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

DEC 28 2009

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: Initial Implementation of the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean

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: The National Marine Fisheries Service (NMFS) proposes regulations to implement, in part, 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). Pursuant to the WCPFCIA, NMFS is promulgating regulations that would implement the provisions of the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (Convention) that are fully specified; that is, provisions for which no further action is required by the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean prior to implementation.

The regulations would establish requirements related to the operation of U.S. fishing vessels that are used for commercial fishing for highly migratory species (HMS) in the area of application of the Convention (Convention Area). U.S. vessels from three major sectors, purse seine, longline, and albacore troll, engage in HMS fishing on the high seas in the Convention Area. U.S. vessels from other sectors, including pole-and-line, handline, and tropical troll, may also be affected by the rule, as may U.S. support vessels, such as fish carriers and bunkers. The dominant U.S. fisheries for HMS in the Convention Area target skipjack tuna (*Katsuwonus pelamis*), yellowfin tuna (*Thunnus albacares*), bigeye tuna (*Thunnus obesus*), albacore (*Thunnus alalunga*), and swordfish (*Xiphias gladius*).

The regulations relate to the following: obtaining fishing authorizations; submitting vessel information; carrying and using vessel monitoring system units; accepting observers; accepting transshipment inspectors;

accepting boarding and inspection; vessel marking; maintaining and submitting information about fishing effort and catch; at-sea transshipments of HMS from purse seine vessels; and procedures for protecting the confidentiality of information.

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 environmental assessment (EA), 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 Paul N. Doremus, Ph. D.
NOAA NEPA Coordinator

Enclosure

Environmental Assessment for the Initial Implementation of the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean

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Executive Summary

The National Marine Fisheries Service is issuing regulations to implement provisions of the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean, pursuant to its responsibilities under the Western and Central Pacific Fisheries Convention Implementation Act, Pub. L. 109-479, Sec 501, et seq., and codified at 16 U.S.C. 6901 et seq.

The regulations would establish requirements primarily related to the operation of U.S. fishing vessels that are used for commercial fishing for highly migratory species on the high seas in the area of application of the convention. The requirements relate to the following: obtaining fishing authorizations; submitting vessel information; carrying and using vessel monitoring system units; accepting observers; accepting transshipment inspectors; accepting boarding and inspection; vessel marking; maintaining and submitting information about fishing effort and catch; at-sea transshipments of highly migratory species from purse seine vessels; and procedures for protecting the confidentiality of information.

The National Marine Fisheries Service has some discretion regarding the implementation of four of the provisions in the rule: obtaining fishing authorizations; submitting vessel information; carrying and using vessel monitoring system units; and accepting boarding and inspection. The other provisions are non-discretionary and the National Marine Fisheries Service cannot consider alternatives in their implementation. Thus, this Environmental Assessment is limited to studying the provisions for which alternatives can be considered.

The National Marine Fisheries Service has developed four action alternatives that would implement various combinations of the four discretionary provisions. These four action alternatives (Alternative B, Alternative C, Alternative D, and Alternative E) and the no-action alternative (Alternative A) constitute the range of alternatives studied in this Environmental Assessment.

The primary environmental effect of any of the action alternatives is that it would be more costly to fish, and thus, there could be a disincentive to fish, at least in the area of application of the requirements. However, the disincentive to fish would be expected to be minor for the majority of vessels operating in the area of application of the convention. At most, the disincentive to fish could result in slight decreases in longline and/or albacore troll fishing effort on the high seas in the area of application of the convention, and correspondingly slight increases in other areas, including the high seas in the eastern Pacific Ocean and the U.S. Exclusive Economic Zone around the Mariana Islands.

None of the requirements would directly control fishing practices per se, such as how much fishing effort is exerted, how much of a given resource may be caught, where fishing may take place, what type of fishing gear may be used, or how fishing gear may be deployed. None of the action alternatives would authorize or open up the possibility for a new fishery or expand fishing opportunities.

None of the action alternatives would be anticipated to result in an increase in fishing effort in the area of application of the convention, and none would be expected to result in marked changes in fishing patterns anywhere. Consequently, the environmental impacts are not expected to be significant.

Any of the four action alternatives would, if fully implemented, fulfill the international obligations of the United States under the convention and be consistent with the Western and Central Pacific Fisheries Convention Implementation Act. The no-action alternative would not. Among the four action alternatives, the National Marine Fisheries Service prefers Alternative D because it would achieve what the National Marine Fisheries Service believes is the best balance between the compliance costs that would be imposed on fishermen and the effectiveness of the resulting management regime.

This Environmental Assessment has been prepared pursuant to the provisions of the National Environmental Policy Act and related environmental regulations, such as the Council on Environmental Quality's Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR Parts 1500-1508) and the National Oceanic and Atmospheric Administration's Environmental Review Procedures for Implementing the National Environmental Policy Act (NAO 216-6). The organization of the Environmental Assessment is as follows:

- Chapter 1 provides background information regarding the convention and its implementation and sets forth the purpose of and need for the proposed action.
- Chapter 2 defines the proposed action for this Environmental Assessment, provides information regarding the development of the action alternatives, and describes the specific components of the five alternatives studied in depth.
- Chapter 3 describes the environment (physical environment, biological environment, and fisheries) that could be affected by the proposed action.
- Chapter 4 assesses the potential environmental effects that could be caused by each of the five alternatives.
- Chapter 5 explains the reasons for designating Alternative D as the preferred alternative.
- Chapter 6 lists the agencies and persons contacted for information in the preparation of the Environmental Assessment.
- Chapter 7 lists the preparers of the Environmental Assessment.
- Chapter 8 provides a comprehensive bibliography of the sources used to prepare the Environmental Assessment.
- Chapter 9 provides information regarding the non-discretionary provisions of the rule.

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Abbreviations and acronyms

AMSY	Average Maximum Sustainable Yield
B	Biomass
CEQ	Council on Environmental Quality
CI	Confidence Interval
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
CPUE	Catch per Unit of Effort
CV	Corrected Value
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ENSO	El Niño – Southern Oscillation
EPO	Eastern Pacific Ocean
ESA	Endangered Species Act
ETP	Eastern Tropical Pacific Ocean
F	Fishing Mortality Rate
FADs	Fish Aggregating Devices
FAO	United Nations Food and Agriculture Organization
FEIS	Final Environmental Impact Statement
FFA	Pacific Islands 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
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
JIMAR	Joint Institute for Marine and Atmospheric Research
MARWG	Marlin Working Group
MMPA	Marine Mammal Protection Act

MPPRCA	Marine Plastic Pollution Research and Control Act
MFCMA	Magnuson Fishery Conservation and Management Act
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSY	Maximum Sustainable Yield
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
NOI	Notice of Intent
NWR	National Wildlife Refuge
NWSAA	National Wildlife System Administration Act of 1966
OFP	Oceanic Fisheries Programme (of the Secretariat of the Pacific Community)
Palau Arrangement	1992 Palau Arrangement for the Management of the Western Pacific Purse Seine Fishery
PBF	Pacific Bluefin Tuna
PFMC	Pacific Fisheries Management Council
PIC	Pacific Island Countries
PIFSC	NOAA Pacific Islands Fisheries Science Center
PMUS	Pelagic Management Unit Species
PNA	Parties to the Nauru Agreement
PRIA	Pacific Remote Island Area
SC1	Scientific Committee 1
SC2	Scientific Committee 2
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)
SSB	Spawning Stock Biomass
SSL	Sound Scattering Layer
SST	Sea Surface Temperature
UN Law of the Sea	United Nations Convention on the Law of the Sea
UN Fish Stocks Agreement	United Nations Convention on the Law of the Sea relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks
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
WIN	WCPFC Identification Number
WFOA	Western Fishboat Owners Association
WPFMC	Western Pacific Fishery Management Council

CHAPTER 1
PURPOSE OF AND NEED FOR ACTION

1 Purpose and Need

1.1 Introduction

This environmental assessment (EA) describes and analyzes the impacts of action the National Marine Fisheries Service (NMFS) proposes to take to implement an international fisheries agreement, the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (hereafter, "the Convention"). The Convention was signed in Honolulu in September 2000 and came into force in June 2004. The Convention was ratified by, and came into force for, the United States in 2007. The Convention text can be found at http://www.wcpfc.int.

As a Party to the Convention, the United States has an international obligation to implement the Convention's provisions. The authority to do so is established by the Western and Central Pacific Fisheries Convention Implementation Act, Pub. L. 109-479, Sec 501, et seq., and codified at 16 U.S.C. 6901 et seq. (WCPFCIA), which became law in 2007. The WCPFCIA 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 promulgate such regulations as are needed to carry out the international obligations of the United States under the Convention. The authority to promulgate those regulations has been delegated to NMFS.

The proposed action described and analyzed in this EA is intended to implement the provisions of the Convention itself and not, with some minor exceptions, the decisions of the commission established by the Convention. The proposed action will establish the initial set of regulations needed for the United States to fulfill its obligations as a Party to the Convention. As some Convention provisions will require further action or clarification by the commission established by the Convention,[1] the proposed action considered here is limited to provisions of the Convention requiring domestic regulation and not needing further action by the commission established by the Convention.[2]

The objective of the Convention is "to ensure, through effective management, the long-term conservation and sustainable use of highly migratory fish stocks in the western and central Pacific Ocean in accordance with the 1982 Convention [referred to hereafter as the "UN Law of the Sea"] and the Agreement [referred to hereafter as the "UN Fish Stocks Agreement"]."[3]

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[1] An example of a Convention provision dependent upon a future WCPFC decision is found in Convention Article 24(3)(b), which states that commission members must condition their authorization of vessels to fish on the high seas so as to comply with "any procedures established by the [c]ommission to verify the quantity and species transhipped…." As the Commission has not yet established such procedures, it is premature to implement this Convention provision.

[2] The proposed action is also limited to Convention provisions that require federal action. Convention provisions that are merely statements of principle or guidance and those provisions that have already been effectively implemented through existing regulations, policy, or practice are taken into account in NMFS' decision-making process, but are not identified in this EA as provisions needing federal action.

[3] The "1982 Convention" is the United Nations Convention on the Law of the Sea of 10 December 1982. The "Agreement" is the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of December 10, 1982 relating to the Conservation and Management of

The Convention generally applies to the western and central Pacific Ocean (WCPO). The Convention Area comprises all waters of the Pacific Ocean bounded on the south and on the east by defined lines (Figure 1).

The Convention applies to highly migratory fish stocks, specifically all stocks of the species listed in Annex I of the UN Law of the Sea (Table 1) occurring in the Convention Area, except sauries, and such other species of fish as the commission established by the Convention may determine. Hereafter, these species are collectively referred to as "highly migratory species," or HMS.[4] The Convention also has provisions related to the management of non-target species and species dependent on or associated with target stocks.

Table 1 Annex I of the UN Law of the Sea

Albacore tuna: *Thunnus alalunga*
Bluefin tuna: *Thunnus thynnus*
Bigeye tuna: *Thunnus obesus*
Skipjack tuna: *Katsuwonus pelamis*
Yellowfin tuna: *Thunnus albacares*
Blackfin tuna: *Thunnus atlanticus*
Little tuna: *Euthynnus alletteratus*; *Euthynnus affinis*
Southern bluefin tuna: *Thunnus maccoyii*
Frigate mackerel: *Auxis thazard*; *Auxis rochei*
Pomfrets: Family *Bramidae*
Marlins: *Tetrapturus angustirostris*; *Tetrapturus belone*; *Tetrapturus pfluegeri*; *Tetrapturus albidus*; *Tetrapturus audax*; *Tetrapturus georgei*; *Makaira mazara*; *Makaira indica*; *Makaira nigricans*
Sail-fishes: *Istiophorus platypterus*; *Istiophorus albicans*
Sauries: *Scomberesox saurus*; *Cololabis saira*; *Cololabis adocetus*; *Scomberesox saurus scombroides*
Swordfish : *Xiphias gladius*
Dolphin: *Coryphaena hippurus*; *Coryphaena equiselis*
Oceanic sharks: *Hexanchus griseus*; *Cetorhinus maximus*; Family *Alopiidae*; *Rhincodon typus*; Family *Carcharhinidae*; Family *Sphyrnidae*; Family *Isurida*
Cetaceans: Family *Physeteridae*; Family *Balaenopteridae*; Family *Balaenidae*; Family *Eschrichtiidae*; Family *Monodontidae*; Family *Ziphiidae*; Family *Delphinidae*

The Convention established the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (hereafter, "WCPFC"). The headquarters and secretariat for the WCPFC are based in Pohnpei, Federated States of Micronesia, and the WCPFC is charged with, among other functions, adopting conservation and management measures for the fish stocks and other resources covered by the Convention. The members of the WCPFC, which include all the Parties to the Convention, are then responsible for implementing those measures within their realms of jurisdiction.

Typically, when the WCPFC makes decisions, for example, elaborating on particular Convention provisions or adopting conservation and management measures for particular stocks, NMFS, on behalf of the Secretary of Commerce, follows up with regulatory action needed to implement

Straddling Fish Stocks and Highly Migratory Fish Stocks. These two agreements can be found at http://www.intfish.net/treaties/index1.htm

[4] In implementing the Convention, the regulatory definition of HMS may differ slightly from the definition used in Annex I, due to taxonomic changes that have occurred since the UN Law of the Sea was adopted.

those decisions and make them applicable under U.S. law to areas, persons, and/or vessels under the jurisdiction of the United States. In some cases, determining how to implement a WCPFC decision will also involve the Regional Fishery Management Councils established by the Magnuson-Stevens Fishery Conservation and Management Act (MSA; 16 U.S.C. 1801, et seq.).[5]

It is important to note that all the U.S. fisheries affected by this proposed action, as well as those anticipated to be affected by future regulatory actions under the WCPFCIA, are already actively managed under a variety of domestic fishery-related statutes and their respective implementing regulations. These include the MSA, the High Seas Fishing Compliance Act of 1995 (HSFCA; 16 U.S.C. 5501, et seq.), and in the case of the purse seine fishery, the South Pacific Tuna Act of 1988 (SPTA; 16 U.S.C. 973-973r). The management regime currently in place for the affected fisheries (i.e., the bundle of fisheries regulations established under the various legal authorities just cited) is described in Section 3.3.

The Convention provisions to be implemented in this action and the associated rule fit into one of two categories: provisions that allow NMFS discretion in methods and means to implement them, and provisions that do not afford such discretion. NMFS proposes to implement the provisions in both categories together in a single rule. However, the proposed action considered in this EA includes within its scope only those in the former category; that is, those for which real alternatives can be considered.[6] For reasons of clarity, the non-discretionary elements of the rule are described in this document (Appendix I). They are also considered in the context of examining the cumulative impacts of the proposed action: in Section 4.2.13, where the impacts of the proposed action and alternatives are considered together with those of the non-discretionary elements of the rule as well as other past, present, and reasonably foreseeable future actions.

1.2 Purpose and Need for Action

The purpose of this action is for NMFS to develop and promulgate domestic fishery regulations that implement the provisions of the Convention. More specifically, it is for NMFS to implement the provisions of the Convention that are ready for implementation, in accordance with its responsibilities and authority under the WCPFCIA.

The need for the action is to fulfill the United States' obligations under the Convention in order to achieve the Convention objective, as described above.[7]

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[5] The WCPFCIA (Sec. 505) provides that "In cases where the Secretary [of Commerce] has discretion in the implementation of one or more measures adopted by the Commission that would govern fisheries under the authority of a Regional Fishery Management Council, the Secretary may, to the extent practicable within the implementation schedule of the WCPFC Convention and any recommendations and decisions adopted by the Commission, promulgate such regulations in accordance with the procedures established by the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1801 et seq.)."

[6] See: State of South Dakota v. Andrus, 614 F.2d 1190 (8th Cir. 1980), cert. denied, 449 U.S. 822 (1980) and Department of Transportation v. Public Citizen, 541 U.S. 752 (2004).

[7] Because the Convention objective is in part to achieve the objectives of the UN Law of the Sea and the UN Fish Stocks Agreement, this proposed action will also contribute to the achievement of the objectives of those two international agreements.

To more fully describe the purpose and need for action, Table 2 in Chapter 2 and Appendix I together describe the Convention provisions with which the United States is now obligated to comply and that are specific enough (i.e., not requiring further action by the WCPFC) to be implemented at this time. Table 2 identifies provisions that require action by NMFS and allow the exercise of some discretion in their implementation. Appendix I is included for clarity and describes provisions that do not allow the exercise of discretion.

1.3 The Environmental Review Process

This EA has been prepared pursuant to the provisions of the National Environmental Policy Act (NEPA; 42 U.S.C. 4321, et seq.) and related environmental regulations, 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).

On October 19, 2005, NMFS published a notice in the Federal Register to conduct two public meetings regarding the Convention (70 Fed. Reg. 60795). The purposes of the meetings were to seek specific input for the U.S. delegation to the December 2005 session of the WCPFC, and to provide information about and seek public input on potential regulatory and other actions to be taken by NMFS to implement the Convention should the United States ratify the Convention and enact implementing legislation. NMFS also sought public input on potential environmental analyses it might perform when implementing the provisions of the Convention. The first meeting was held in San Diego on November 1, 2005; the second meeting was held in Honolulu on November 15, 2005. NMFS did not receive specific comments regarding environmental analyses.

NMFS published a Notice of Intent (NOI) to prepare the EA in the Federal Register on February 26, 2007 (NOI; 72 Fed. Reg. 8352). The Notice of Intent outlined the proposed action to be considered in this EA and requested written comments on the scope of issues to be included in the EA.

The U.S. Fish and Wildlife Service (USFWS) submitted a comment letter requesting that NMFS consult with USFWS regarding any measures that would authorize actions in the waters of National Wildlife Refuges (NWRs). USFWS recommended that the EA "identify all cases where proposed actions would affect NWRs within the Convention Area and incorporate into the assessment all relevant information on the outcome of any consultations with [USFWS] on such proposed actions." Section 3.1.3 of the EA describes the NWRs that could be affected by activities in the Convention Area and Section 4.2.6 describes the potential effects of the proposed action and alternatives on NWRs.

The EA was issued in draft form – in conjunction with the proposed rule – for public comment for a period of 30 days. Two comment letters, neither of which addressed the EA, were received during the comment period. In addition, one late-filed comment letter raised matters pertaining to the EA. These have been addressed in the preamble to the final rule.

CHAPTER 2

ALTERNATIVES INCLUDING PROPOSED FEDERAL ACTION

2 Description of the Proposed Action and Alternatives

As stated in Chapter 1, the proposed action includes only the elements of the rule that allow NMFS some exercise of discretion in their implementation. In order to specify the meaning of the term "proposed action" as used throughout this document, NMFS begins this chapter with a section defining the proposed action. The sections that follow discuss the various options for implementing the provisions of the proposed action. The chapter concludes with setting forth the alternatives studied in detail in this EA.[8]

2.1 Defining the Proposed Action

The proposed action consists of several elements, each of which responds to a specific provision of the Convention. There are four provisions included as part of the proposed action (Table 2).

[8] In general, the term "proposed action" in NEPA documents refers to a specific action alternative. NMFS has defined the proposed action as indicated in Section 2.1 and included the discussion in Sections 2.2 through 2.5 to enable the reader to understand the development of the alternatives studied here. This chapter, in conjuction with Chapter 5, contains the information specified at 40 CFR 1502.14 for comparing alternatives.

Table 2 Provisions of the Convention ready for implementation and allowing the exercise of agency discretion

Convention Provision (paraphrased from the Convention language, as each would be applied to the United States as a Contracting Party to the Convention)	Convention Article No.
1. Authorization-to-fish: Do not allow U.S.-flagged vessels to be used for commercial fishing for HMS on the high seas in the Convention Area without authorization from the appropriate authorities (NMFS), and provide such authorization only where the United States is able to exercise its responsibilities under UN Law of the Sea, the UN Fish Stocks Agreement, and the Convention.	24.2
2. Vessel information: For each U.S.-flagged vessel that has been authorized by the United States to be used for commercial fishing for HMS in the Convention Area beyond the area of U.S. jurisdiction, obtain and update the vessel record information listed in Annex IV to the Convention.	24.4 24.5 24.6
3. Vessel monitoring system: As part of a WCPFC-operated vessel monitoring system (VMS), require that the owners and operators of U.S.-flagged vessels that are used for commercial fishing for HMS on the high seas in the Convention Area carry and use VMS units in accordance with the specifications and procedures established by the WCPFC.[9]	24.8
4. Boarding and inspection: Require that owners and operators of U.S.-flagged fishing vessels, when on the high seas in the Convention Area, accept boarding and inspection by duly authorized inspectors in accordance with procedures established by the WCPFC.[10]	26.3

Sections 2.2 through 2.5 discuss these four Convention provisions in more detail and identify a number of “options” for implementing each one. Then, in Section 2.6, the options are put together in various practical combinations to form alternative actions. Each alternative action would fulfill the requirements of all four Convention provisions. The impacts of each of the alternatives are then assessed in Chapter 4. Chapter 5 summarizes the differences between the alternatives and sets forths NMFS rationale for designating Alternative D as the preferred alternative at this time. Unless otherwise stated, each of the alternatives would be implemented by regulations issued by NMFS under the authority of the WCPFCIA.

[9] These specifications and procedures were adopted by the WCPFC in Conservation and Management Measure 2007-02, adopted in December 2007, and at the WCPFC’s Fifth Regular Session, in December 2008 (this and other decisions of the WCPFC can be found at http://www.wcpfc.int).

