the limit would be in effect for only at the most several months in 2012, if at all; (2) after the limit is reached, all of the affected longline vessels in the fleet could transfer their effort to other areas, such as the EPO, or to other species, mitigating any diminishing effect of the prohibition on fishing mortality rates (as stated in Chapter 3, Section 3.4 of the 2009 EA, the stock structure of bigeye tuna in the Pacific Ocean is not well known, but there is some degree of mixing between the EPO and the WCPO, so any fishing mortality in the EPO would likely affect the status of the stock in the WCPO and fishing for other species in the Convention Area would result in at least some bigeye tuna being incidentally caught); (3) dual permit vessels could continue fishing for bigeye tuna in the Convention Area outside of the U.S. EEZ surrounding the Hawaiian Archipelago; and (4) vessels operating under arrangements under the authorization of Section 113(a) of the CFCAA could continue fishing for bigeye tuna in the Convention Area regardless of where the fish are caught and landed. Moreover, based on recent catch statistics, the Hawaii-based longline fleet comprises only about 3 percent of the total catches of WCPO bigeye tuna, so its contribution to the stock's fishing mortality rate is relatively small. The effects to other stocks and protected resources would consequently be minor or negligible as well.

As described in Section 4.17 of the 2012 SEA, the incremental impact of the proposed action was considered in addition to other past, present, and reasonably foreseeable future actions in the affected environment. The objective of Alternative 6 and the other identified fishery management actions is to implement conservation and management measures to help sustain the resources in the affected environment and maintain fishing activities for the long term. There could be some associated adverse effects from the implementation of the other actions. For example, implementation of a measure for the conservation of one resource could lead to adverse effects on another resource. But again, given that the objective of these actions would be to improve the status of resources in the affected environment, it is unlikely that any adverse effects would be substantial. Actions that contribute to changes in ocean conditions, such as those contributing to climate change could also lead to some adverse effects on resources in the affected environment. These adverse effects are difficult to quantify and would be counteracted by the actions of fishery managers. Therefore, the overall cumulative, or additive, impacts on the affected environment from this interim final rule under Alternative 6, other present actions, and all reasonably foreseeable future actions would likely be beneficial. Due to the small size of any effects to the affected environment under Alternative 6 (the minor effects as described throughout Chapter 4 of the 2012 SEA would be present for at most a few months of 2012, if at all), the synergistic or interactive effects of implementation of the interim final rule and any reasonably foreseeable management measures and other actions in the affected environment would not be substantial, and thus, the proposed action is not expected to have individually or cumulatively significant impacts on the environment.

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

Response: No. As stated in Section 4.1.4 of the 2012 SEA, any potential shifts in fishing effort would be small and would take place in the open ocean, without any contact to the ocean floor or any increased potential to affect anthropogenic objects or areas used for traditional practices. Because of the nature and size of the action – implementation of a bigeye tuna catch limit for a few months in 2012 that may or may not cause a small shift in fishing effort to other areas or other species – the interim final rule is not the type of undertaking that would cause effects to historic properties, if such historic properties were present, and there would be no effects to districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or potential loss or destruction of significant scientific, cultural, or historical resources.

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

Response: No. Alternative 6 would implement a specific catch limit for bigeye tuna in the Convention Area. Vessels affected by the catch limit may change their current fishing practices to some degree, as discussed in Section 4.1 of the 2012 SEA, but these changes would not lead to the introduction or spread of a nonindegenous species.

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

Response: No. As stated in Chapter 1 of the 2012 SEA, the purpose of the implementation of the interim final rule under Alternative 6 is for NMFS to ensure the timely implementation of the United States of the bigeye tuna catch limit established by the WCPFC for 2012. The need for the rule is to satisfy the international obligations of the United States, pursuant to the WCPFCIA, and to make effective a CMM provision that requires immediate implementation. Thus, the rule is limited to an immediate and focused objective and it does not establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration.

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

Response: No. As stated in the response to #14, the purpose of the rule is to implement a specific catch limit and the need for the rule is to satisfy the international obligations of the United States as a member of the WCPFC. As such, the rule would not be expected to violate any laws or requirements imposed for the protection of the environment.

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

Response: No. See the response to #11 above for a discussion of cumulative effects. Moreover, as stated throughout the 2012 SEA, the implementation of Alternative 6 would be generally beneficial, and as stated in Section 4.1.7 of the 2012 SEA, the overall cumulative, or additive, impacts on the affected environment from the implementation of the interim final rule under Alternative 6, other present actions, and all reasonably foreseeable future actions would likely be beneficial.

**DETERMINATION**

In view of the information presented in this document and the analysis contained in the Supplemental EA prepared for the rule, "Bigeye Tuna Catch Limits for Longline Fisheries in 2012," it is hereby determined that the proposed action will not significantly impact the quality of the human environment as described above and in the supporting Supplemental EA and Regulatory Impact Review. In addition, all beneficial and adverse impacts of the proposed action have been addressed to reach the conclusion of no significant impacts. Accordingly, preparation of an Environmental Impact Statement for this action is not necessary.

Regional Administrator
Pacific Islands Regional Office

6 AUG 2012
Date