[10] The WCPFC established its Boarding and Inspection Procedures in 2006 (WCPFC Conservation and Management Measure 2006-08; see http://www.wcpfc.int).

2.2 Options for Authorization-to-Fish

The Convention requires that the United States not allow U.S. vessels to be used for commercial fishing for HMS beyond areas of national jurisdiction (i.e., in international waters, or the “high seas”) in the Convention Area without authorization by the appropriate U.S. authority (i.e., NMFS). The agency has no discretion as to whether or not such an authorization should be required. There is, however, discretion in the scope of the authorization, as well as its form.

The Convention’s and WCPFCIA’s definitions of “fishing vessel” include a vessel that receives fish from another vessel (i.e., one that receives a transshipment, referred to hereafter as a “carrier vessel”), as well as vessels that support HMS fishing operations, such as bunker (fuel) and other supply vessels. All such “fishing vessels” are subject to the authorization-to-fish Convention provisions, so they will be subject to the United States’ authorization-to-fish requirement.

The options considered for the authorization-to-fish provision are characterized as follows:

2.2.1 HSFCA Permit

U.S.-flagged vessels used for fishing on the high seas for commercial purposes are currently required to possess a permit issued under the HSFCA’s implementing regulations (50 CFR 300.13), termed here a “HSFCA permit.” Under this option, vessels used for commercial fishing for HMS on the high seas in the Convention Area would simply continue to be required to obtain such permits. That is, no action would be taken to require any additional authorization-to-fish for HMS on the high seas in the Convention Area or to modify the existing permit requirement under the HSFCA.[11]

2.2.2 HSFCA Permit with WCPFC Area Endorsement

Under this option, owners or operators of U.S.-flagged vessels used for commercial fishing for HMS on the high seas in the Convention Area would be required to obtain from NMFS an endorsement to their HSFCA permit, termed hereafter a “WCPFC Area Endorsement.” This WCPFC Area Endorsement would specifically authorize the vessel to be used for such activity. Obtaining a HSFCA permit would be a prerequisite to obtaining a WCPFC Area Endorsement. The requirement for the WCPFC Area Endorsement would be included in regulations issued under the authority of the WCPFCIA, not the HSFCA, but the WCPFC Area Endorsement application process would be designed so that the endorsement and underlying HSFCA permit could be applied for together.

As part of the WCPFC Area Endorsement application process, applicants would be required to provide information about the vessel and intended activities that are not currently collected under the HSFCA permit application process. This information would be used to fulfill the vessel information requirements described in the second entry in Table 2 (options 2-7).

[11] Carriers, bunkers, and other vessels that support fishing operations are not currently – by policy and practice – issued HSFCA permits. The HSFCA and its implementing regulations do, however, allow for the issuance of permits to such vessels, so under this option the agency’s policies and practices with respect to issuing HSFCA permits to these vessels would have to change in order for the United States to comply fully with this Convention provision.

2.2.3 WCPFC Area Permit

Under this option, a new and distinct "WCPFC Area Permit," not associated with the HSFCA permit, would be required of all U.S. vessels used for commercial fishing for HMS in the Convention Area. The permit would be required for fishing either on the high seas or in foreign exclusive economic zones (EEZs) in the Convention Area. The period of validity of the permit would be one year.

2.3 Options for Obtaining and Updating Vessel Information

The Convention states: "Each member of the Commission shall, for the purposes of effective implementation of this Convention, maintain a record of fishing vessels entitled to fly its flag and authorized to be used for fishing in the Convention area beyond its area of national jurisdiction, and shall ensure that all such vessels are entered in that record" (Article 24.4). This record is hereafter referred to as the "U.S. Record of Fishing Vessels," and the WCPFC's collective record for all its members is referred to as the "WCPFC Record of Fishing Vessels."

For each U.S. vessel authorized to fish for HMS in the Convention Area beyond the area of U.S. jurisdiction (i.e., both on the high seas and in foreign EEZs), the United States is required to obtain and update the following information (listed in Annex IV to the Convention and modified in Conservation and Management Measure 2004-01), and submit it to the WCPFC:

(a) name of the fishing vessel, registration number, WCPFC Identification Number (WIN),[12] previous names (if known) and port of registry;
(b) name and address of the owner or owners;
(c) name and nationality of the master;
(d) previous flag (if any);
(e) International Radio Call Sign;
(f) vessel communication types and numbers (Inmarsat A, B, and C numbers, and satellite telephone number);
(g) color photograph of the vessel;
(h) where and when the vessel was built;
(i) type of vessel;
(j) normal crew complement;
(k) type of fishing method or methods;
(l) length;
(m) molded depth;
(n) beam;
(o) gross registered tonnage;
(p) power of main engine or engines;
(q) carrying capacity, including freezer type, capacity and number, and fish hold capacity; and

[12] A separate decision of the Commission regarding vessel marking, Conservation and Management Measure 2004-03, defines the WIN to be the marking required on the vessel, which is the vessel's international radio call sign, or if not assigned a call sign, the vessel's national registration number, preceded by a three letter code designed for the flag State (in the case of the United States, "USA").

(r) the form and number of the authorization granted by the flag State including any specific areas, species, and time periods for which it is valid.

For most of the subject vessels (i.e., those used for commercial fishing for HMS on the high seas in the Convention Area), specifically those authorized under the HSFCA to fish on the high seas generally, most of the required information is already collected as part of the HSFCA permit application process. However, some pieces are not collected, so supplementary data collection will be needed for HSFCA-permitted vessels. The information lacking from HSFCA permit holders is:

- nationality of the master;
- vessel communication types and numbers (Inmarsat A, B, and C numbers, and satellite telephone number);
- type of fishing method or methods;
- carrying capacity, including freezer type, capacity and number, and fish hold capacity; and
- color photograph of the vessel.

None of the required information is currently collected for vessels exclusively used for fishing in foreign EEZs in the Convention Area (i.e., vessels not required to obtain HSFCA permits).[13] Also, in the case of vessels with HSFCA permits that also fish in foreign EEZs in the Convention Area, information about the vessel's fishing authorization(s) granted by the other nation(s) would have to be collected, including:

- nation issuing the authorization;
- description of the authorization type and any unique identifiers;
- period of validity; and
- specific activities, species, and areas authorized.

The options considered for obtaining vessel record information are characterized as follows:

2.3.1 Stand-Alone Collection Requirement

Under this option, the information required for the purposes of the U.S. Record of Fishing Vessels, including both the supplementary pieces of information needed for vessels with HSFCA permits and all the information needed for vessels fishing in foreign EEZs, would be required to be submitted by vessel owners or operators under a stand-alone regulation (i.e., not as a condition of a fishing authorization) issued under the authority of the WCPFCIA. Depending on which authorization-to-fish option is implemented, the requirement would apply to vessels used for commercial fishing for HMS on the high seas in the Convention Area, in foreign EEZs in the Convention Area, or both. The requirement and the information collection form(s) would be designed so that owners/operators would be exempted from providing information that has already been provided on a HSFCA permit application and/or a WCPFC Area Endorsement application, as the case may be.

[13] As noted in Section 2.2, carriers, bunkers, and other vessels supporting HMS fishing are not routinely issued HSFCA permits, so they comprise another category of vessel for which none of the required information is currently being collected. However, as this circumstance may be addressed with a change in NMFS policy and practice, no regulatory action is needed.

2.3.2 Collection via WCPFC Area Endorsement Application

This option would be implemented in conjunction with the WCPFC Area Endorsement requirement (Section 2.2.2). The supplementary information needed for vessels with HSFCA permits would be collected via the WCPFC Area Endorsement application. This application would be designed so that it can be completed and submitted together with the HSFCA permit application. A stand-alone information requirement for vessels used to fish in foreign EEZs in the Convention Area also would be needed.

2.3.3 Collection via WCPFC Area Permit Application

Under this option, the supplementary information would be collected as part of the WCPFC Area Permit (Section 2.2.3) application process.

2.4 Options for Vessel Monitoring System

As part of the WCPFC-operated Vessel Monitoring System, the United States must require owners and operators of U.S. vessels used to commercially fish for HMS on the high seas in the Convention Area to carry and use near real-time satellite position-fixing transmitters (VMS units) in accordance with the specifications and procedures established by the WCPFC. Under all the options identified below, the position reports from the VMS units would be transmitted to NMFS at all times, and they would be transmitted to the WCPFC while the vessel is on the high seas in the Convention Area.

Although the Convention requires the operation of VMS units only on the high seas in the Convention Area, there are reasons to consider requiring their use on a broader spatial scale. For example, extending VMS coverage to a broader area would support fundamental flag State responsibilities (as articulated in the UN Fish Stocks Agreement, Articles 5(l) and 18.3(b)(IV)) to govern the conduct of vessels wherever they fish. It could also improve compliance with the Convention's basic VMS requirement in the area of primary concern, because it would reduce the ability of vessel operators to switch their VMS units off when leaving the VMS area-of-application, which would make it difficult for enforcement authorities to know when the vessel is in fact in the area of concern.

Three categories of VMS options have been identified and are described below. They are related to: what circumstances would trigger the requirement to carry a VMS unit; the spatial application of the VMS unit requirement; and the temporal application of the VMS unit requirement. Because these three factors are interrelated, not all combinations of the options from each category are practical.

2.4.1 Options for Triggering the Requirement to Operate a VMS Unit

2.4.1.1 Commercial Fishing for HMS on the High Seas in the Convention Area

Under this option the basic requirement to carry and use a VMS unit – but not when, exactly, it would have to be operated – would be triggered for a vessel if the vessel is used for commercially fishing for HMS on the high seas in the Convention Area.

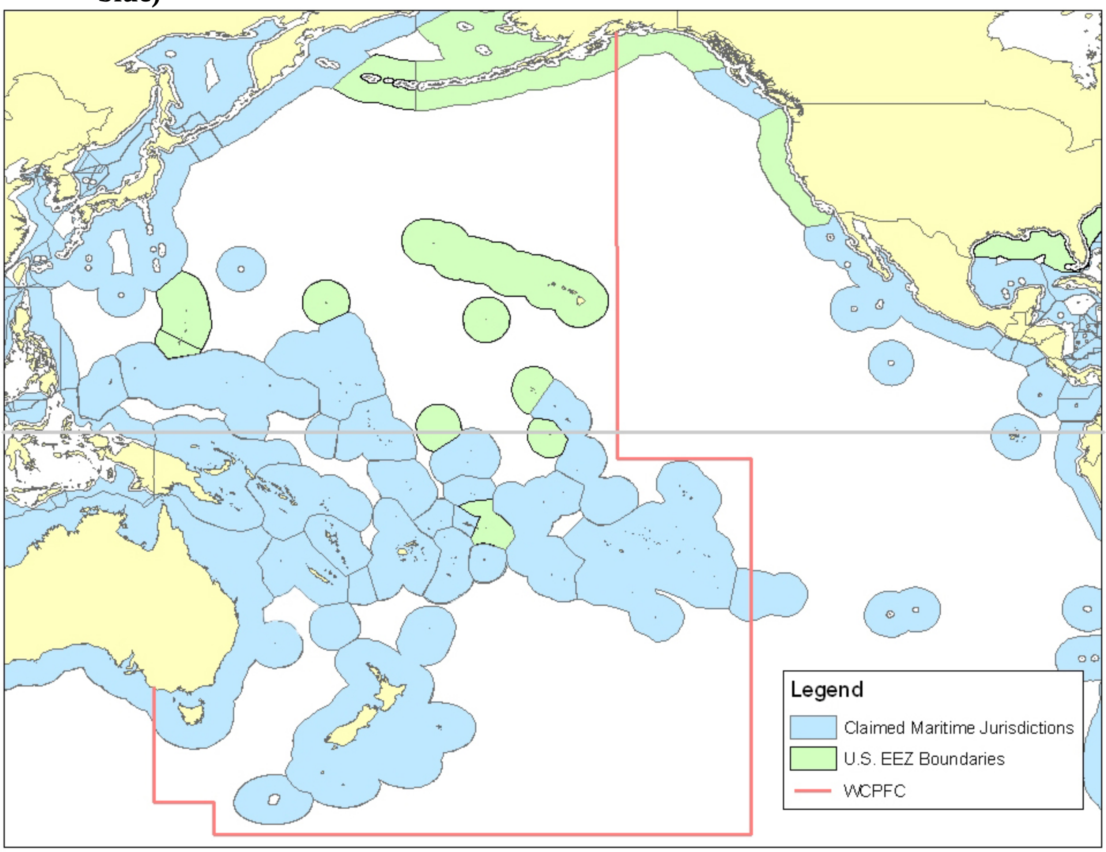
2.4.1.2 Possession of Authorization-to-fish

Under this option, holding any of the three authorizations-to-fish (Section 2.2) would trigger the requirement (but not trigger when, exactly, the VMS unit would have to be operated).

2.4.2 Options for Area-of-Application of VMS requirement

The four options identified below present a range of areas-of-application (spatial requirements) for the VMS. The first two options, which are specific to the Convention Area, could be implemented independently of the authorization-to-fish mechanism (i.e., not as a condition of a permit/endorsement). The latter two options, which extend beyond the Convention Area, could be applied as conditions of a permit/endorsement that is specific to the Convention Area (i.e., either of options 2.2.2 or 2.2.3).

Figure 1 The Convention Area and areas relevant to VMS options: high seas (in white), U.S. EEZ (in green), and foreign jurisdictions ("claimed maritime jurisdictions," in blue)



The names of the options are self-explanatory, so no further explanations are provided under the following headings.

2.4.2.1 High seas – only within Convention Area

2.4.2.2 High seas and foreign EEZs – only within Convention Area

2.4.2.3 High seas – everywhere

2.4.2.4 High seas and foreign EEZs – everywhere

2.4.3 Options for Temporal Application of VMS Requirement

The options in this category specify the time period during which the VMS unit would have to be operated. For example, the general requirement might be triggered by commercially fishing for HMS on the high seas in the Convention Area (option 2.4.1.1), but there would remain the question of whether the VMS unit would have to remain operational after the vessel leaves that area, and even whether the VMS unit would have to be carried and used on subsequent trips that do not include that area. The three options described below represent a range from the least restrictive to the most restrictive.

2.4.3.1 VMS unit required to be operational while in the area-of-application

This option would require the VMS unit to be turned on only while the vessel is in the area of application – it could be turned off once the vessel leaves the area of application.

2.4.3.2 VMS unit required to be operational while at sea

If the requirement is not triggered by an authorization-to-fish (option 2.4.1.1), this option would require the VMS unit to be turned on during the entirety of any trip (while at sea or port-to-port) that includes the area-of-application. If obtaining an authorization-to-fish triggers the requirement (option 2.2), this option would require the VMS unit to be turned on during the entirety of all trips, regardless of destination. In both cases, the vessel owner or operator would be required to notify NMFS upon turning off and turning on the VMS unit.

2.4.3.3 VMS unit required to be operational at all times

This option would only be applied as a condition of an authorization-to-fish (i.e., once the requirement is triggered by a vessel obtaining a permit/endorsement, the VMS unit would have to be turned on at all times, regardless of whether it enters the Convention Area or is even at sea). This option would allow for the VMS unit to be turned off in certain circumstances (e.g., while in a shipyard or at port for an extended period), but the owner or operator would be required to notify NMFS in such instances.

2.5 Options for Boarding and Inspection

In accordance with key provisions of the UN Fish Stocks Agreement, Article 26 of the Convention establishes the basic framework for a high seas boarding and inspection regime, the purpose of which is to ensure compliance with the WCPFC's conservation and management measures. Article 26 calls for the WCPFC to establish procedures for boarding and inspection of fishing vessels on the high seas in the Convention Area. The WCPFC's Boarding and Inspection Procedures established by the WCPFC in 2006, provide for duly authorized inspectors of any Contracting Party to the Convention to board and inspect the fishing vessels of any Member of the WCPFC on the high seas in the Convention Area.[14] The Procedures describe the rights and obligations of both the Contracting Parties whose vessels will undertake such boarding and inspection and the Members whose fishing vessels operate on the high seas in the Convention Area.

Among the obligations of Contracting Parties that intend to conduct boarding and inspection are: (1) notifying the WCPFC of the inspection vessels, and the authorities of its inspectors, that it has authorized to conduct boarding and inspection; and (2) ensuring that its inspection vessels and inspectors follow such procedures as being clearly marked and identifiable as being on government service, flying the WCPFC inspection flag, making best efforts to establish contact with the fishing vessel prior to boarding, identifying themselves, conducting the inspection in a specified manner, and preparing boarding and inspection reports that are shared with the operator of the inspected fishing vessels, the authorities of the fishing vessels' flag states, and the WCPFC.

The obligations of Members include ensuring that the operators of their fishing vessels accept boarding by duly authorized inspectors and cooperate with them in their inspection.

With respect to what types of fishing vessels may be boarded and inspected, the Procedures state that each Contracting Party may carry out boarding and inspection on the high seas in the Convention Area of "fishing vessels engaged in or reported to have engaged in a fishery regulated pursuant to the Convention." In other words, only fishing vessels engaged in, or reported to have engaged in, fishing for HMS in the Convention Area may be boarded and inspected. Although the scope of application of the Procedures is clear, expressing this scope in the context of a regulation applicable to U.S. fishing vessels is not straightforward. On the one hand, the Procedures are clearly aimed at fishing vessels engaged in fishing for HMS. On the other hand, inspectors might in some cases not be able to definitively determine whether a fishing vessel is engaged in fishing for HMS without actually boarding the vessel. It is also complicated by the fact that boarding and inspection can legitimately be undertaken in response to a mere report from a third party that the subject vessel was engaged in fishing for HMS. Because of these circumstances, it might be prudent to apply the requirement to all US fishing vessels on the high seas in the Convention Area, not just those used to fish for HMS. This would make vessel operators not fishing for HMS aware of the WCPFC Boarding and Inspection Procedures and be prepared for boarding. NMFS has identified two options for imposing this requirement on U.S.-flagged fishing vessels – one that would be limited to fishing vessels used to fish for HMS and one that would apply more broadly to all fishing vessels. In both cases, the requirement would apply only while the vessel is on the high seas in the Convention Area.

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[14] All the Members of the WPCFC are Contracting Parties to the Convention with the exception of Chinese Taipei (Taiwan). Taiwan is a "Fishing Entity" that has agreed to be bound by the regime established by the Convention. As such, Taiwan will, like the Contracting Parties, have the authority to board and inspect vessels in accordance with the WCPFC's Boarding and Inspection Procedures, but it will only be able to board and inspect fishing vessels flagged to Contracting Parties that have agreed to have the Procedures apply between themselves and Taiwan. The United States has not yet determined whether it will notify the WCPFC of its agreement to that effect. Only upon such notification would Taiwan's authorized inspectors have the authority to board and inspect U.S. fishing vessels on the high seas in the Convention Area.

2.5.1 HMS Fishing Vessels

Under this option, any vessel that is used for fishing for HMS would, when on the high seas in the Convention Area, be required to accept and facilitate boarding and inspection by duly authorized inspectors of other Contracting Parties to the Convention.

2.5.2 All Fishing Vessels

Under this option, any vessel that is used for fishing would, when on the high seas in the Convention Area, be required to accept and facilitate boarding and inspection by duly authorized inspectors of other Contracting Parties to the Convention.

2.6 Alternatives

As part of the environmental review process required by NEPA, an agency must evaluate all reasonable and feasible alternatives for a proposal, including the no-action alternative.[15] The reasonable alternatives considered in detail should be analyzed in enough depth for reviewers to evaluate their comparative merits.[16] An alternative must accomplish the purpose of the proposal to be considered reasonable.[17] The objectives must not be defined so narrowly that all alternatives are effectively foreclosed, nor should they be defined so broadly that an "infinite number" of alternatives might further the objectives and the project would "collapse under the weight" of the resulting analysis.[18] A reasonable range of alternatives need not include all possible alternatives as long as examples from a full spectrum of alternatives are covered.[19]

The proposed action here comprises four main provisions (as shown in Table 2), each with several options for implementation. In the case of the VMS element, the options also include sub-options. In some instances, options for one element would be incompatible with options for another element. In order to represent a reasonable and feasible range of alternatives for consideration, NMFS has created four combinations of the options to form four action alternatives that would fulfill the purpose of and need for the proposed action. These four alternatives, in addition to the no-action alternative, represent the range of alternatives considered in this EA. The alternatives have been crafted with two objectives in mind. First, they capture a wide range of possible combinations in terms of their degree of restrictiveness, so as to facilitate analysis of a wide range of possible environmental consequences as well as a range of burdens on fishermen and effectiveness in terms of fishery management objectives. Second, the alternatives have been crafted to identify combinations that make good practical sense. That is, they comprise options that would be expected to work effectively together.

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[15] 42 U.S.C. 4332(2)(c)iii; NAO 216-6 5.03b.

[16] 40 CFR 1502.14.

[17] Citizens Against Burlington v. Busey, 938 F.2d 190, 195 (D.C. Cir. 1990).

[18] Id. at 196. See also Forty Most Asked Questions Concerning CEQ's NEPA Regulations, 46 Fed. Reg. 18026 (1981), (Forty Questions), Question 1.

[19] See Forty Questions, Question 1.

Table 3 lists all the options and indicates the combinations of options that make up the four action alternatives (B-E). Generally, the alternatives become more restrictive as they progress from B to E. Table 3 is followed by descriptions of each of the five alternatives, starting with the no-action alternative.

Table 3 Summary of options and action alternatives

Options	Action Alternatives			
	B	**C**	**D**	**E**
Authorization-to-fish:				
2.2.1 HSFCA permit	√	√		
2.2.2 HSFCA permit with WCPFC Area Endorsement			√	
2.2.3 WCPFC Area Permit				√
Vessel information:				
2.3.1 Stand-alone collection requirement	√	√	√	
2.3.2 Collection via WCPFC Area Endorsement application			√	
2.3.3 Collection via WCPFC Area Permit application				√
Vessel monitoring system:				
2.4.1 Trigger mechanism:				
2.4.1.1 Comm. fishing for HMS on high seas in Con. Area	√	√		
2.4.1.2 Possession of authorization-to-fish			√	√
2.4.2 Area of application:				
2.4.2.1 High seas – only within Convention Area	√	√		
2.4.2.2 High seas and foreign EEZs – only within Con. Area				
2.4.2.3 High seas – everywhere				
2.4.2.4 High seas and foreign EEZs – everywhere				
2.4.3 Temporal application:				
2.4.3.1 Operational while in area of application	√			
2.4.3.2 Operational while at sea		√	√	
2.4.3.3 Operational at all times				√
Boarding and inspection:				
2.5.1 HMS fishing vessels	√	√		
2.5.2 All fishing vessels			√	√

2.6.1 Alternative A (no-action)

Alternative A, the no-action alternative, 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 four action 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.[20]

Under Alternative A the four elements of the proposed action would be as follows:

[20] 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 Convention, 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 even where an agency is under a legislative command to act (40 CFR 1502.14(d)).

- Authorization-to-fish: Vessels would continue to be authorized to fish on the high seas by the HSFCA permit, so the authorization would not be specific to the Convention Area. It would, however, fulfill the Convention's authorization-to-fish requirement.
- Vessel information: The additional vessel information required for the U.S. Record of Fishing Vessels would not be collected from HSFCA-permitted vessels. None of the required information would be collected from U.S. vessels operating only in foreign EEZs in the Convention Area.
- VMS: VMS units would continue to be required for some of the relevant vessels under authority of the MSA and the SPTA, but not for all U.S. vessels used to commercially fish for HMS on the high seas in the Convention Area, and no VMS data from any vessels would be provided to the WCPFC.
- Boarding and inspection: Vessels would not be required to accept boarding and inspection by the authorized inspectors of other Contracting Parties to the Convention (but such inspectors would, nonetheless, have the authority under international law to conduct boarding and inspection on the high seas in the Convention Area of U.S. vessels engaged in, or reported to have engaged in, fishing for HMS).

2.6.2 Alternative B

The options that comprise Alternative B are:

- Authorization-to-fish: The existing HSFCA permit requirement would continue to serve as the only authorization, so it would not be specific to the Convention Area (Section 2.2.1).
- Vessel information: There would be a stand-alone information collection requirement applied to vessels used to commercially fish for HMS on the high seas or in foreign EEZs within the Convention Area (Section 2.3.1).
- VMS: A vessel used to commercially fish for HMS would be required to carry and operate a VMS unit if, and only when, it is on the high seas in the Convention Area (Section 2.4).
- Boarding and inspection: A vessel used for fishing for HMS would, while on the high seas in the Convention Area, be required to accept and facilitate boarding and inspection by duly authorized inspectors of other Contracting Parties to the Convention (Section 2.5).

2.6.3 Alternative C

The options that comprise Alternative C are:

- Authorization-to-fish: As in Alternatives A and B, the existing HSFCA permit requirement would continue to serve as the only authorization, so it would not be specific to the Convention Area (Section 2.2.1).
- Vessel information: As in Alternative B, there would be a stand-alone information collection requirement that applies to vessels used to commercially fish for HMS on the high seas or in foreign EEZs within the Convention Area (Section 2.3.1).
- VMS: A vessel used to commercially fish for HMS would be required to carry and operate a VMS unit during the entirety of any trip that includes the high seas in the Convention Area (Section 2.4.1.1, 2.4.2.1 and 2.4.3.3).
- Boarding and inspection: A vessel used for fishing for HMS would, while on the high seas in the Convention Area, be required to accept and facilitate boarding and inspection by duly authorized inspectors of other Contracting Parties to the Convention (Section 2.5.1).

2.6.4 Alternative D (preferred)

The options that comprise Alternative D are:

- Authorization-to-fish: Vessels used for commercial fishing for HMS on the high seas in the Convention Area would be required to obtain an endorsement on their HSFCA permit, a “WCPFC Area Endorsement” (Section 2.2.2).
- Vessel information: The supplementary information needed for HSFCA-permitted vessels would be collected via the application for the WCPFC Area Endorsement (Section 2.3.2) and the information needed for vessels fishing in foreign EEZs in the Convention Area would be collected via a stand-alone information collection requirement (Section 2.3.1).
- VMS: Any vessel with a WCPFC Area Endorsement would be required to carry and operate a VMS unit while at sea, and NMFS would have to be notified each time the unit is turned off (at port) and each time it is turned back on (before leaving port) (Section 2.4.1.2 and Section 2.4.3.2). The area-of-application options would not be relevant.
- Boarding and inspection: A vessel used for fishing would, while on the high seas in the Convention Area, be required to accept and facilitate boarding and inspection by duly authorized inspectors of other Contracting Parties to the Convention (Section 2.5.2).

2.6.5 Alternative E

The options that comprise Alternative E are:

- Authorization-to-fish: Vessels used for commercial fishing for HMS anywhere in the Convention Area (not just the high seas) would be required to obtain a new authorization, a “WCPFC Area Permit” (Section 2.2.3).
- Vessel information: All the needed vessel information would be collected via the WCPFC Area Permit application (Section 2.3.3).
- VMS: Any vessel with a WCPFC Area Permit would be required to carry and operate a VMS unit at all times, except for certain circumstances while not at sea and only if NMFS is notified each time the VMS unit is turned on or off (Section 2.4.1.2 and Section 2.4.2.3). The area-of-application options would not be relevant.
- Boarding and inspection: A vessel used for fishing would, while on the high seas in the Convention Area, be required to accept and facilitate boarding and inspection by duly authorized inspectors of other Contracting Parties to the Convention (Section 2.5.2).

CHAPTER 3
AFFECTED ENVIRONMENT

3 Affected Environment

This chapter describes the existing environment and resources potentially affected by the proposed action and alternatives described in Chapter 2. The chapter begins with a description of the physical environment, followed by detailed information regarding the biological resources in the area and concludes with a detailed description of each of the fisheries operating in the area.

Sections of this chapter build upon the information presented in the 2001 Western Pacific Pelagics Final Environmental Impact Statement (FEIS) (NMFS 2001), 2004 Western Pacific Pelagics Supplemental Environmental Impact Statement (WPRFMC 2004), 2005 Western Pacific Seabird – Squid FEIS (NMFS 2005), 2004 South Pacific Albacore Troll EA (NMFS 2004), 2004 EA for the Third Extension of the South Pacific Tuna Treaty (NMFS 2004a) and the 2003 West Coast HMS Environmental Impact Statement (Pacific Fisheries Management Council (PFMC) 2003).

3.1 Physical Environment

The physical reach of the Convention, or the Convention Area, comprises all waters of the Pacific Ocean bounded to the south and to the east by the following line (Figure 1): 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.

Various tables throughout the document refer to the WCPFC Statistical Area rather than the Convention Area. The Convention Area is essentially encompassed by the WCPFC Statistical Area; the WCPFC Statistical Area is defined on the west side, unlike the Convention Area. The entire WCPFC Statistical Area is defined as follows: 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; and from the north coast of Australia due north along the 129° meridian of east longitude to its intersection with the 8° parallel of south latitude, thence due west along the 8° parallel of south latitude to the Indonesian archipelago; and from the Indonesian archipelago due east along the 2°30′ parallel of north latitude to the Malaysian peninsula.

3.1.1 Oceanography

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 et al. 2003). These naturally occurring cycles can either mitigate or accentuate the impact of fishing mortality on target species. El Niño Southern Oscillation (ENSO)[21] 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), also impact the recruitment and fishing vulnerability of HMS. Below is a description of the specific physical environment in which the WCPO fisheries occur and how physical features of the pelagic environment, as well as the distribution of HMS, influence the fisheries.

3.1.1.1 The physical environment of the WCPO

In addition to water, ocean currents transport plankton, fish, heat, momentum, salts, oxygen, and carbon dioxide. Wind is the primary force that drives ocean surface currents; however, Earth's rotation and the wind determine the direction of current flow. Figure 2 illustrates the two main subtropical gyres (the North Pacific subtropical gyre in the northern hemisphere and the South Pacific subtropical gyre in the southern hemisphere) and the other major Pacific Ocean currents.

Subtropical gyres rotate clockwise in the northern hemisphere and counter clockwise in the southern hemisphere in response to trade and westerly wind forces. Due to this, the central Pacific Ocean (~20° N-20° S) experiences weak mean currents flowing from east to west, while the northern and southern portions of the Pacific Ocean experience a weak mean current flowing from west to east. 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, have important biological impacts.

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

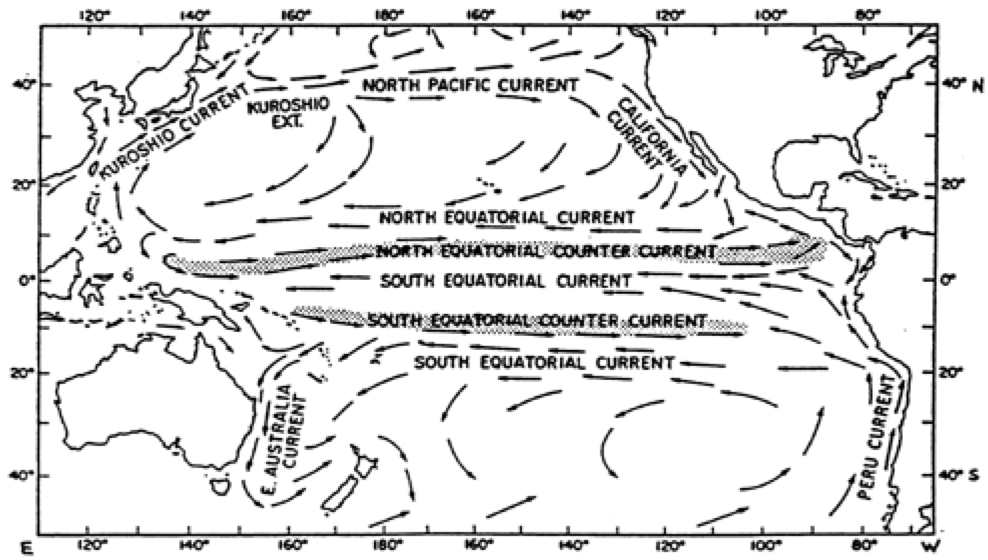
North of the Hawaiian and Marianas archipelagoes, and south of American Samoa, lie the subtropical frontal zones consisting of several convergent fronts between latitudes 25°- 40° N and S, often referred to as the Transition Zones. In general transition zones are areas of ocean water bounded to the north and south by large-scale surface currents originating from subartic and

[21] 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 2004).

subtropical locations (Polovina et al. 2001). These zones also provide important habitat for pelagic fish and thus, are targeted by fishers. A common characteristic among some of the most abundant animals found in the Transition Zones, such as flying squid, blue sharks, Pacific pomfret, and Pacific saury, is that they undergo seasonal migrations from summer feeding grounds in subarctic waters to winter spawning grounds in the subtropical waters.

The equatorial current system spans latitudes 15° N-15° S. This system consists of alternating east and west zonal flows with adjacent fronts.

Figure 2 The dominant ocean current systems in the Pacific Ocean



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

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. The oceanographic conditions in the tropical Pacific show limited seasonal variation, but they do have a strong interannual variability that affects the entire Pacific Ocean (Langley et al. 2004).

ENSO events cause 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 eastern Pacific Ocean (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 influence the abundance and distribution of organisms within marine ecosystems. During an 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 et al. 1997). The major change is a horizontal extension or contraction of the skipjack tuna habitat during El Niño and La Niña phases respectively. The deepening of the mixed layer depth that occurs with an El Niño shows an increase in pole and line and purse seine Catch per Unit of Effort (CPUE) of yellowfin tuna in the central/western regions of the Pacific with a 2-3 month delay. El Niño also shows a positive effect on bigeye tuna CPUE in these regions for the longline fleet.

A La Niña event exhibits the opposite conditions: cooler than normal sea-surface temperatures in the central and eastern tropical Pacific Ocean that impact global weather patterns. It has been hypothesized that recruitment of albacore is positively affected by a La Niña event. For the South Pacific albacore, a positive effect of La Niña on the recruitment has been proposed on the basis of the estimated recruitment by the length-based, age-structured population dynamic model MULTIFAN-CL (Hampton and Fournier 2001;Langley 2006). More species-specific studies need to be implemented to verify this hypothesis.

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 1996;Polovina, Mitchum, and Evans 1995). Changes in the frequency of ENSO events have thus been propagated in the population structure suggesting a decadal change. Some potential impacts of these changes on the tropical Pacific fisheries for tunas include the extension of present fisheries to higher latitudes, a decrease in productivity, mainly in the eastern Pacific, increasing variability in the catches, changes in the catchability of the different species, and increasing fishing pressure, particularly on bigeye and yellowfin tuna (The World Bank 2000).

3.1.1.2 Climate change

Climate change can affect the marine environment by impacting the established hydrologic cycle (a change in precipitation and evaporation rates) (Roessig 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 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 et al. 2004). Studies on plankton ecosystems, demonstrate that climate change is affecting phytoplankton, copepod herbivores, and zooplankton carnivores, which cause effects to ecosystem services, such as oxygen production, carbon sequestration, and biogeochemical cycling (Richardson et al. 2004). These studies concluded that fish, seabirds, and marine mammals will need to adapt to a changing spatial distribution of primary and secondary production within pelagic marine ecosystems (Richardson et al. 2004).

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

3.1.1.3 Key features and geographic distribution of HMS as related to the pelagic physical environment

The HMS (Table 1) in the study area are all 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. In the pelagic environment, physical conditions such as isotherm and isohaline boundaries often determine whether or not the surrounding water mass is suitable for pelagic fish.

Geographic distribution varies with seasonal changes in ocean temperature. Additionally, areas of high trophic transfer as found in fronts and eddies are important habitat for foraging, migration, and reproduction for many species (Bakun 1996). Oceanic pelagic fish, such as skipjack tuna, yellowfin tuna, and blue marlin, 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). Other fish such as albacore, bigeye tuna, striped marlin, and swordfish 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 of many pelagic species usually move to warmer waters, the preferred habitat of their larval and juvenile stages.

As discussed above, 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. Swordfish and numerous other pelagic species tend to concentrate along food-rich temperature fronts between cold, upwelled water, and warmer oceanic water masses. These fronts represent sharp boundaries in a variety of physical parameters including temperature, salinity, chlorophyll, and sea surface height (geostrophic flow) (Niller and Reynolds 1984; Roden 1980; Seki et al. 2002). Biologically, these convergent fronts appear to represent zones of enhanced trophic transfer (Bakun 1996; Olson et al. 1994). The dense cooler phytoplankton-rich water sinks below the warmer water creating a convergence of phytoplankton (Polovina et al. 2000; Roden 1980). Buoyant organisms, such as jellyfish as well as vertically swimming zooplankton, can maintain their vertical position in the weak down-welling, and aggregate in the front to graze on the down-welled phytoplankton (Bakun 1996; Olson et al. 1994). The increased level of biological productivity in these zones attracts higher trophic level predators such as swordfish and tunas.

Migration patterns of pelagic fish 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. This is particularly evident for the more tropical tuna species (e.g., yellowfin tuna, skipjack tuna, and bigeye tuna), which 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 and skipjack tuna.

These two species have extremely large population sizes. Thus, the rate of genetic drift should be slower than that observed for other tuna species (Ely et al. 2005). 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. A Pacific hemispheric stock structure for albacore is accepted (Pujolar, Roldan, and Pla 2003). The movement of the cooler-water tuna (e.g., Pacific bluefin tuna, albacore) is more predictable and defined, with tagging studies documenting regular and well-defined seasonal movement patterns relating to specific feeding and spawning grounds. The oceanic migrations of billfish are poorly understood, but the results of extensive tagging work conclude that most billfish species are capable of transoceanic movement and some seasonal regularity has been noted (Pepperell, Lowry, and Holdsworth 2003). Recent studies on swordfish indicate reasonable seasonal cyclic migration patterns (Takahashi et al. 2003).

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 swordfish and 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 (SSL) organisms thus following the diel vertical movements of these organisms. Average night-time depth was correlated with lunar illumination, a behavior which mimics movements of the SSL (Musyl et al. 2003). Surface concentrations of juvenile albacore are largely concentrated where the warm mixed layer of the ocean is shallow (above 90 meters), but adults are caught mostly in deeper water (90-275 meters). The vertical and horizontal distribution of prey species, in addition to the ambient temperature structure, also plays an important role in the feeding behavior of bluefin tuna (Kitagawa et al. 2004). Swordfish are usually caught near the ocean surface but are known to venture into deeper waters. Swordfish demonstrate an affinity for thermal oceanic frontal systems that may act to aggregate their prey (Seki et al. 2002) and enhance migration by providing an energetic gain by moving the fish along with favorable currents (Olson et al. 1994).

3.1.2 Essential Fish Habitat and Habitat Areas of Particular Concern

The Essential Fish Habitat (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 fishery management plans (FMPs) established under the MSA.[22]

[22] The FMPs being the Fishery Management Plan for Pelagic Fisheries of the Western Pacific Region, the West Coast Highly Migratory Species Fishery Management Plan, the Coral Reef Ecosystems Fishery Management Plan, the Precious Corals Fishery Management Plan, and the Crustaceans Fishery Management Plan.

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 pelagic management unit species (PMUS) in the WCPO were designated in Amendment 8 to the Pelagics FMP. The EFH for PMUS are the areas within the U.S. EEZ from the surface to a depth of 1000 meters below the surface. Eggs and larvae of the PMUS are distributed throughout the tropical epipelagic zone[23] 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).

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

Table 4 lists the EFH and HAPC for species managed under the various western Pacific FMPs.

Table 4 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: 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

3.1.3 National Wildlife Refuges 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.[24]

3.1.3.1 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.[25]

3.1.3.2 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.[26]

3.1.3.3 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.[27]

3.1.3.4 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.[28]

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[24] 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.

[25] 72 Fed. Reg. 37037, July 6, 2007.

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

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

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

3.1.3.5 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.[29]

3.1.3.6 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.[30]

3.1.3.7 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.[31]

3.1.3.8 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.[32]

3.1.3.9 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,

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

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

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

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

and invertebrates. Approximately 240 fish species have been identified in the area to date, and the refuge supports breeding sites for 19 seabird species.[33]

3.1.3.10 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.[34] 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.[35]

3.1.3.11 Papahanaumokuakea Marine National Monument

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.[36]

3.1.3.12 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 Commonwealth of the Northern Mariana Islands (CNMI); the Marianas Trench, the deepest place on Earth, approximately 940 nautical miles long and 38 nautical miles wide within the U.S. EEZ; and a series of 21 active, hyrdrothermal submarine volcanoes and thermal vents. Many scientists believe extreme conditions like these could have been the first incubators of life on Earth.[37]

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.[38]

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

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

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

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

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

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

The Rose Atoll includes about 20 acres of land and 1,600 acres of lagoon.[39]

3.2 Biological Resources

Principal Target Stocks

Table 5 summarizes the current status of the main target stocks of U.S. 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 (National Marine Fisheries Service 2009). MSA requires NMFS and the regional fishery management councils to set overfished and overfishing thresholds for individuals stocks.

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 maximum sustainable yield (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 fishing mortality threshold for at least one year. The fishing mortality threshold can be set at a single number or fraction of spawning biomass or other measure of productive capacity. 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 stock size threshold at any time. The stock size threshold should equal one-half the maximum sustainable yield 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)).

For the purpose of this study, stock assessments will be described in terms of F (fishing mortality rate) and B (biomass). B_{MSY} is the calculated long-term average biomass value expected if fishing at F_{MSY}. If F is applied constantly MSY is attained. Both B_{MSY} and F_{MSY} can be obtained from production models or age-based analyses using a stock recruitment model. Both are often used as biological reference points in fisheries management. To assess and compare current levels of biomass with those at equilibrium that would result from fishing at any given F-based reference point, it is necessary to postulate the current productivity of the stock. That is, appropriate consideration of the status of the population necessarily involves assumptions regarding current levels of recruitment. The spawning potential ratio reference point (i.e., $F_{\%}$) is essentially based on assumptions regarding current F, coupled with the per-recruit analyses.

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

Table 5 Stock status summary of HMS in the Pacific Ocean from the Report on the Status of U.S. Fisheries for 2008

Species	Stock	Overfishing?	Overfished?
Albacore (*Thunnus alalunga)*	North Pacific	Unknown	Unknown
	South Pacific	No	No
Bigeye tuna (*Thunnus obesus)*	Pacific	**Yes**	No
Skipjack tuna *(Katsuwonus pelamis)*	Western central Pacific	No	No
Yellowfin tuna (*Thunnus albacares)*	Western central Pacific	No	No
	Eastern Pacific	**Yes**	No
Swordfish *(Xiphias gladius)*	North Pacific	No	No

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

3.2.1.1 Albacore tuna (*Thunnus alalunga*)

The primary source used in this description 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 Sea Surface Temperature (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 380 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.

Trollers and longliners currently dominate the fishery. Trollers catch small albacore at the surface in cool waters outside the tropics, longliners catch larger fish at lower latitudes (Gillet and Langley 2007) (Figure 3). The U.S. North Pacific albacore troll season is distributed from 159° E to the west coast of the United States and Canada, between approximately 30° N and 50° N. The U.S. South Pacific troll fishing effort is concentrated from the Tasman Sea to approximately 110° W and between 25° S and 45° S (Figure 3).

3.2.1.1.1 Stock Status

The North Pacific Albacore Workshop in 2004 and in 2006 conducted assessments of the North Pacific albacore for the International Science Committee (ISC) (Albacore Working Group for the International Science Committee 2007; Stocker 2005). ISC is the provider of scientific advice concerning northern stocks to the WCPFC – via the WCPFC's Northern Committee. Results of the assessments indicate that due to recent good recruitment biomass has been trending upward. However, recent fishing mortality rates are high and both total and spawning biomass are projected to decline even if good recruitment persists. Current estimated fishing mortality F (0.75/yr) is in excess of most biological reference points that are commonly used as candidates for F_{MSY} proxies for fish populations.

The ISC estimated an 'exploitable' (fishable) stock biomass of 180,000 metric tons. The 2006 fishable biomass is roughly 7% above the time series average of 169,000 metric tons (1996-2005) (Albacore Working Group for the International Science Committee 2007).

Sibert et al. (2006) used integrated stock assessment models to estimate the trends in total biomass on the exploited (fished) versus unexploited (in the absence of fishing) populations. They estimated North Pacific albacore total biomass ratio to be 0.38 (total biomass is 38% of what it would be in the absence of fishing). The authors found that this approximates the level of $\tilde{B}_{MSY}$ calculated for this stock. NMFS has been unable to interpret the available assessment results in terms of the MSA thresholds and thus, as indicated in

Table 5 the status of this stock is unknown.

The South Pacific albacore stock appears to be in good condition and is experiencing moderate levels of exploitation. The most recent update to the stock assessment of the South Pacific albacore stock was presented to the Scientific Committee of the WCPFC at the Scientific Committee 2 (SC2) meeting in August 2006 (Langley and Hampton 2006). The stock assessment used a MULTIFAN-CL model and concluded that current levels of exploitation of the total biomass are low ($F_{current} / \tilde{F}_{MSY} = 0.04$ and $B_{current} / \tilde{B}_{MSY} = 1.34$). The model results continue to indicate that recent catches are less than the MSY, aggregate fishing mortality is less than $\tilde{F}_{MSY}$ and the adult biomass is greater than $\tilde{B}_{MSY}$. As indicated in

Table 5, this stock is neither overfished nor subject to overfishing.

3.2.1.2 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 than skipjack and yellowfin tunas, occupying depth strata at or below the “thermocline” at water temperatures of 15° C or lower.

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. Secretariat of the Pacific Community (SPC) has been tagging tuna on and off since the 70s. Currently they are in Phase II of a tagging program focusing on tagging tuna from more western Pacific waters, such as Papua New Guinea 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.

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 (FADs) to aggregate commercial concentrations of bigeye tuna. 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). It is well known that juvenile bigeye tuna aggregate strongly to drifting or anchored objects or to large, slow-moving marine animals, such as whale sharks and manta rays (Calkins 1980; Hampton and Bailey 1993). This phenomenon has been exploited by surface fisheries to aggregate juvenile yellowfin and bigeye tunas to anchored or drifting FADs. 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 tuna are caught on the surface by purse seine and pole and line gear, 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 (Figure 3).

3.2.1.2.1 Stock Status

The evidence appears to point to single Pacific-wide stock. The most recent stock assessment of bigeye tuna in the WCPO was presented at the WCPFC SC2 meeting held in August 2006 (Hampton, Langley, and Kleiber 2006). The current level of biomass was estimated to be 28% of unfished levels for the six-region models and 44% for the seven-region model, with impacts more severe in the equatorial region of the WCPO, particularly in the west. All analyses undertaken produced fishing mortality estimates of $F_{current} / \tilde{F}_{MSY} > 1$ and biomass estimates $B_{current} / \tilde{B}_{MSY} > 1$. In other words, using the stock status determination criteria under the MSA, overfishing is occurring but the stock is not overfished. Biomass has been sustained due to above-average recruitment since about 1990. If recruitment were to return to the average level estimated in this stock assessment, biomass decline would be rapid. Should recruitment fall to long-term average levels, current catch levels would result in stock reductions to less than $\tilde{B}_{MSY}$. Reduction of juvenile fishing mortality in the equatorial regions could have major benefits for the bigeye tuna stock.

At the WCPFC Scientific Committee 1 (SC1) meeting, Hampton and Maunder (2005) presented a comparison of Pacific-wide, WCPO, and EPO assessments of bigeye tuna. The Pacific-wide model results were slightly more optimistic for the WCPO and significantly more optimistic in terms of biomass for the EPO than the respective area specific models. The different model results, particularly in the EPO could have substantial implications for management and the authors suggested continued research to resolve the differences, where possible.

3.2.1.3 Skipjack tuna (*Katsuwonus pelamis*)

Major reviews of skipjack tuna life history and distribution used in the preparation of this description include Matsumoto, Skillman, and Dizon (1984) and Wild and Hampton (1994).

A reliable means for establishing an age-length relationship does not exist. Matsumoto et al., (1984) estimate a maximum age for skipjack tuna of 8-12 years based on the largest individual documented in the literature being in the 106.5-108.4 centimeters size class. Matsumoto, Skillman, and Dizon, (1984) provide an extensive review of growth estimates. Estimates for a one-year old are 26-41 centimeters and 54-91 centimeters for four-year olds. Matsumoto, Skillman, and Dizon, (1984) reviewing a variety of sources, argue that the minimum size for female skipjack tuna at maturity is 40 centimeters and initial spawning occurs between 40-45 centimeters. Based on growth estimates, skipjack tuna are about one year old at this size. Skipjack tuna spawn more than once in a season, but the frequency is not known. They spawn year-round in tropical waters and seasonally, spring to early fall, in sub-tropical areas. Although relatively little has been published on the fecundity of skipjack tuna, in the Pacific the reported range is between 100,000 and two million ova for fish 43-87 centimeters.

Morphological and genetic research indicates that *Katsuwonus pelamis* is one worldwide species, with no recognized subspecies. It is currently believed that the skipjack tuna of the Pacific Ocean can be separated into EPO and WCPO stocks. Skipjack tuna are found in large schools across the tropical Pacific. They prefer warm, well mixed surface waters. A maximum range is proposed as an area bounded by the 15° C or roughly between 45° N and S in the western Pacific and 30º N and S in the east. This range is more restricted in the eastern Pacific due to the basin-wide current regime, which brings cooler water close to the equator in the east. Wild and Hampton (1994) note that a variety of other oceanographic and biological features influence distribution, including thermocline structure, bottom topography, water transparency, current systems, water masses, and biological productivity. Although skipjack tuna form large schools, these are not stable and often break up at night. Tagging data indicate that school membership is not stable over time (Hilborn 1991).

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 western Pacific, the fishery is diverse, occurring in the waters of a number of island nations and 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 (Figure 3).

3.2.1.3.1 Stock Status

The most recent stock assessment for western Pacific skipjack tuna stock was presented at the WCPFC SC1 meeting held in August 2005 (Langley, Ogura, and Hampton 2005) using the MULTIFAN-CL model. The results showed that biomass trends are driven largely by recruitment, with the highest biomass estimates for the model period being those in 1998-2001 and 2004. The model results suggest that the skipjack tuna stock in the WCPO in recent years has been at an all-time high. The impact of fishing is approximated to have reduced biomass by 15%. An equilibrium yield analysis confirms that skipjack tuna is currently exploited at a modest level relative to its biological potential. The estimates of $F_{current} / \tilde{F}_{MSY} = 0.08\text{-}0.34$ and $B_{current} / \tilde{B}_{MSY} = 2.91\text{-}3.38$ suggest that the stock is neither being overfished nor in an overfished state. Recruitment variability and influences of environmental conditions will continue to be the primary determinants of stock size and fishery performance.

3.2.1.4 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 SST 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 1000 meters with water temperature of 5.8° C (Dagorn et al. 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 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. Pole and line vessels also target yellowfin tuna. Small yellowfin tuna are caught on the surface by purse seine and pole and line vessels, 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 and on the high seas and carried out by both small domestic fleets and distant water fleets from developed nations (Figure 3).

3.2.1.4.1 Stock Status

The yellowfin stock in the WCPO is not in an overfished state yet the WCPO yellowfin tuna fishery can be considered to be fully exploited, with a substantial (47%) probability that overfishing is occurring (Langley et al. 2007). The 2007 stock assessment for yellowfin tuna in the WCPO (Langley et al. 2007) confirmed the previous assessment (Hampton, Kleiber, and Langley 2006) but was slightly more positive. $F_{current} / \tilde{F}_{MSY} \geq 1$, with 47% probability and $B_{current} / \tilde{B}_{MSY} > 1$, with 94% probability.

The yellowfin tuna stock in the EPO is estimated to be near or at full exploitation, as at the beginning of 2005, the biomass of yellowfin tuna in the EPO appears to have been very close to the level corresponding to the average maximum sustainable yield (AMSY), and the recent catches have been slightly above the AMSY level (Mauder and Hoyle 2006). Uncertainty exists regarding recent and future recruitment and biomass levels.

3.2.1.5 Swordfish (*Xiphias gladius*)

The biology of swordfish is covered in some detail by prior analysis by NMFS (2005). 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 et al. (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 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 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).

3.2.1.5.1 Stock Status

Stock structure of swordfish in the Pacific is still undefined. Several studies have been unable to reject the hypothesis that there is a single, Pacific Ocean-wide stock while some evidence indicates that there may, in fact, be some delineation of separate stocks in different parts of the Pacific Ocean (Reeb, Arcangeli, and Block 2000; Ward and Elscot 2000). Recent stock analyses for the North Pacific (Kleiber and Yokawa 2002) and the eastern Pacific (Hinton 2003) concluded that swordfish are lightly exploited by fisheries. No assessment for swordfish Pacific-wide is available. Kolody, Davies, and Campbell, (2006) presented an initial assessment and future assessment plan for the southwest Pacific region at WCPFC SC2. There is considerable uncertainty in the modeling of this stock, which undermines the usefulness of the MSY-based reference points. However, in so far as these reference points have been calculated, the majority of estimates from the plausible model ensemble suggest that total biomass and spawning biomass are probably above levels that would sustain MSY and fishing mortality is probably below F_{MSY}. The apparent optimism of the MSY-related reference points is countered by projections indicating stock decline in the near future.

3.2.2 Secondary Target Stocks

3.2.2.1 Pacific Bluefin tuna *(Thunnus orientalis)*

The Pacific bluefin population is considered a single stock but with a wide range and complex migratory patterns.

The Seventh Meeting of the ISC presented the result of a MULTIFAN-CL stock assessment of Pacific bluefin (PBF) conducted on data from 1952 to 2002 (Albacore Working Group for the International Science Committee 2007). The PBF fishery has been sustained for over 50 years while taking annual catches similar to those taken in recent years. PBF biomass and spawning stock biomass (SSB) have fluctuated widely over the fifty-year history. These fluctuations have been driven mainly by recruitment changes (without trend) over this period. Biomass appears to have recovered from a record low level in the late 1980s to a more intermediate level in recent years, largely due to better than average recruitment during the 1990s (particularly the strong 1994 year-class). Despite good recruitment, however, the SSB has generally declined since 1995 and if the estimated recent fishing mortality rates continue, SSB would likely continue to decline at least over the 2003-2005 period. Recent F is greater than F_{MAX}, which has economic implications (too much fishing effort for the yield returned) and is also generally taken as an indicator of biological concern. In particular, the high F on young fish (ages 0-2) and older fish (ages 6+) may be cause for concern with respect to maintaining a sustainable fishery in future years. ISC recommended that there be no further increases in F for any of the fisheries taking PBF. Further, ISC also recommended that every effort should be made to reduce the uncertainty associated with the assessment results by undertaking improvements in the data collection, data analyses, and assessment models used in the PBF stock assessment process. A stock assessment is scheduled for spring 2008.

3.2.2.2 Blue marlin (*Makaira mazara*)

The most recent analysis of the Pacific-wide stock used a MULTIFAN-CL model to conclude that, at worst, Pacific blue marlin are close to fully exploited (e.g., biomass is at the maximum sustainable yield 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 determinations of a stable stock at or close to MSY.

3.2.2.3 Striped marlin (*Tetrapturus audax*)

The Pacific striped marlin resource appears healthy regardless of whether a single Pacific-wide stock or two separate north and southern stocks are assumed. 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 (IATTC 2005).

Results from an assessment for North Pacific striped marlin were presented by the Marlin Working Group (MARWG) to the 2007 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 $F_{20\text{-}40\%}$ 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 SSB and yield would increase over the next three years to levels above the beginning levels.

After discussion of the 2007 MARWGs' report and comments raised by plenary members, the ISC offered the following conservation advice (International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean 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.

3.2.2.4 Dolphinfish (*Coryphaena hippurus*)

Under the current FMP no management measures have been put in place specifically for this species because catch trends have not indicated a need for this. The 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.

3.2.2.5 Pacific wahoo (*Acanthocybium solanderi*)

Population levels are estimated to be high, but no information is available as to whether overfishing is occurring or not.

3.2.3 Non-Target, Associated, or Dependent Species

3.2.3.1 Marine mammals

This section identifies the marine mammals listed as endangered or threatened under the U.S. Endangered Species Act (ESA) found in the WCPO and summarizes the biology and population status of the species most likely to be affected by HMS fisheries. Interactions with fisheries are covered from a regional perspective. In addition the non-endangered and non-threatened marine mammals found in the WCPO are listed.

Marine debris or contaminants can also have direct and indirect impacts on marine mammals, although the scope and magnitude of such impacts are poorly understood. Entanglement in or ingestion of marine debris can potentially impair an animal's ability to feed, breathe, or swim. Contaminants such as petroleum can be toxic if ingested or absorbed. Marine debris or contaminants may compromise an animal's immune system or make the animal more vulnerable to predators. Future actions that increase amounts of marine debris and pollution in the fishing areas may affect survival and fecundity rates of individual whales or potentially the entire stock. Noise from anthropogenic sources and collisions with vessels are also concerns for marine mammals in the WCPO. Efforts are underway to evaluate the relative contribution of different sources of noise to the marine environment, although reports summarizing the results of recent research are not yet available.

3.2.3.1.1 Endangered or Threatened Marine Mammals found in the WCPO

Endangered or threatened marine mammals in the WCPO (Table 6) include eight cetaceans, two pinnipeds, and the dugong (*Dugong dugon*).

Table 6 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 International Union for the Conservation of Nature (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 U.S. Endangered Species Act - http://www.nmfs.noaa.gov/pr/species/esa.htm, 2008
2. Codes for IUCN http://www.iucnredlist.org/search, 2008

Although bowhead whales, right whales, and Steller sea lions are found within the region and could potentially interact with WCPO HMS fisheries, there have been no reported or observed incidental takes of these species in these fisheries; therefore these species are not discussed further in this document.

Dugongs feed on seagrass and therefore frequent coastal and island waters including shallow protected bays, mangrove channels, the lee sides of large inshore islands, and deeper water farther offshore in areas where the continental shelf is wide, shallow, and protected (Series, Forums, and Foundation 1995). Most of the world's population of dugongs is now found in northern Australian waters (Marsh and Lefebvre 1994). Interaction with HMS fisheries or overlap with the range of U.S. HMS fisheries is extremely unlikely and therefore dugongs are not discussed further in this document.

The Hawaiian monk seal is a tropical seal endemic to the Hawaiian Islands. Monk seals are non-migratory, but recent studies show that their home ranges may be extensive (Forney et al. 2000). Monk seals are a benthic feeding coastal species that are protected by a number of U.S. domestic measures including the establishment of the Papahanaumokuakea Marine National Monument on June 15, 2006. The monument's current uses are limited primarily to management activities by jurisdictional agencies, research, and education. Although a small-scale commercial bottomfish and pelagic troll fishery does operate within the monument, no HMS fisheries are active within the monument, making the potential for interactions with monk seals very limited.

The listed (endangered or threatened) marine mammals most likely to be affected by HMS fisheries 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*). Sections 3.2.3.1.1.1 through 3.2.3.1.1.5 summarize the biology, population status, and fishery interactions of these five species.

3.2.3.1.1.1 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 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.

There are no reports of fisheries-related mortality or serious injury in any of the blue whale populations (Richardson et al. 1995). There are no records of ship strikes for blue whales in the western North Pacific but mortalities caused by ship strikes have likely occurred without being reported. The number of blue whales struck and killed by ships is unknown because the whales do not always strand, or because examinations of blue whales that have stranded did not identify traumas that could have been caused by ship collisions. Blue whales do not appear to be greatly disturbed by noise. In the presence of approaching vessels and the noise from vessel traffic, some feeding blue whales are observed to react more slowly and with less obvious avoidance measures. When vessels approach erratically or change speeds suddenly blue whales’ reactions are more evident (Baillie and Groombridge 1996).

3.2.3.1.1.2 Fin Whale (*Balaenoptera physalus*)

Fin whales are found throughout all oceans and seas of the world from tropical to polar latitudes (Forney 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 Jr. 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 et al. 2000). Pauly 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% confidence interval (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.

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.

3.2.3.1.1.3 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 (Balcomb K. III 1987; Vang 2002). Recent studies on South Pacific humpback whales confirm migratory links between breeding grounds and feeding areas (Olavarria 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 et al. 2007).

There is no precise estimate of the Pacific humpback whale population. The central North Pacific 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 Jr. et al. 2001). Mizroch 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 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 on 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.

Jensen and Silber (2003) compiled records of bycatch in Japanese and Korean commercial fisheries between 1993 and 2000. During the period 1995-1999, six humpback whales were indicated as "bycatch." In addition, two strandings were reported during this period. Furthermore, analysis of whale meat found in markets indicated that humpback whales are being sold. Researchers do not know if any strandings were caused by incidental interactions with commercial fisheries; similarly, it is not known whether the humpback whales identified in market samples were killed incidentally by commercial fisheries. It is also not known which fishery may be responsible for the bycatch. Regardless, these data indicate a minimum mortality level of 1.1/year (using bycatch data only) to 2.4/year (using bycatch, stranding, and market data) in the waters of Japan and Korea.

The overall fishery-related minimum mortality and serious injury rate for the central North Pacific stock is 3.39 humpback whales per year, based on observer data from Alaska (0.49), self reports from Alaska (0.4), stranding records from Alaska (2.25), and stranding records from Hawaii (0.25). Because it is unknown whether the stranding reports for Hawaii involve animals from the central or northern portion of the central North Pacific stock, the level of serious injury/mortality is assessed as if it came from either stock. However, the 0.25 animals per year reported via stranding reports for Hawaii are included once for the entire stock. As mentioned previously, these estimates of serious injury/mortality levels should be considered a minimum.

In 2005, NMFS received 19 reports of humpback whale entanglements in Alaska, although it is not clear whether all are unique records or some are resighted entanglements. Additionally, it is difficult to associate these interactions with a specific fishery because of insufficient information. For entanglements that do not result in immediate or discernable mortality, it is difficult to determine the extent of impact to the animal. Most entangled whales reported to the marine mammal stranding network in Alaska are not resighted. Without further information, it is unclear which types of entanglements are ultimately life-threatening. Data such as that collected by Neilson et al. (2005), however, lead to the conclusion that many humpback whales survive their entanglements. Some, it would appear, survive multiple entanglement incidents. The effects of trailing fishing gear on large whale species are largely unknown.

Although there is no official reporting system for ship strikes, numerous incidents have been documented in Alaska. Forty-eight reports from 1986 to 2005 representing confirmed, unconfirmed, and suspected ship strikes with humpback whales exist in the NMFS stranding database (http://www.fakr.noaa.gov/protectedresources/strandings.htm). This is a minimum estimate, as not all whales struck are reported, not all whales are struck by commercial fishing vessels, and not all whales struck can be identified by species or cause of mortality. The fate of struck animals is also not always determined unless the whale dies immediately upon impact or is discovered as a carcass on the bow of a ship and it can be determined that the strike was the cause of death.

Collisions between humpback whales and vessels are occurring with increasing frequency in Hawaiian waters (Lammers, Pack, and Davis 2003). Three types of collisions are documented: collisions with little/no forewarning; collisions resulting from efforts to avoid whales; and circumstantial collisions not reported but evident from trauma.

Humpback whales seem to respond to moving sound sources, such as fishing vessels, and low-flying aircraft (Anon. 1987; Atkins and Swartz 1989; Herman, Forestell, and Antinoja 1980). Their responses to noise are variable and have been correlated with the size of whale, group size, and behavior of the whales when the noises occurred (Glockner-Ferrari 1990; Jurasz and Jurasz 1979; Salden 1988). Several investigators have suggested that noise may have caused humpback whales to avoid or leave feeding or nursery areas (Glockner-Ferrari 1990; Watkins 1981), while others have suggested that humpback whales may become habituated to vessel traffic and its associated noise (Swingle et al. 1993; Wiley et al. 1995). Still other researchers suggest that humpback whales may become more vulnerable to vessel strikes once they habituate to vessel traffic (Allen 1980). Studies show that humpback whales lengthen their song cycles when exposed to the low frequency active sonar source (Miller et al. 2000), move away from mid-frequency sonar (Maybaum 1993), tend to cease vocalizations when near boats (Watkins 1986), and humpback groups containing at least one calf are more sensitive to vessel traffic than are groups without calves (Bauer, Mobley, and Herman 1993). No real comprehensive understanding of marine mammal responses to noise is available, either to predict how marine mammals respond behaviorally to intense sounds, or to long-term increases in ambient noise (Hildebrand 2004).

3.2.3.1.1.4 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 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 Ocean 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. Ship strikes may occasionally kill sei whales, as they have been shown to kill their larger relatives: blue and fin whales.

3.2.3.1.1.5 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.

The North Pacific sperm whale population is estimated at nearly 40,000 (Carretta et al. 2005). 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 endangered 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.

3.2.3.1.2 Non-listed Marine Mammals found in the WCPO

Table 7 identifies all the marine mammal species found in the WCPO, but not listed under the ESA (Donoghue, Reeves, and Stone 2003).

Table 7 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

3.2.3.1.3 Marine Mammal Fisheries Interactions

All marine mammals are protected under the Marine Mammal Protection Act of 1972 (MMPA; 16 U.S.C.1361, et seq.). 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; and
- Category III designates fisheries with a remote likelihood or no known serious injuries or mortalities.

The Hawaii-based longline fishery is classified as Category I, the pole-and-line and handline, the American Samoa longline fishery, and the albacore troll fisheries are classified as Category III, and the WCPO purse seine fishery and the California longline 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 (Secretariat of the Pacific Community 2001) due to increasing scarcity of food resources driven by overfishing (Tudela 2004).

Bait removal is typically observed to be practiced by small (non-listed) cetaceans. Eight species of dolphins have been specifically documented to be in the vicinity of longline sets in the South Pacific: bottlenose, common, Fraser's, pantropical spotted, Risso's, rough toothed, spinner, and striped dolphin, but it is uncertain whether all of these species remove bait.

3.2.3.1.3.1 Marine Mammal Interactions with the WCPO Tuna-targeted, 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. Table 8 lists the observed marine mammal interactions with the WCPO purse seine fishery; the data for the U.S. fleet are included in the following review of the WCPO purse seine fisheries' observer data for the 1980-2004 period. The condition of most mammals was not recorded although mortality rates were low. Most observed interactions with marine mammals have taken place east of 180º (Molony 2005).

Table 8 Marine mammal interactions with the WCPO purse seine fishery, by species, 1980-2004

Year	Species	Interactions	Source:
1980-04	Bottlenose dolphin	18	Secretariat of the Pacific Community observer database
	Common dolphin	24	
	Pygmy Killer whale	1	
	Short-finned Pilot whale	2	
	Spinner dolphin	4	
	Toothed whales (Blackfish)	19	
	Unidentified whale	5	
	Unidentified dolphin/porpoises	33	
	Unidentified marine mammal	581	

Source: Molony 2005

Molony (2005) reported that in the 27,644 sets observed in the WCPO between 1980 and 2004 (Table 9) observers reported a total of 687 marine mammals caught in 163 sets. The majority of the observed captures were not identified as to species.

Table 9 Marine mammal interactions with the WCPO purse seine fishery 1980-2004, from SPC observer database

Year	Observed sets	Sets with marine mammals	Sets with unidentified marine mammals	Sets with unidentified dolphins & porpoises	Sets with unidentified toothed whales	Sets with unidentified whales
1980-2004	27,644	163	132 (581 animals)	12 (33 animals)	2 (19 animals)	2 (5 animals)

Source: Molony 2005

Overall, there was a low level of interactions (0.6% of sets) between marine mammals and the WCPO purse seine fishery.

3.2.3.1.3.2 *U.S. Purse Seine Fleet Interactions with Marine Mammals*

SPC observer data for the U.S. purse seine fishery covering a 66-month period from January 1997 to June 2002 show that interactions with marine mammals occurred in 11 of the 6,058 observed sets and involved seven different vessels. None of the marine mammals was identified to species. Six of the sets involved one animal, four involved more than one animal and one was listed as “0” animals involved.[40] No indication exists from the data whether the sets were made with the knowledge that marine mammals were in the vicinity.[41] From the available data, it is believed that mortality of the animals may have occurred in four of the 11 observed instances.

[40] SPC Oceanic Fisheries Program suggests the set indicating zero animals may have been a data entry error.

[41] The means of detecting marine mammals prior to a set include visual observation where possible, and possible appearance of marine mammals on sonar during regular monitoring of the target school’s location. The degree to which marine mammals could be seen on the sonar during any one incident is unknown, particularly because all attention would presumably be paid to the location of the target school.

In 2003, among 698 observed sets, the fishery interacted with three unidentified marine mammals in a single set; the animals were released alive and unharmed (Secretariat of the Pacific Community 2005). In 2004, among 801 observed sets, the fishery interacted with two Risso's dolphins (not a listed species) in a single set; their condition/fate is unknown (SPC unpublished data). Based on the observed interaction data for the years 1997-2004, as described above, the observed interaction rate (with all marine mammals, not just listed species) was 0.17 events per 100 sets. For the period 1997-2003, for which condition data are available, the estimated rate of interactions known to have resulted in mortalities was 0.06 events per 100 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).

3.2.3.1.3.3 *Marine Mammal Interactions with WCPO 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.

Table 10 shows the U.S. Hawaii longline deep-set and shallow-set interactions in 2006, 2007, and 2008. In 2006, there were a total of 14 observed interactions by deep-set longliners; one animal was released dead and 13 were released injured. For the shallow-set component of this longline fleet there were four marine mammal interactions; one was released dead and three were released injured. In 2007, there were eight observed interactions by deep-set longliners and six interactions by shallow-set longliners; all of the animals were released injured. 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 2008a).

Table 10 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		
Risso's dolphin		2		
False Killer whale		4		
Short-finned Pilot whale		2		Deep-set
Striped dolphin	1			
Unidentified cetacean		2		
Unidentified dolphin		2		
Bottlenose dolphin		1		
Humpback whale		1		Shallow-set
Risso's dolphin	1	1		
2007				
Species	**Released dead**	**Released injured**	**Released unknown**	**Fishery method**
Unidentified cetacean		1		
False Killer whale		4		
Short-finned Pilot whale		1		Deep-set
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		
Unidentified whale		3		
Short-finned Pilot whale		3		Deep-set
False Killer whale		2		
Risso's dolphin		1		
Spotted dolphin	1			
False Killer whale		1		
Humpback whale		1		
Risso's dolphin	1	3		Shallow-set
Pygmy Sperm whale		1		
Striped dolphin		1		
Unidentified whale		1		

°The shallow-set data for 2007 covers the first three quarters only
Source: http://www.fpir.noaa.gov/OBS/obs_qrtrly_annual_rprts.html

Currently there have been no observed marine mammals caught by the American Samoa longline fleet.

3.2.3.1.3.4 *Marine Mammal Interactions with other WCPO HMS Fisheries*

There is little information indicating the extent to which listed marine mammals interact with other fisheries (e.g., pole and line and troll fisheries) in the WCPO, however, such interactions are expected to be rare and unlikely to cause serious injury or mortality.

There are no reported interactions between the albacore troll fleet and marine mammals.

3.2.3.2 Seabirds

This section identifies the seabird species of concern found in the WCPO (Table 11) and summarizes the biology and population status of the species most likely to be adversely affected by HMS fisheries, 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 South Pacific Tuna Treaty 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 11 Listing status of seabird species of concern in the WCPO

Species	Endangered Species Act[1]	The World Conservation Union[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 U.S. ESA - http://www.nmfs.noaa.gov/pr/species/esa.htm, 2008
2. Codes for IUCN http://www.iucnredlist.org/search, 2008

3.2.3.2.1 Short-tailed Albatross *(Phoebastria albatrus)*

Prior to the 1880s, the short-tailed albatross population was estimated to be in the millions, and it was considered the most common albatross species ranging along the coasts of the entire North Pacific Ocean from China, including the Japan Sea and the Okhotsk Sea (Sherburne 1993), to the west coast of North America. Overexploitation in the breeding colonies in the early 20th century, mainly by Japanese hunters, drove the species to near extinction by 1930 (Environment Canada and Parker 2003).

Short-tailed albatross breed on Torishima, Japan, and the Senkaku Islands that are claimed jointly by Japan, mainland China, and Chinese Taipei. Historical breeding grounds existed on several additional Japanese islands and islands off the coast of Chinese Taipei. In 2007, conservative efforts were underway to create a new breeding colony on the island of Ogasawara (Yamashina Institute for Ornithology 2007). The short-tailed albatross has an annual survival rate of 96% and a population growth rate of 7.8% (Hasegawa 1991). Because of the robust growth of the population at Torishima, and the fact that short-tailed albatross do not return to the colony until three or four years of age, a large number of these birds are dispersed at sea. At least 25% of the reproducing adults also remain at sea during each breeding season (Cochrane and Starfield 1999). As a consequence, the exact number of individuals in the population is unknown. The current population is estimated, via modeling based on productivity data, to be 2,052 individuals, with 1,712 birds from Torishima and 340 birds from the Senkaku Islands (BirdLife International 2006)

The primary threats to the species are destruction of breeding habitat by volcanic eruption, landslides, reduced genetic variability, limited breeding distribution, plastics ingestion, contaminants, airplane strikes, and incidental capture in longline fisheries.

3.2.3.2.2 Seabird Fisheries Interactions

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 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 fishers 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;[42] thus the impact on the sustainability of seabird populations from purse seine fisheries in the WCPO is negligible.

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 EEZ 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.

NMFS' Final EIS titled *Seabird Interaction Avoidance Methods and Pelagic Squid Fishery Management* (NMFS 2005) dealt extensively with interactions between seabirds and the Hawaii-

[42] 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).

based longline fleet over the history and geographical range of the fishery, and is included here by reference.

NMFS observer records show that Hawaii-based pelagic longline fishing operations inadvertently hook, entangle, and kill black-footed (*Phoebastria nigripes*) and laysan (*P. immutabilis*) albatrosses. On rare occasions, wedge-tailed (*Puffinus pacificus*), sooty (*P. griseus*), and fleshfooted (*P. carneipes*) shearwaters are also incidentally hooked. Seven shearwaters of various species were observed hooked by Hawaii longline vessels between 1994 and 2004. A total of five shearwaters were observed to have been caught and killed by the fishery, one fleshfooted shearwater, two sooty shearwaters, and two unidentified shearwaters (NMFS PIRO observer data).

The short-tailed albatross (*P. albatrus*) and Newell's shearwater (*Puffinus auricularis newelli*) are two seabird species listed under the ESA that are present in the area where the Hawaii longline fishery operates. No short-tailed albatross or Newell's shearwaters have been recorded caught or killed by the Hawaii-based longline fishery.

No albatross species are present in American Samoa. There are some shearwater species present, such as the wedge-tailed shearwater, that have the potential to interact with longline gear. Only one unidentified shearwater (released dead) has been observed (in 2007) as incidentally caught by the American Samoa longline fishery to date.

Troll fisheries targeting albacore have no significant bycatch. Fishers report very few interactions with protected species and the limited observer data available suggest likewise (NMFS 2000). The few seabirds caught are mostly released alive with little apparent damage (MRAG Americas 2002).

3.2.3.3 Sea turtles

There are five species of endangered or threatened sea turtles found in the WCPO (Table 12), 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 12 Listing status of sea turtles in the WCPO

Species	Endangered Species Act[1]	The World Conservation Union[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 U.S. ESA- http://www.nmfs.noaa.gov/pr/species/esa.htm, 2009
2. Codes for IUCN http://www.iucnredlist.org/search, 2009

3.2.3.3.1 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 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; Spotila et al. 2000; Wetherall 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 Papua New Guinea, Indonesia, and the Solomon Islands, there have been no systematic, consistent nesting surveys, so it is difficult to assess the status and trends of leatherback turtles at these beaches. In all areas where leatherback nesting has been documented, 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 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 (Western Pacific Fishery Management Council, NMFS and WorldFish Center 2004).

3.2.3.3.2 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 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.[43] In 2005 a total of 5,167 loggerhead nests were recorded on 252 Japanese beaches (Matsuzawa 2005).

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[43] 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, March 2005, final report to the WPRFMC).

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 et al. 2006). During the monitoring period of the project for the nesting season 62 loggerhead turtles were recorded (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 et al. 1995).

3.2.3.3.3 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 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) although 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 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 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 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.

3.2.3.3.4 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, Godnez-Dominguez, 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.

3.2.3.3.5 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 1988; 1984). 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).

3.2.3.3.6 Sea Turtle Fisheries Interactions

Several attempts to estimate the region-wide purse seine fishery's impact on sea turtles have been made. These estimates are based on less than 5% observer coverage and have very wide confidence intervals. Brogan (2002) provides a preliminary estimate of 105 sea turtle interactions per year in the WCPO purse seine fishery. It is expected that less than 20 of these interactions would result in mortality.

Molony (2005) assumed a single purse seine fishery in the WCPO using observer data held by SPC and reports a total of 104 turtles captured from 99 sets in the WCPO between 1995 and 2004, from a total of 27,644 observed sets. Most turtles (77%) were not identified to species. The condition of turtles recorded at time of capture was 72% unknown, 24% alive, and 4% dead (ten olive ridley turtles, eight hawksbill turtles, five green turtles, and one leatherback turtle).

Using this data Molony estimated turtle interactions and mortality with the purse seine fishery. The estimated mean interaction rate (catch) was 202 turtles per year with 17 mortalities. Molony noted significant differences in interaction rates relative to set type. Sets associated with logs, anchored FADs, and whales resulted in higher than expected interaction rates. In general, sets on floating objects were more likely to catch turtles than sets on unassociated schools of tuna.

Unpublished observer data from the Pacific Islands Forum Fisheries Agency (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).

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 since observer coverage is <1%.

Molony (2005) 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% confidence interval. Mortality rates for the three combined longline fisheries were 1,000 sea turtles in 2004.

Table 13 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).

Sea turtle interactions in the pole and line fishery are considered to be non-existent (MRAG Americas 2002). A review of bycatch issues for the WCPO region (MRAG Americas 2002) noted no records of sea turtles taken with albacore troll gear.

Table 13 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

3.2.3.4 Sharks

Sharks are notable in that they produce relatively small numbers of young. Sharks are either oviparous (egg laying) or viviparous (producing living young instead of eggs from within the body). Viviparity reduces the susceptibility of young to predation but the production of comparatively few, well-developed offspring also makes sharks vulnerable to overfishing. Hoenig and Gruber (1990) state that, unlike teleost fish, sharks can be characterized as having a direct relationship between stock and recruitment, owing to the reproductive strategy of low fecundity combined with few, well-formed offspring.

Across the WCPO, longline fisheries catch the most sharks. Observer data from the longline fisheries across the WCPO held by SPC includes records of 290,000 sharks of more than 40 species reported from more than 21,000 sets. Most sharks in this data set were identified to species. The dominant shark species in this dataset include blue sharks and silky sharks. Molony's (2005) longline fisheries analysis across the WCPO region produced an annual estimated catch of 696,401±907,848 sharks per year. The high number of shark species, relatively high abundance of sharks, the existence of dedicated shark longline fisheries, and the fact that sharks and shark products (e.g., fins) are part of the commercial catch of all fleets, all contribute to the level of catch and the estimation that mortalities are similar to catches.

Data from the NMFS longline observer program indicate that blue sharks comprise approximately 93% of the sharks caught on Hawaii longline vessels carrying observers. The remaining sharks fall into four families: Alopiidae, Lamnidae, Carcharhinidae, and Sphyrnidae. Within these families, only the thresher sharks, oceanic whitetip, and mako sharks constitute over 1% of the Hawaii longline shark catch. All other species are taken in extremely low numbers. In 2004 the shallow-set longline fishery based out of Hawaii reopened and required the use of wider circle hooks and fish bait (instead of J-hooks and squid bait), which resulted in a drop in shark catch rate of 36% (Gilman et al. 2006).

SPC observer data collected between 1994-2004 reported a total of 44,180 sharks captured in the purse seine industry. This dataset represented more than 20 shark species, mainly silky sharks and oceanic whitetip sharks. Total estimated catches varied between approximately 2,000 and 80,000 sharks per year.

The main threats faced by sharks are various fishing activities and habitat degradation (Stevens et al. 2005). Sections 3.2.3.4.1 through 3.2.3.4.4 identify the most common shark species and families caught by pelagic fisheries in the WCPO and describe the population status of the species.

3.2.3.4.1 Blue Shark *(Prionace glauca)*

In the Pacific, the blue shark is present in greatest abundance between 20º N and 50º N, where it shows strong fluctuations in seasonal abundance related to population shifts northward in summer and southward in winter. The blue shark is the most common longline bycatch species in most areas of the WCPO. It is relatively productive and therefore resilient to fishing pressure. The blue shark is listed as not threatened nationally or internationally (Table 14). The most recent stock assessment of blue shark in the Pacific Ocean was conducted by Kleiber et al. (2001) using a MULTIFAN-CL model. All outputs of the model indicated a decline in the blue shark population during the 1980s followed by some level of recovery during the 1990s. The decline in the 1980s coincided with the existence of an extensive small-mesh driftnet fishery in the North Pacific Ocean and recovery of the stock occurred following the banning of the driftnet fishery. On the basis of the most pessimistic estimate of stock size, MSY is estimated to be approximately twice the current take (averaged between 1994 and 1998) by all fisheries in the North Pacific Ocean. In this scenario, the fishing mortality at MSY (F_{MSY}) is approximately twice the current level of fishing mortality (average of fishing mortality from 1994 through 1998) by all fisheries in the North Pacific Ocean. Other, equally plausible estimates indicate that the stock could support an MSY up to four times current take levels and F_{MSY} up to 15 times current fishing mortality. Since 2004, Pacific Islands Fisheries Science Center/Joint Institute for Marine and Atmospheric Research (PIFSC/JIMAR) and Japanese scientists have worked to update the assessment, incorporating more recent Japanese and Hawaii longline fishery data and better estimates of Taiwanese and Korean catch and effort essential for the assessment. New assessment results based on a Bayesian surplus production model conducted by PIFSC/JIMAR were presented at the 2006 meeting of the ISC Bycatch Working Group. Future work will include systematic comparison of results using different stock assessment models, which will include updating of the MULTIFAN-CL assessment by NMFS. Molony's (2005) study based on three longline fisheries estimated an average 243,269±52,513 blue sharks captured per year between 1993-2004, concluding that the blue shark stock in the South Pacific can sustain this level of annual catch.

Table 14 Listing status of blue shark species

Species	Endangered Species Act[1]	The World Conservation Union[2]
Blue shark (*Prionace glauca*)	Not listed	Lower Risk

1. U.S. ESA - http://www.nmfs.noaa.gov/pr/species/esa.htm, 2007
2. Codes for IUCN http://www.iucn.org/themes/ssc/redlist2007/redlist2007.htm, 2007

3.2.3.4.2 *Family Alopiidae*

The Alopiidae family includes the thresher sharks. This genus has three confirmed species with worldwide distributions in tropical and subtropical seas. Molony's (2005) analysis on SPC observer data from 1990-2004 estimated annual catch and mortality rates of thresher sharks (Table 15) in the WCPO region. Stock assessments for thresher sharks are currently unavailable.

Table 15 Estimated annual catch and mortalities of Alopiidae, 1990-2004 in four fisheries across the WCPO (purse seine, tropical shallow longline, tropical deep longline, and temperate albacore longline)

Species	Catch, in numbers	Confidence Interval (CI)	Mortalities	CI	Endangered Species Act[1]	The World Conservation Union[2]
Thresher sharks (*Alopias vulpinus*)	5,228	6,265	997	3,599	Not listed	Data Deficient
Bigeye thresher sharks (*Alopias superciliosus)*	22,857	15,612	8,512	677	Not listed	Not listed

1. U.S. ESA - http://www.nmfs.noaa.gov/pr/species/esa.htm, 2007
2. Codes for IUCN http://www.iucn.org/themes/ssc/redlist2007/redlist2007.htm, 2007

Source: Molony 2005

3.2.3.4.3 Family Carcharhinidae

This is one of the largest and most important families of sharks, with many common and wide-ranging species found in all warm and temperate seas. The silky shark (*Carcharhinus falciformis)* is one of the three most abundant pelagic sharks, along with the blue (*Prionace glauca*) and oceanic whitetip sharks *(C. longimanus)* (Compagno 1984). Not surprisingly, silky and oceanic whitetip sharks (Table 16) are two of the most abundant species caught by the purse seine fishery (Molony 2005).

Bonfil (1994) estimated that 19,900 metric tons of silky sharks were caught from the zone observed by the SPC in the central and South Pacific in 1989. Stevens (1996) estimated 84,000 metric tons of silky sharks were caught in the international Pacific Ocean high-seas fisheries (purse seine, longline, and drift-net). Oshiya (2000) conducted a stock assessment of Pacific silky sharks, with an estimated Pacific Ocean-wide standing stock of 170,000 to 240,000 metric tons, from which 15,000 and 20,000 metric tons is caught annually by longline vessels.

Bonfil (1994) estimated 8,200 metric tons of oceanic whitetips were caught from the WCPO in 1989. Stevens (1996) roughly estimated 50,000 to 239,000 metric tons of oceanic whitetips were caught by the international Pacific Ocean high-seas fisheries (purse seine, longline, and drift-net) in 1994. There have been no quantitative assessments of Pacific oceanic whitetip shark populations published to date.

Table 16 Estimated annual catch and mortalities of Carcharinidae, 1990-2004 in four fisheries across the WCPO (purse seine, tropical shallow longline, tropical deep longline, and temperate albacore longline)

Species	Catch, in numbers	Confidence Interval (CI)	Mortalities	CI	Endangered Species Act[1]	The World Conservation Union[2]
Silky sharks (*Carcharhinus falciformis*)	276,792	85,100	81,728	36,457	Not listed	LR
Oceanic whitetip sharks *(C. longimanus)*	108,958	51,231	21,024	17,896	Not listed	VU
Gray reef sharks (*C. amblyrhynchos*)	30,491	18,442	9,801	8,552	Not listed	LR
Silvertip sharks (*C. albimarginatus*)	17,856	13,552	3,576	5,700	Not listed	Not listed

1. U.S. ESA - http://www.nmfs.noaa.gov/pr/species/esa.htm, 2007
2. Codes for IUCN EN=endangered, VU=vulnerable, LR=lower risk (cd=conservation dependent, nt = near threatened), DD=data deficient- http://www.iucn.org/themes/ssc/redlist2007/redlist2007.htm, 2007
Source: Molony 2005

3.2.3.4.4 Family Lamnidae

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

Table 17 Estimated annual catch and mortalities of Lamnidae, 1990-2004 in four fisheries across the WCPO (purse seine, tropical shallow longline, tropical deep longline, and temperate albacore longline)

Species	Catch, in numbers	CI	Mortalities	CI	Endangered Species Act[1]	The World Conservation Union[2]
Crocodile sharks (*Pseudocarcharius kamoharia*)	14,978	14,135	4,444	6,443	Not listed	Lower Risk/near threatened
Short-fin mako sharks *(Isurus oxyrhinchus)*	19,744	17,087	4,655	7,670	Not listed	Lower Risk/near threatened

1. U.S. ESA - http://www.nmfs.noaa.gov/pr/species/esa.htm, 2007
2. Codes for IUCN http://www.iucn.org/themes/ssc/redlist2007/redlist2007.htm, 2007
Source: Molony 2005

3.3 Description of the Fisheries

3.3.1 Overview of Convention Area HMS Fisheries

The dominant HMS fisheries in the Convention Area are tuna fisheries that target skipjack tuna (*Katsuwonus pelamis*), yellowfin tuna (*Thunnus albacares*), bigeye tuna (*Thunnus obesus*), and albacore tuna (*Thunnus alalunga*). Many distant-water nations and coastal states participate and operations vary from small-scale, subsistence, and artisanal operations in the coastal waters of Pacific states, to industrial scale purse seine, pole and line, and longline operations both in the EEZs of Pacific states and in the high seas. This section describes the fisheries from a regional perspective while a later section narrows the focus to U.S. HMS fisheries.

The objective of the Convention is to ensure the long-term conservation and sustainable use of the fish stocks covered by the Convention, in accordance with the relevant rules of international law. Where the Convention Area overlaps with an area under regulation by another fisheries management organization, such as the Inter-American Tropical Tuna Commission (IATTC), the WCPFC shall cooperate with such other organizations in order to avoid the duplication of measures with respect to species in the area that are regulated by both organizations. The IATTC acts as the regional fisheries management organization in the EPO. The WCPFC will work with the IATTC to ensure that the objective of the Convention is reached. The WCPFC shall initiate consultation with the IATTC with a view to reaching agreement on a consistent set of conservation and management measures, including measures relating to monitoring, control, and surveillance, for fish stocks that occur in the Convention Areas of both organizations.

HMS fisheries in the Convention Area are individually managed under a number of authorities. The fishing activities of tuna purse seine vessels participating in the tuna fishery of the WCPO are 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). In addition to the SPTT, two other management agreements exist in the western Pacific region. These are the 1992 Palau Arrangement for the Management of the Western Pacific Purse Seine Fishery (Palau Arrangement) and the 1994 Federated States of Micronesia Arrangement for Regional Fisheries Access (FSM Arrangement). Both of these agreements exist 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 (PNA): The United States is not a party to the Nauru Agreement although the number of licenses granted under the SPTT is included in the Palau Arrangement. [44]

The Palau Arrangement limits the number of purse seiners that can be licensed to fish in the EEZs of the eight Pacific Island Countries (PIC) parties to the Arrangement. Since the Palau Arrangement's inception in 1992, the United States has been ensured an adequate number of licenses for its flag vessels wishing to operate under the SPTT, although such allocations are not necessarily "reserved."

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[44] The PNA are a sub-regional group of countries within the FFA with the largest stake in the tuna resource, in terms of size of national EEZs and productivity of fishing grounds. The member countries are Palau, Nauru, Federated States of Micronesia, Solomon Islands, Marshall Islands, Kiribati, Tuvalu, and Papua New Guinea.

The Palau Arrangement is currently undergoing major modifications, with an initiative underway to limit fishing days, rather than the number of licenses (Joseph, Rodwell, and Dunn 2006). The Vessel Day Scheme was fully implemented in December 2007, with the existing restrictions under the Palau Arrangement remaining in place until that time (Joseph, Rodwell, and Dunn 2006).

In May 2008 the PICs signed the Third Arrangement implementing the Nauru Agreement. Through this arrangement PNA will apply conservation and management measures within their EEZs. These measures apply to catch retention, FAD closures, observer coverage, Vessel Monitoring Systems, and area closures, and are similar to the management measures to be implemented for the U.S. WCPO purse seine fishery through the rule studied in this Environmental Assessment.

The prohibitions and the licensing requirements under the regulations implementing the SPTT (50 CFR 300.38 and 50 CFR 300.32) do not apply to the albacore troll fleet or the longline fleets in the high seas areas covered by the SPTT.

Catch and effort information is compiled by the Oceanic Fisheries Program (OFP) at SPC on behalf of the WCPFC for most fisheries. The WCPFC Tuna Yearbook, produced by the OFP at SPC, provides this information and is available to the public (SPC website at: http://www.spc.int/oceanfish/Docs/Statistics/TYB.htm). Table 18 through Table 21 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. Over the past five 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 18 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 19 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 20 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 21 Number of vessels active[45] 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 improved data coming from Indonesia. In recent years Indonesia has reported around 1,000 domestic purse seine vessels, many of which had been previously counted as pole and line vessels.

3.3.2 U.S. Fisheries operating in the Convention Area

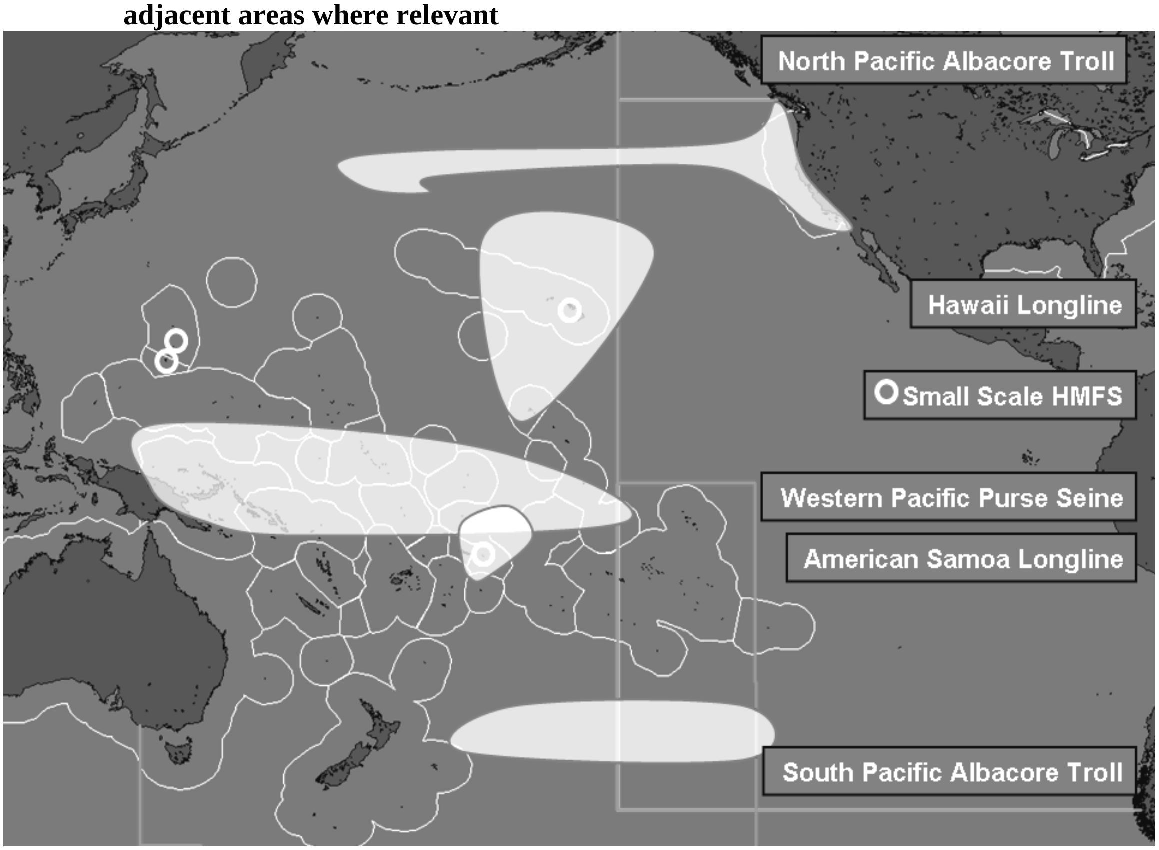
Vessels of the United States from three major sectors, purse seine, longline, and albacore troll, engage in HMS fishing on the high seas in the Convention Area. The longline sector is sub-

[45] An active vessel is any vessel that has actively fished at some point during the course of the year.

divided into four fisheries (Hawaii, American Samoa, General Western Pacific, and the West Coast longline fisheries), which are differentiated by their geographic location. Figure 3 illustrates the approximate areas of operation of relevant U.S. fleets in the Convention Area and the EPO where overlap occurs. The western Pacific purse seine fleet operates mostly in the EEZs of Pacific Island nations between 10° N and 10° S within the Convention Area. The Hawaii and American Samoa-based longline fleets operate around their respective homeports both within the U.S. EEZ and on the high seas. The albacore troll fleet operates exclusively in the high seas portions of the Convention Area. There are also small-scale fleets targeting HMS that operate exclusively within the U.S. EEZ around Hawaii, American Samoa, Guam, and CNMI.

In 2006 the western Pacific purse seine fleet included 13 vessels that landed 67,000 metric tons of tuna; the longline fleets, based in Hawaii and American Samoa, included 154 vessels that landed 11,000 metric tons; and the albacore troll fleet included eight vessels, which landed 600 metric tons. The separate sectors and fleets are discussed in more detail below.

Figure 3 Approximate areas of operation for U.S. fleets in the Convention Area and adjacent areas where relevant



Source: NMFS unpublished data

3.3.2.1 Management

U.S. HMS fisheries in the Convention Area are managed under a number of authorities that will be elaborated further in the individual fishery sections of this document. Conservation and management measures applicable to U.S. vessels operating in the Convention Area are summarized by fishery in the following tables.

Table 22 Summary of conservation and management measures applicable to U.S. vessels participating in fisheries in the Convention Area

Conservation and Management Measure	Fishery					
	Purse-Seine	Longline			Albacore Troll	
		Hawaii	American Samoa	U.S. West Coast	North Pacific	South Pacific
Permit	✓	✓	✓	✓	✓	✓
Limited entry	✓	✓	✓			
Catch/Effort reporting	✓	✓	✓	✓	✓	✓
Dealer reporting	✓	✓	✓	✓	✓	✓
Catch sampling	✓	✓	✓	✓	✓	✓
Observer program	✓	✓	✓	✓	✓*	✓*
VMS	✓	✓	✓	✓	✓*	✓*
Time/Area closures	✓	✓	✓	✓		
Vessel Size restrictions		✓	✓			

* Required by regulation when directed by the United States Government but not currently implemented.

Table 23 Summary of conservation and management measures applicable to U.S. vessels operating in small-scale HMS fisheries within the U.S. EEZ in the Convention Area

Conservation and Management Measure	Small-Scale HMS Fisheries[2]				
	Hawaii	Guam	American Samoa	CNMI	PRIA[3]
Permit	✓				✓
Catch/Effort reporting	✓				✓
Creel survey		✓	✓	✓	
Dealer reporting	✓	✓	✓	✓	
Time/Area closures	✓				

[2]Small-scale consists of troll, handline, pole-and-line, and miscellaneous gears
[3] U.S. Pacific Remote Island Areas

3.3.2.2 Previous environmental analysis

The fisheries described in this section have been studied in numerous environmental documents, prepared pursuant to the provisions of NEPA. Table 24 lists primary relevant NEPA documents for the respective fisheries. These documents are mentioned here solely for informational purposes to provide the reader with comprehensive information regarding the affected environment. This EA is limited to assessing the impacts of the proposed action, as defined in Chapter 2.

Table 24 Primary NEPA documents for U.S. fisheries operating in the Convention Area

Fishery	Document
Western Pacific Purse seine	EA-South Pacific Tuna Treaty Extension (NMFS 2004b)
Hawaii, American Samoa, Guam, and CNMI Longline	Final EIS-Pelagics Fishery Management Plan (NMFS 2001b)
	Supplemental EIS-Pelagics Fishery Management Plan (NMFS 2004c)
	Supplemental EIS-Pelagics Fishery Management Plan (NMFS 2005)
West coast Longline	EIS-FMP-West Coast Fisheries for HMS (PFMC 2003a)
Albacore Troll	EIS-FMP-West Coast Fisheries for HMS (PFMC 2003b)
	EA-South Pacific Albacore Troll Fishery (NMFS 2004a)

3.3.2.3 U.S. western Pacific purse seine fishery

3.3.2.3.1 Fleet Characteristics

Gillett et al. (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, Federated States of Micronesia, Papua New Guinea, 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 target skipjack and yellowfin tuna found in association with drifting logs/flotsam or FADs and also unassociated free-swimming schools. The relative proportion of the different set types has varied over time as 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.

3.3.2.3.2 Management

The fishing activities of U.S. tuna purse seine vessels participating in the tuna fishery of the WCPO are governed by the SPTT. Specifically, the SPTT manages access of U.S. purse seine vessels to the EEZs of Pacific Island Countries 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 HSFCA also regulates this fishery. The main fishery management measures established under the SPTA and HSFCA are summarized in Table 22 and the main regulations 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 vessel operating in the WCPO must have a FFA-issued license. The United States has been ensured an adequate number of licenses for its flag vessels wishing to operate under the SPTT. The number of available licenses is 45, five of which shall only be available to fishing vessels of the U.S. engaged in joint venture arrangements.

- 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 (Figure 3).

    2. The **Licensing Area** where only a licensed vessel may fish in this area.

    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 is limited.

- U.S. purse seine vessels are prohibited from transshipping fish at sea;

- 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 SPTT Area;

- The SPTT provides for a vessel observer program with a target coverage of 20% (in terms of trips);

- U.S. purse seine vessels are required to carry and operate VMS units;

- Vessels are required to be identified in accordance with the 1989 United Nations Food and Agriculture Organization (FAO) standard specifications for the marking and identification of fishing vessels.

As stated above two other management agreements exist in the western Pacific region: the Palau Arrangement; and the FSM Arrangement. The United States has been ensured an adequate number of licenses for its flag vessels wishing to operate under the SPTT. Table 25 identifies the number of purse seine licenses available by category and nationality, and compares the distribution of the number of licenses made available at the inception of the Palau Arrangement in April 1992[46] with the distribution in April 2002 and updated information for 2006. A shift toward an increase in the number of licenses available for the domestic/locally-based category is clearly visible.

Table 25 Purse seine licenses available under the Palau Arrangement

Category	April 1992	April 2002	2006
Multilateral Access			
U.S. SPTT	55	40	40 (+5)
Bilateral Foreign Access			116
Japan	39	35	
Chinese Taipei	44	41	
South Korea	37	27	
Philippines	11	10	
Australia	6	0	
Indonesia	3	0	
Domestic/Locally Based			
All parties	10	45	41
New Bilateral Access			
China	0	3	
European Union	0	4	
Total	205	205	202

Source: Forum Fisheries Agency 2002

Notwithstanding the modifications to the Palau Arrangement, the number of U.S. vessels currently allowed under the SPTT will likely remain unchanged in the revised Palau Arrangement.

3.3.2.3.3 Catch and Effort

3.3.2.3.3.1 Target Stocks

Vessel numbers have gradually decreased since the late 1990s, yet there has been a sharp increase in vessel numbers in recent years. The standard "licensing year" under the SPTT is 15 June of one year to 14 June of the following year. From a historical high catch of 216,000 metric tons in 1991, the catch decreased to less than 120,000 metric tons in 2002 (Gillett and Lewis 2003). Catch rates during the history of the fishery have not shown any clear trend. The greatest CPUE was recorded in 1999, at 34.1 metric tons per day (NMFS 2004b).

[46] The categories and numbers in 1992 represent those vessels licensed by PNA parties at that time.

During 1995-1996, the fishing strategy of the U.S. fleet shifted to a higher reliance on "associated" setting and the utilization of drifting FADs. This allowed the U.S. fleet to operate in the eastern area of the fishery, where natural logs were scarce. As a result, these catches contained high proportions of smaller tunas (such as skipjack and juvenile yellowfin and bigeye tuna) and bycatch species, thus eventually depressing ex-vessel value on a per-ton and per-trip basis (Itano 2003). Ex-vessel revenues are nominal values (not adjusted for inflation).

Table 26 Annual U.S. purse seine catch and effort estimates in metric tons by set type (unassociated and associated), 2003-2008 (data for 2008 is 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: Secretariat of the Pacific Community 2009a

3.3.2.3.4 Economics

Costs and revenue estimates on a per vessel basis for the U.S. purse seine fleet in 1998 based in American Samoa are summarized in Table 27 The revenue and cost numbers reflect the cannery prices[47] being offered at the time of the survey in the late 1990s. The 1998 gross revenue per vessel of $4.7 million given in that table is equal to about $5.8 million in 2006 dollars (Consumer Price Index, http://www.bls.gov/CPI/).[48] Since 2007, the number of new vessels entering the U.S. purse seine fishery has increased substantially (as of March 2008, the fleet included 26 vessels).

Table 27 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

[47] While no published cannery prices are available for fish landed in American Samoa, the global nature of the industry tends to cancel out major discrepancies between various markets (Squires et al. 2006).

[48] This document provides revenue data in terms of 2006 dollars because that is the most recent year for which data are available for the majority of the fleets studied here.

In 2007, average gross registered tonnage was 1,365 and average vessel length was 69 meters compared to the average gross registered tonnage of 1,241 and average vessel length of 73.2 meters in 2003. Fish carrying capacity, an estimate of tonnage, varies as a result of the size and species of fish loaded onto the vessel. Fish carrying capacity was estimated to be approximately 31,600 metric tons for the U.S. fleet as a whole, with an average capacity of 1,264 metric tons (Gillet and Lewis 2003). Crew size currently ranges from 18-36 people.

The increase in overall capacity of the fleet can be explained partially by the physical size increase of existing vessels. In 2006, ten U.S. purse seiners were "stretched," which involved cutting the ship aft of the deckhouse and adding hull and fish wells to increase vessel carrying capacity. These capacity increases can be significant, with some vessels increasing their hold capacity by more than 50%. Currently, vessels in the U.S. fleet can carry approximately 1,000-1,770 metric tons, depending on the mix and sizes of species in the catch.

The 26 vessels in the fleet have varying ages: 11 vessels were built during the 1970s; four during the 1980s; and 11 in the 2000s. The oldest vessels in the fleet were 37 years old (Gillet, McCoy, and Itano 2002). However, the vessels have undergone regular upgrading and outfitting to maintain their viability in the fishery.

The U.S. purse seine fleet generally operates out of Pago Pago, American Samoa. 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. To date, none of the carrier vessels have been U.S.-flagged.

Purse seine fishing effort in the WCPO is not characterized by any marked seasonal patterns. The spatial distribution of fishing effort is, however, strongly influenced by the (irregular) cycles associated with ENSO events. ENSO impacts on the U.S. purse seine fishery are still the subject of much study and are not completely understood. The relative strength of an ENSO event, coupled with other factors, such as a fleet's (other than the United States) ability to obtain fishery access to the EEZs of countries in the eastern portion of the WCPO, have an impact on the distribution of effort. Catch by purse seiners in some areas, notably the Bismarck Sea region of Papua New Guinea, do not seem to be as greatly affected by ENSO events in comparison to high seas regions that are large distances from large land masses in the WCPO.

3.3.2.4 U.S. longline fleets

Currently there are three longline fleets fishing in the Convention Area (Figure 3): the Hawaii-based, American Samoa-based, and west coast-based fleets. The Hawaii-based fleet can be divided into those vessels (the majority) that target tunas using relatively deep sets, and those that target swordfish using relatively shallow sets. Sections 3.3.2.4.1 through 3.3.2.4.4 describe the three fleets in more detail.

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.

Transshipments in the longline fishery are relatively rare, although prior to the shark finning prohibition in 2000, transshipments of shark fins in the Hawaii-based longline fishery were fairly commonplace. During 2002-2007, transshipments to U.S. vessels occurred zero to six times per year (NMFS unpublished data). These transshipments have generally had bigeye tuna as the main component. As of March 2008, nine U.S. vessels held Western Pacific Receiving Vessel Permits (permitted under the FMP).[49] All these vessels, and all the receiving vessels involved in the transshipments in recent years, have not been carrier vessels, per se, but rather longline catcher vessels that occasionally receive fish from other longline vessels. In other words, there are currently no U.S. support vessels[50] in the fishery.

One possible development in the fishery is swordfish-directed longline fishing in the South Pacific. Because the fishing grounds are distant from American Samoa, where such vessels would likely be based, fishing of this type might depend on at-sea transshipments, which could lead to the involvement of U.S. carriers and other support vessels.

3.3.2.4.1 Hawaii Longline Fishery

3.3.2.4.1.1 Fleet Characteristics

The Hawaii-based limited entry longline fishery is the largest U.S. longline fishery 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.

3.3.2.4.1.2 Management

The Western Pacific Fishery Management Council (WPFMC) developed a fishery FMP[51] for pelagic species authorized pursuant to the Magnuson Fishery Conservation and Management Act of 1976 (MFCMA).[52] This FMP regulates the U.S. domestic fisheries for tuna, swordfish, marlin,

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[49] As described in Section 3.3.2.4.1.2, a Receiving Vessel Permit is required for any U.S. vessel that receives or lands within the Western Pacific Management Area pelagic species that were caught by another vessel using longline gear.

[50] The term "support vessel" includes any carrier vessels that receive fish from fishing vessels, any bunker vessels that supply to fishing vessels, and any other vessels that supply or otherwise support the at-sea activities of harvesting vessels.

[51] The FMP for the Pelagic Fisheries of the Western Pacific Region was approved by NMFS on March 23, 1987.

[52] The MFCMA became known as the MSA after it was amended in 1996.

and other HMS in the region (the U.S. EEZ around Hawaii, American Samoa, Guam, CNMI, Wake Island, Johnston Island, Palmyra Atoll, Kingman Reef, Howland, and Baker and Jarvis Islands). The primary fishery management measures established pursuant to MFCMA are summarized in Table 22 and the primary regulations and mitigation measures, as set forth at 50 CFR Part 665, are summarized in Table 28.

Table 28 Mitigation measures required for the Hawaii longline shallow-set and deep-set fisheries

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

3.3.2.4.1.3 Catch and Effort

The recent characteristics and performance of the Hawaii-based longline fishery are summarized in Table 29. 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, as discussed further in Section 3.3.2.4.1.4, 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 (Pub. L. No. 106-557).

Table 29 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	2,644	2,815	1,205	61.3
2001	101	1,034	987	4	22.4	7,167	2,354	235	1,033	40.0
2002	100	1,163	1,163	0	27.0	7,888	4,390	309	560	45.7
2003	110	1,215	1,215	0	29.9	8,008	3,591	137	823	45.9
2004	125	1,338	1,332	6	32.0	8,380	4,324	249	707	47.7
2005	124	1,496	1,397	99	35.0	10,578	4,978	1,600	735	64.4
2006	127	1,401	1,341	60	35.3	9,762	4,424	1,167	962	57.0
2007	129	1,462	1,381	81	40.2	11,208	5,779	1,715	845	62.7
5 year average	123	1,382	1,333	49	34.5	9,587	4,619	974	814	55.5

Source: WPFMC 2008

3.3.2.4.1.4 Economics

In 2008, the U.S. Hawaii-based longline fleet consists of 121 permitted (under the FMP) vessels.[53] Out of the 121 permitted vessels, 117 also had a high seas fishing permit (permitted under the HSFCA). Vessels range from 50 feet to 80 feet in length and can carry an average of 98 metric tons. 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 was three weeks. Some of the newer vessels in the fleet are larger and have onboard ice systems, allowing for greater range than in the past.

In recent years, Hawaii's commercial pelagic fisheries have been greatly affected by a series of court decisions that led to the adoption of certain federal regulatory measures. As shown in Table 29, in 2001, the total catch and ex-vessel value decreased by about 3,747 metric tons 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. 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.

[53] Data as of March 2008.

In April 2004, NMFS reopened the swordfish-targeting segment (shallow-set) of the Hawaii longline fishery under new federal rules. About two-thirds of the 164 Hawaii longline limited entry permit holders requested shallow-set certificates for 2004.

Weak economic conditions in the United States and Japan also contributed to the decline. The recovery of Hawaii's tourist industry and increased demand for Hawaii's fresh fish in 2000 was short-lived as the U.S. economy slowed in 2001. A downturn in the economy in Japan resulted in lower prices for high grade bigeye tuna. Average prices for all species except swordfish declined in 2001. In recent years, bigeye tuna has been the most important pelagic species by both volume and value, followed by yellowfin and albacore tuna, and by swordfish since 2004. The most recent available information regarding ex-vessel value of landing in Hawaii's pelagic fisheries increased to about $44.2 million in 2004 with the reopening of the swordfish fishery and to about $63 million in 2006 (Table 29) (WPFMC 2006).

O'Malley and Pooley (2003) found in 2000 that average annual revenues for five different vessel categories (combinations of target species and vessel sizes) in the Hawaii longline fishery ranged between $497,000 and $526,000, and that on average, the top three highliners in each category each netted about $300,000 more than any vessel in the rest of the fleet.

In 2004, with the reopening of the swordfish fishery, those requesting shallow-set certificates included permit holders who had no history of participation in the swordfish portion of the Hawaii longline fishery and permit holders who do not currently own a longline vessel. The large number of requests suggests that certificates are perceived by permit holders as having substantial cash value in the "created market" for fishing effort. It is also possible that speculation in anticipation of future allocations based on swordfish catch or effort history may lead some fishermen to increase their amount of swordfish fishing activity (the phenomenon of increasing catch history in anticipation of a quota allocation is commonly referred to as "fishing for quota"). While it is uncertain at this early stage of the reopening what the impacts will be on the economic performance of the Hawaii longline fleet, the effects are likely to be positive and significant.

Hawaii's location in the central Pacific is convenient for consolidating fish shipments from other Pacific islands for shipping to the U.S. mainland. Market dynamics are facilitated by the presence of a fish auction that facilitates sales in a manner that is different from practices in most other U.S. markets. In addition, small amounts of some species are sold directly to retailers and restaurants (Bartram 1997; Pooley 1986). Hawaii's main fish auction is the United Fishing Agency auction in Honolulu, a major component of the Hawaii market. Although the Suisan Company Ltd. Fish auction located in Hilo closed in 2002, the company still receives fish directly from longliners making it also a major component of the Hawaii market.

Some vessel owners have become increasingly dependent on crew from the Philippines (Allen and Gough 2006). Vessel owners interested in hiring Filipino crew contact one of four agencies in the Philippines, typically through the agencies' Hawaii-based representatives, and pay a flat fee ranging from $700 to $1500 per crew member (Allen and Gough 2006).

The increasing dependence on Filipino crews has been accompanied by a change in the way in which crew members are paid in the Hawaii-based longline fleet. Filipino crew members are paid a monthly salary and, in some cases, a tonnage or captain's bonus depending on the catch. Salaries start at $385 per month and are arranged between the vessel owner, manning agency, and individual (Allen and Gough 2004). The average monthly salary of these foreign workers is $475. Local and Micronesian crew continue to be paid a percentage of the earnings rather than a set salary. O'Malley and Pooley (2003) noted that the type of crew remuneration used can have a marked effect on the cost of operating a longline vessel. The researchers compared the annual costs to pay crew using the share method and those that paid a fixed salary. The 2000 fleet average annual cost using the crew shares method was $152,097, and the annual cost to pay the crew a monthly salary was $44,333 (this figure does not include the agency and immigration fees associated with the hiring of foreign crew).

In 2006 the ex-vessel value for the landings (11,792.9 metric tons) of the entire Hawaii-based longline fleet was approximately $63 million, for an average ex-vessel price of $2.42 per pound and an average gross revenue per vessel of about $470,000 (based on 134 permitted vessels in 2006) (Table 29) (WPFMC 2006).

3.3.2.4.2 American Samoa Longline Fishery

3.3.2.4.2.1 Fleet Characteristics

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 much as ten miles of mainline from a hand cranked reel. Trips typically last for a single day, and the target species, albacore, is sold to the local canneries. By 2004 the number of alia had fallen dramatically and multi-day, mono-hull vessels larger than 50 feet in length now dominate the fishery.

3.3.2.4.2.2 Management

As stated above the WPFMC developed a FMP for pelagic species pursuant to the MFCMA, which regulates the U.S. domestic fisheries for tuna, swordfish, marlin, and other pelagic species in this region.

The American Samoa Longline Limited Access Program was established under Amendment 11 to the FMP for Pelagic Fisheries of the Western Pacific Region. The final regulations implementing the program were published in the Federal Register on May 24, 2005 (70 Fed. Reg. 29646). Fishers are required to have an American Samoa longline permit (American Samoa longline limited access permit) on board the vessel to use longline gear to catch pelagic fish in the EEZ around American Samoa. A 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 caught by longline gear in the EEZ around American Samoa or on the high seas. The American Samoa longline limited access permit system allows for as many as 60 vessels. Some applications for initial permits, the collective number of which will determine the total number of available permits, are under review; the ultimate limit on permit numbers may consequently increase from 60. The primary fishery management measures established pursuant to MFCMA are summarized in Table 22 and the primary regulations and mitigation measures, as set forth at 50 CFR Part 665, are summarized in Table 30.

Table 30 Mitigation measures required for the American Samoa longline fisheries

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: (1) To fish for Pacific 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)); • 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; • Land or transship Pacific PMUS that were harvested with longline gear; • The holder of a size Class C or D American Samoa longline permit and master of the vessel must carry a VMS unit on board whenever the vessel is at sea; • Carry a NMFS observer, if requested by Pacific Islands Regional Office; • Sea turtle mitigation requirements: Any owner or operator of a 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 minimum design standards. Any owner or operator of a 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 vessels 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; • Each year, both the owner and the operator of a vessel 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; • The operator of any fishing vessel must maintain on board the vessel an accurate and complete record of catch, effort, and other data; and • Any person must maintain on board the vessel an accurate and complete NMFS transshipment logbook.

3.3.2.4.2.3 Catch and Effort

Table 31 includes general information on the overall performance of the American Samoa longline fishery from 1996 to 2006.

Table 31 Performance of the American Samoa longline fishery

Year	Total Catch (metric tons)	Tuna Catch (metric tons)	Swordfish Catch (metric tons)	Shark Catch (metric tons)	No. Of Active Vessels	No. Of Trips	No. of Hooks (million)	Total Ex-Vessel Revenue ($million adjusted)
1996	NA[a]	144	NA	NA	12	NA	0.15	NA
1997	NA	363	NA	NA	21	NA	0.51	NA
1998	NA	526	NA	NA	26	NA	1.0	NA
1999	NA	457	NA	NA	29	NA	1.2	NA
2000	NA	761	NA	NA	37	NA	1.5	NA
2001	NA	3,560	NA	NA	62	NA	5.8	NA
2002	NA	6,886	NA	NA	58	NA	13.2	NA
2003	NA	4,803	NA	NA	49	NA	13.9	NA
2004	NA	3,833	NA	NA	41	NA	11.7	NA
2005	3,910	3,722	NA	NA	36	402	11.1	NA
2006	NA	5,072	21	0.089	30	331	14.3	63

Source: WPFMC 2006
[a] NA stands for Not Available.

More specific information reveals that albacore continued to dominate the catch in 2006 with a 19% increase over the previous year's catch. Catch of skipjack tuna increased 41%, yellowfin tuna decreased by 31%, and bigeye tuna increased by 20% from the previous year. Catch of billfishes increased by 74%, mahimahi increased by 36%, wahoo increased by 21%, while catch of sharks decreased by 7% relative to 2005. Albacore CPUE increased 6% in 2006. The CPUE of skipjack tuna increased by 26%, bigeye tuna increased by 8%, while yellowfin tuna decreased by 38%. The CPUE of billfish increased by 58%, while sharks decreased by 17% (Department of Marine & Wildlife Resources 2007).

3.3.2.4.2.4 Economics

This fishery differs from the Hawaii-based longline fishery 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. In March 2008, 57 vessels had permits under the limited access permit system outlined in the FMP. Out of the 57 permitted vessels, 28 also held high seas fishing permits (permitted under the HSFCA).

The fishery is based almost entirely on albacore caught for the two local canneries. 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.[54] The large vessels land their catch as frozen, gilled, and gutted product. The canneries only export to the U.S. market. Unfortunately the U.S. market is showing a slow growth rate, just above 1% in sales in the last 15 years compared to the 2.5% increase worldwide. This could be due to competition from fast food restaurants or decrease in can size (6.5 to 6.0 ounces) (United States Department of Labor 2005).

The alia fleet lands its catch as whole fresh product, with the albacore going to the canneries and other species marketed locally.

The major processing plants in American Samoa are, StarKist Samoa (a subsidiary of StarKist Seafood, owned by Del Monte, which is the largest tuna cannery in the world) producing more than 60% of American Samoa's canned tuna and Chicken of the Sea (owned completely by Thai Union Frozen Products of Bangkok, the largest canner in Asia). StarKist is the leading brand of canned tuna sold in the United States followed in third place by Chicken of the Sea (United States Department of Labor 2005). The two canneries provided direct employment for over 4,700 workers in 2004. During 2003, the tuna canneries combined exported approximately $470 million of tuna to the United States (United States Department of Labor 2005). Tuna processing supports the economy both directly and indirectly (60% of all jobs in American Samoa).

In 2006 the estimated ex-vessel value of the landings (5,390.6 metric tons) of the entire American Samoa longline fleet was $11.5 million ($0.97 per pound), making the gross revenues per vessel about $205,000, on average (fleet size in 2006 was 56 vessels) (WPFMC 2006).

3.3.2.4.3 California Longline Fishery

3.3.2.4.3.1 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. Given the distance from their home ports, however, such trips would be uncommon. The principal HMS harvested by longliners based on the west coast include tuna species (albacore, yellowfin, bigeye, skipjack, and Pacific bluefin tuna) and swordfish.

A typical longliner carries a crew of six, including the captain, although some of the smaller vessels operate with a four-person crew. Fishing trips last around three weeks. Some vessels do not have built-in refrigeration equipment, limiting their trip length. They take on ice at the docks, but this only supports relatively shorter trips (20 days). Some vessels have ice-making equipment

[54] 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.

so that they can refresh ice supplies and maintain fish quality with iced brine for long periods (up to 60 days). The fish are iced and sold as fresh.

3.3.2.4.3.2 Management

The West Coast HMS 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:

- Line clippers, dip nets, and bolt cutters meeting NMFS' specifications must be carried aboard each vessel for releasing turtles (specifications vary by vessel size);
- 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;
- 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);
- 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;
- No light stick may be possessed on board a vessel;
- When a longline is deployed, no fewer than 15 branch lines may be set between any two floats;
- 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;
- 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 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 (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; and

- Other 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.

3.3.2.4.3.3 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 32 and Table 33 provide information on the status of the fishery from 2000 to 2004.

Table 32 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 33 Vessels, landings (round metric tons), and ex-vessel revenue for swordfish in California by the pelagic longline fishery, 1981-2004

Year[55]	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	4,671,173

*1Ex-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

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

3.3.2.4.3.4 Economics

Estimates of ex-vessel revenues in the West Coast longline fishery since 2005 are confidential and may not be publicly disclosed because of the small number of vessels in the fishery (PFMC 2008). Vessel numbers are not expected to increase in the upcoming years.

In 1991 three longline vessels fished beyond the U.S. EEZ targeting swordfish and bigeye tuna and unloaded their catch and reprovisioned in California ports. In 1993 a Gulf coast fish processor set up infrastructure at Ventura Harbor, California to provide longline vessels with ice, gear, bait, fuel, and fish offloading and transportation services (Vojkovich and Barsky 1998). By 1994, 31 vessels were fishing beyond the EEZ and landing HMS into California ports. These vessels fished side by side with Hawaii-based longline vessels in the area around 135° W longitude in the months from September through January. In 1994, total west coast longline landings were more than five times those in 1993 (636 metric tons). West coast longline landings increased from 1991 through 1999, from the 1991 low of 56 metric tons to the 1999 high of 1,524 metric tons.

The group of vessels that came to California from the Gulf of Mexico in 1993 and 1994 left the California-based fishery and either returned to the Gulf of Mexico fishery, or acquired Hawaiian longline permits in order to have fishery options for the months from February to September, when fishing within range of California ports drops off substantially. Many of the vessels that had participated in the California fishery had discovered productive swordfish fishing grounds in the fall and winter that were further east than the Hawaiian fleet usually operated. As the California fleet migrated to Hawaii, these vessels continued to move east later in the year, and operated out of California ports, which was more convenient than returning to Hawaii. These vessels fished from California until about January, when the pattern of fishing moved to the west, and operating from Hawaii became more convenient. Consequently, beginning in the latter part of 1995, a number of vessels from the Hawaiian fleet began a pattern of fishing operations that moved to California in the fall and winter and then back to Hawaii in the spring and summer.

As discussed above, in 2001 a court-ordered closure was imposed on the Hawaii-based swordfish fishery. As a result, some Hawaiian longline permit holders deregistered their vessels from the permit, and proceeded to fish from California ports, as was their custom during fall and winter. California-registered vessels are allowed to land longline caught fish in California ports as long as fishing takes place outside of the EEZ. There is a developmental pelagic longline fishery authorized off Oregon, but it has produced negligible landings (PFMC 2003). In 2004 the Hawaii-based swordfish fishery reopened resulting in the relocation of the majority of the swordfish fleet back to Hawaii.

Longline-caught fish are sold to wholesale fish dealers. Local California fisheries, distant offshore fisheries, and imports from Hawaii, Chile, and Chinese Taipei all influence the ex-vessel price paid to local longliners. Fish are often graded by size and quality and the price adjusted accordingly. In California, there were 90 seafood processors in 1995 (PFMC 2003). Processors receive, process, and sell the fish wholesale. Processors receive mostly fresh, dressed swordfish. There is a greater demand for fish weighing over 45 kilograms dressed weight (approximately 60 kilogram whole weight), called marker fish, than for fish less than 45 kilogram, called pups. Processors usually cut the swordfish into loins, but there is a growing trend of cutting the swordfish into 198-to-227 gram steaks, called portion control. Pacific processors import fresh and frozen swordfish when the U.S. fisheries are closed. Most California swordfish is sold to local markets.

The overall average Pacific coast commercial HMS fish price increased from $1.50 in 2003 to $1.64 in 2004 (PFMC 2006). Due to the limited number of vessels in this fleet, recent catch numbers and ex-vessel revenue data are confidential and cannot be disclosed here, but information for the years 2003 and 2004 are provided in Table 34.

Table 34 Pelagic longline Pacific Coast commercial HMS landings, revenues, and average price, 2003-2004

Year	Landings (round metric tons)	Ex-vessel revenue ($1000)	Average price ($/round pounds)
2003	1,854	$6,148	$1.50
2004	951	$3,439	$1.64

Source: Calkins 1982 ; PFMC 2005; PFMC 2006

3.3.2.4.4 Guam and 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 CNMI. Due to the limited number of vessels in the fishery, data regarding these vessels is confidential.

3.3.2.5 Albacore troll fishery

3.3.2.5.1 Fleet Characteristics

U.S. vessels fish for albacore in the Pacific with troll gear (artificial lures with barbless hooks that are towed behind a vessel, also called jigs). The basic troll vessel gear consists of between eight and 12 lines towed up to 30 meters behind the vessel. Lateral spacing of the lines is accomplished by using outriggers or long poles extended to each side of the vessel with fairleads spreading three or more lines to each side, with the remainder attached to the stern. Terminal gear is generally chrome-headed jigs with varying colored plastic fringed skirts and a double barbless undulated hook. The gear is relatively inexpensive. Retrieval is done by hand or by powered gurdies, similar to salmon troll vessels.

Albacore troll vessels range from 16 to more than 100 feet in length. Due to the distance of the Convention Area from the U.S. west coast, the vessels operating in the Convention Area are relatively large vessels. The majority of the vessels are 50 feet or greater in length, and they take trips of 90 days or more.

The 604 vessels in the North Pacific and the eight vessels in the South Pacific reported landings in 2006 and in the 2005-2006 fishing seasons, respectively. Among those, three vessels fished north and south of the equator in the Convention Area (Figure 3). It is estimated that a maximum number of 69 vessels fished in the Convention Area in any one of the previous five years.

The majority of the fleet produces frozen albacore destined for canneries and sold as white meat tuna, but production of fresh product, including loined, steaked, and sashimi-grade product, is increasing. In the past, the majority of the fish was bought by U.S. canneries but more and more has been shipped to Europe in recent years.

Fish are frozen on board using chilled brine, blast, or plate freezing systems. The carrying capacity of troll vessels varies greatly with vessel size, ranging from 4.5 metric tons to more than 72 metric tons.

As discussed in Section 3.2.1.1, albacore are divided into two distinct stocks in the North and South Pacific. In recent years, the North Pacific albacore troll season has begun as early as mid-April in areas northwest of Midway Atoll. In July and August, fishing effort expands to the east (160° W to 130° W and 40° N to 45° N), and along the west coast of North America. Fishing areas along the west coast extend from Vancouver Island to southern California. Fishing can continue into November if weather permits and sufficient amounts of albacore remain available to troll gear (Childers and Aalbers 2006).

The South Pacific albacore troll fishery takes place during the austral summer months (November through April). Participating U.S. troll vessels depart from the U.S. west coast or Hawaii after the end of the North Pacific albacore season and travel to American Samoa or French Polynesia to prepare for the South Pacific season. South Pacific albacore fishing areas extend from the International Dateline to approximately 110° W between 25° S and 50° S. At the end of the South Pacific season they then travel to Hawaii or the U.S. west coast to prepare for the next North Pacific fishing season.

Most catches are landed at ports along the U.S. and Canadian west coast. The vessels that fish as far west as the Convention Area often bring their catch all the way back to the west coast, but they sometime land their catch at ports in the WCPO (Hawaii in the North; American Samoa or occasionally French Polynesia in the South) or transship at sea in order to extend the effective length of a fishing trip that might otherwise be limited by the vessel's carrying capacity.

According to the Western Fishboat Owners Association (WFOA) (W. Heikkila, WFOA Executive Director, oral communication, June 2008), which represents a large portion of the vessel owners in the fleet, the albacore troll fleet has not made any at-sea transshipments for several years. Transshipments at sea were conducted fairly regularly in the 1990s and early 2000s. During that period, as many as three to five trips were made annually by carrier vessels to receive transshipments from the fishing fleet, and during the peak years of 1997-1999, as much as approximately 5,000 metric tons were transshipped annually. The carriers usually landed the fish in American Samoa, but they also took the catch to Thailand, Mexico, and other destinations with canneries. In most cases the carriers were chartered by the WFOA.

For the same reasons that vessels operating far from the U.S. west coast have sometimes transshipped at sea, they have sometimes received fuel and water at sea. These services have been provided by both fish carriers and bunker vessels. The carrier and bunker vessels that have interacted with the fishing fleet have in most or all cases been foreign-flagged. Support vessels have in recent history not played a major role in U.S. HMS fisheries in the Convention Area although they wish to continue to keep this option available.

3.3.2.5.2 Management

New management regulations for all west coast-based U.S. fishing vessels that target HMS in the Pacific (such as albacore) were implemented in April, 2004 (50 CFR Part 660). Under these new regulations U.S. troll fishermen are required to obtain a permit to fish for albacore and are required to submit copies of the U.S. Pacific Albacore Logbook from each trip to NMFS within 30 days of each landing or transhipment of HMS.

As stated above, all U.S. vessels that fish on the high seas are required to have a permit issued by NMFS in accordance with the HSFCA.

Through the U.S.-Canada Albacore Treaty, U.S. vessels can fish in Canadian waters and land in certain Canadian ports. A reciprocal arrangement holds for Canadian vessels. Thus, in any given year, U.S. troll vessels may fish a portion of the year in the U.S. EEZ, a portion on the high seas, and a portion in Canada's EEZ.

3.3.2.5.3 Catch and Effort

The U.S. albacore troll fisheries annually harvest approximately 21% of the total North Pacific albacore catch and 7% of the total South Pacific albacore catch (Childers and Betcher 2007). For the U.S. fleet the majority of the North Pacific catch is taken to the east of 150° West, outside the Convention Area (Figure 4), whereas the majority of the South Pacific catch comes from within the Convention Area (Figure 5). Total catch from the 2006 U.S. North Pacific entire albacore troll fishery (estimated 604 vessels) increased 50% to 12,590 metric tons from 8,413 metric tons landed in 2005 (Childers and Betcher 2007). The annual catch of South Pacific albacore by troll gear decreased 17% from 725 metric tons in 2005 (11 vessels) to 601 metric tons in 2006 (eight vessels). Table 35 shows the total U.S. North Pacific albacore troll fishery catch and effort data from 1996-2006. The 2005 and 2006 estimates for the North Pacific troll catch within the Convention Area were 53 metric tons and three metric tons respectively. Table 36 shows the total U.S. South Pacific albacore troll fishery catch and effort data from 1996-2006. Table 37 shows the total U.S. albacore troll catch and fleet size in the WCPFC Statistical Area.

Table 35 U.S. North Pacific albacore troll fishery: numbers of vessels and catch and effort, 1996-2006

Year	**Catch (metric tons)**	**Effort**			**CPUE (fish/day)**
		Trips	Days	Vessels	
1996	16,938	1,816	32,717	640	89
1997	14,252	4,000	45,572	1,121	45
1998	14,410	2,358	21,445	755	103
1999	10,060	2,555	34,643	705	36
2000	9,645	2,306	37,331	649	39
2001	11,210	3,554	26,566	870	65
2002	10,387	2,508	25,350	641	67
2003	14,102	2,932	23,442	836	75
2004	13,432	2,413	23,979	734	87
2005	9,122	1,628	25,252	652	51
2006	12,590	1,875	21,778	604	90

Source: Childers and Aalbers 2006; Childers and Betcher 2007

Table 36 U.S. South Pacific albacore troll fishery: number of vessels and catch and effort, 1995-2006

Year	Catch (metric tons)	Effort			CPUE (fish/day)
		Trips	Days	Vessels	
1995-96*	1,964	55	4,145	53	69
1996-97	1,617	26	3,063	26	82
1997-98	1,701	38	5,384	36	51
1998-99	1,241	24	2,505	21	69
1999-2000	2,562	39	4,957	36	69
2000-01	2,128	39	6,377	33	45
2001-02	1,218	12	3,602	12	46
2002-03	1,678	14	2,286	14	101
2003-04	995	12	1,487	11	118
2004-05	725	10	1,478	8	65
2005-06	601	10	1,266	8	64

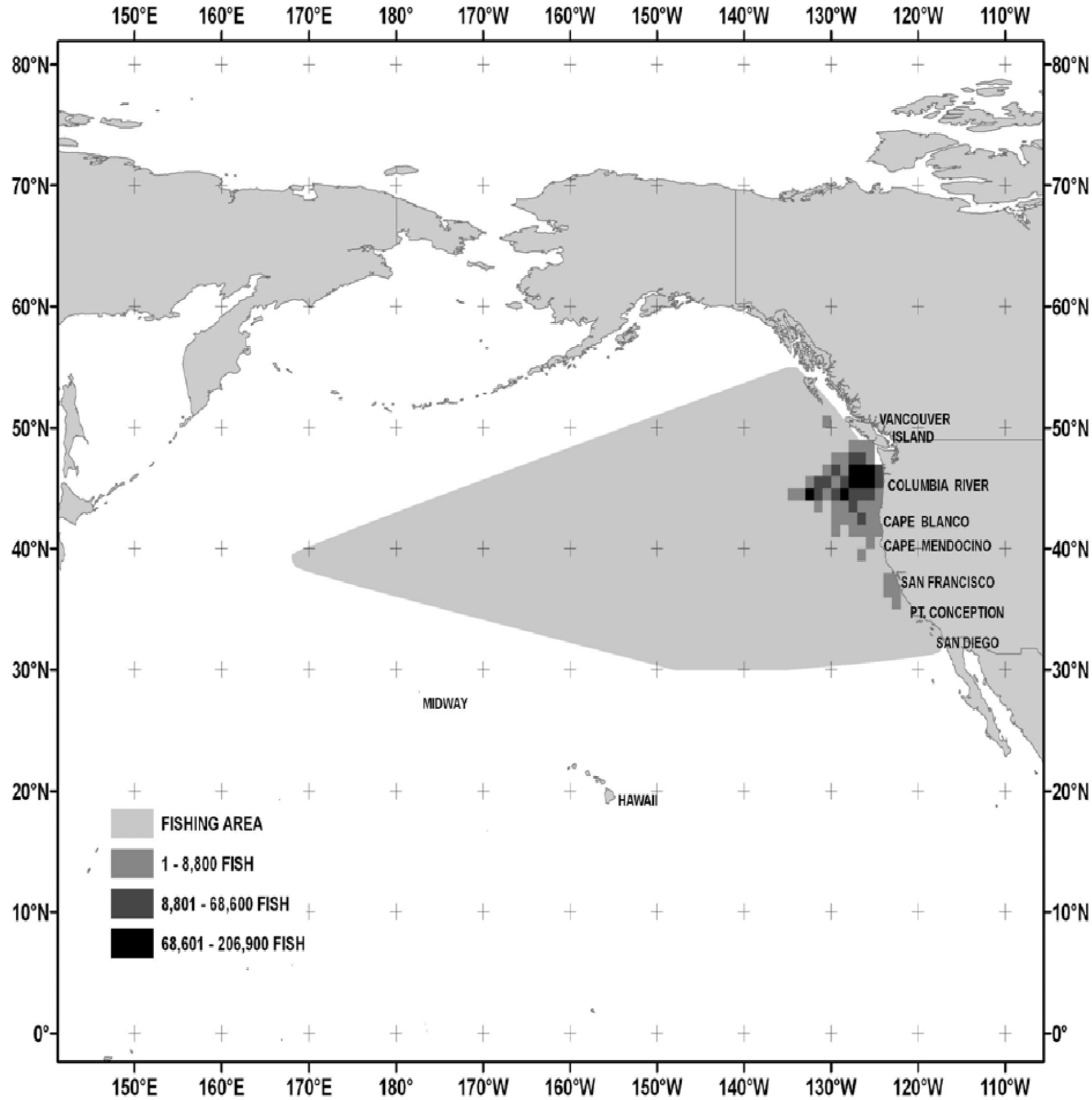
Source: Childers and Aalbers 2006; Childers and Betcher 2007. Total catches for U.S. South Pacific albacore troll fishery may include catch from November and December of the previous year.
*Total catches for seasons before 1996-97 may contain catch from non-U.S. vessels.

Table 37 U.S. North and South Pacific albacore troll fishery in the WCPFC Statistical Area, 2002-2007

	Year	Catch[2] (metric tons)	Number of vessels
North Pacific	2002	NA	78
South Pacific		NA	12[1]
Total vessels			78
North Pacific	2003	NA	69
South Pacific		NA	14[1]
Total vessels			69
North Pacific	2004	NA	28
South Pacific		NA	11[1]
Total vessels			28
North Pacific	2005	89	5[1]
South Pacific		600	8
Total vessels			8
North Pacific	2006	2	3[1]
South Pacific		586	8
Total vessels			8
North Pacific	2007	NA	6
South Pacific		218	1[1]
Total vessels			6

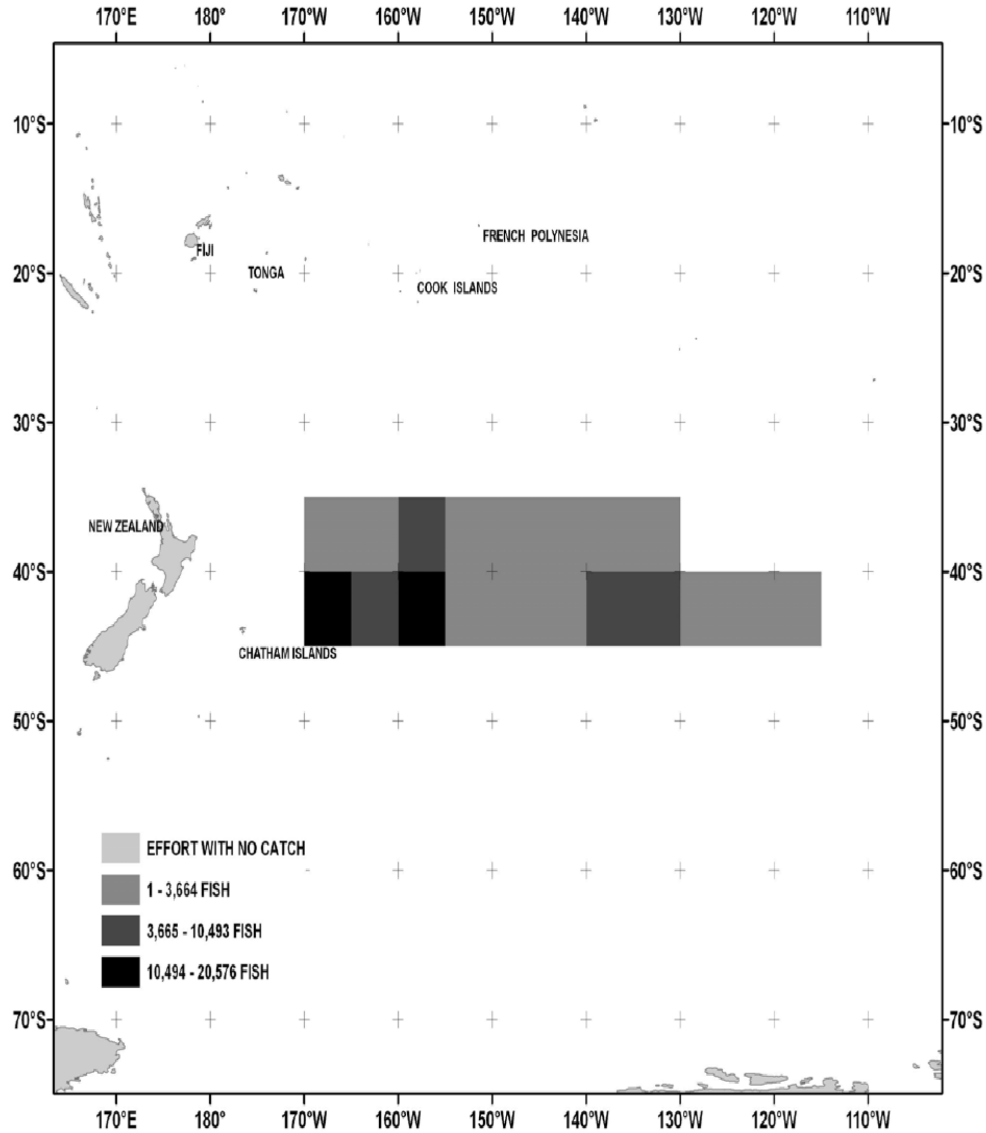
Source: NMFS 2008b
1 These vessels fished on both sides of the equator (North Pacific Ocean and South Pacific Ocean) and are counted only once in the vessel total.
2 Catch estimates are from NMFS unpublished data.
NA stands for data not available.

Figure 4 Distribution of catch of U.S. albacore troll vessels in the North Pacific Ocean, 2006



Source: Childers and Betcher 2007

Figure 5 Distribution of catch of U.S. albacore troll vessels in the South Pacific Ocean, 2004-2006



Source: Childers and Aalbers 2006; Childers and Betcher 2007

3.3.2.5.4 Economics

The North and South Pacific Ocean albacore troll fishery has shown a steady decline in fleet size since 2002. The recent decrease in the numbers of vessels fishing in the Convention Area can be attributed in part to an increase in fishing costs, particularly fuel prices.

The average price paid for albacore caught by troll vessels in the North Pacific in 2006 was $1,744 per metric tons. This is a 9% (Childers and Betcher 2007) decrease from the average price of $2,108 per ton paid in 2005. The average price paid for albacore caught by troll vessels in the South Pacific in the 2005-2006 season was $2,162 per ton, a 8% decrease from the average price of $2,342 per ton paid in the 2004-2005 season (Childers and Betcher 2007). Based on a five year average on catches, prices, and vessel numbers for the period spaning 2001 to 2006 a rough estimate of the average, annual ex-vessel gross revenue per vessel for the South Pacific albacore troll fleet for just the South Pacific season is $136,000 (Childers and Betcher 2007).[56] The vessels can be expected to have substantially greater revenue per year, as the South Pacific albacore troll season extends from November through April, and the fleet fishes in other areas for the rest of the year. It is not possible to estimate per-vessel gross revenue for the portion of the North Pacific fleet that fishes in the Convention Area, but this figure for the South Pacific fishery is presumably roughly indicative for the portion of the fleet that fishes in the Convention Area in either the North or the South.

[56] Annual numbers are calculated based on the following seasons: 2001-2002; 2002-2003; 2003-2004; 2004-2005; and 2005-2006.

CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

4 Environmental Consequences

This chapter analyzes the potential environmental impacts of each of the five alternatives presented in Chapter 2. The first section of the chapter begins with examining how each of the alternatives would affect the operation of the U.S. fishing vessels that would be directly subject to the action (i.e., the authorization-to-fish, vessel information, VMS, and boarding and inspection requirements) for each of the U.S. fisheries in the Convention Area. That section focuses on expected changes in fishing patterns, particularly the magnitude and spatial distribution of fishing effort, because any environmental impacts of the action would be largely driven by changes in these patterns. For example, the size and productivity of a target fish stock is largely a function of fishing mortality, which is largely a function of fishing effort. The information about anticipated effects on fishing patterns is then used to perform the analysis of potential environmental impacts in Section 4.2, Environmental Impacts of the Alternatives. That section is divided into subsections corresponding to different resources.

4.1 Effects of the Alternatives on the U.S. Fisheries

The following discussion assesses the effects of each of the alternatives on U.S. fishing patterns for each of the U.S. fisheries. Section 4.1.1 provides a summary of the overall effects of the action alternatives on fishing and is followed by a detailed discussion of the effects that would be caused by each of the five alternatives on the U.S. purse seine, longline, and albacore troll fisheries.

4.1.1 Summary of Effects

All of the action alternatives would impose additional requirements on vessel owners and operators. The requirements, as described in detail in Chapter 2, include: (1) obtaining fishing authorizations (and none of the alternatives would limit the number of authorizations available); (2) providing information about fishing vessels to NMFS; (3) carrying and using VMS units that would report the vessel's position to NMFS and the WCPFC; and (4) accepting boarding and inspection by authorized inspectors of other nations.

The main effect of these requirements in terms of potential environmental impacts is that they would, to varying degrees, make it more costly to fish, and thus provide a disincentive to fish, at least in the area of application of the requirement. The magnitude of the potential increases in fishing costs varies among the alternatives, but they are, for any given vessel or fishing business, expected to be quite small relative to the total costs of fishing.[57] The resulting disincentive to fish in the requirements' area of application is expected to be correspondingly small.

None of the requirements would directly control fishing practices per se, such as how much fishing effort is exerted, how much of a given resource may be caught, where fishing may take place, what type of fishing gear may be used, or how fishing gear may be deployed. None of the

[57] Chapter 3 includes information regarding the average gross revenue per vessel for the respective U.S. fisheries. These figures can be used as rough indicators of the total cost of fishing. If the expected increase in fishing costs under a given alternative is small relative to the average gross revenue per vessel, these costs would be expected to be small relative to the total cost of fishing as well.

alternatives would authorize or open up the possibility for a new fishery or expand fishing opportunities.

None of the action alternatives would be anticipated to result in an increase in fishing effort in the Convention Area, and none would be expected to result in marked changes in fishing patterns anywhere. Consequently, as concluded in Section 4.2, the environmental impacts are not expected to be significant.

4.1.2 U.S. Purse Seine Fishery

4.1.2.1 Alternative A (no action)

Under the no-action alternative, the purse seine fishery would continue to be subject to the existing management regime, thus it would have no effects relative to the baseline. Baseline conditions are described in detail in Chapter 3, but certain aspects with respect to the purse seine fishery are highlighted below.

One notable trend is that the fleet has been increasing in size for the last two years (Section 3.3.2.3). This trend would eventually be stemmed by the existing 40-license limit that is in place under the SPTT (or 45 licenses counting the five available joint-venture licenses, none of which have been issued to date), if not by other factors. It is expected that under the baseline the fleet size would reach and be maintained at 40 vessels in the near-term future, and that fishing patterns would not deviate far from the patterns of recent years (e.g., see the recent five-year averages of effort and catch in Section 3.3.2.3.3).

There is no history of U.S. carriers, bunkers, or other support vessels[58] interacting with the U.S. purse seine fleet, but under the baseline it is expected that such vessels could become active in the Convention Area in the near-term future. Given the lack of participation by such vessels in the past, it is anticipated that no more than five U.S. support vessels are likely to participate in the near-term future.

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[58] It should be noted that as in the previous chapters, each of the three main fisheries discussed here, the purse seine, longline, and albacore troll fisheries, is considered to include any carrier vessels that receive fish from fishing vessels, any bunker vessels that supply to fishing vessels, and any other vessels that supply or otherwise support the at-sea activities of harvesting vessels. These carriers, bunkers, and supply vessels are collectively referred to as “support vessels.” Consistent with the Convention and the WCPFCIA, the term “to fish” as used here includes the at-sea activities of support vessels (e.g., transshipping and bunkering), and the term “fishing vessel” as used here includes support vessels.

4.1.2.2 Alternative B

4.1.2.2.1 Authorization to Fish

No new authorization requirement would be imposed; there would be no effects relative to the baseline.

4.1.2.2.2 Vessel Information

To effect the information collection NMFS would develop and use two forms that the owners/operators of vessels in the U.S. purse seine fishery would be required to complete and submit to NMFS. The requirement would apply to any U.S. carriers, bunkers, or other support vessels that interact with the purse seine fleet.

The first reporting form would be designed for vessels used to fish on the high seas in the Convention Area. All vessels in the fishery are expected to be used in this area, so it is expected that the owners/operators of all the vessels would be required to complete this form. This would serve to collect only the pieces of information required under the Convention that are not already collected under the HSFCA (Section 2.3).

The second reporting form would be designed for vessels used to fish in the Convention Area in the EEZs of other nations. All vessels in the fishery are expected to be used in this area (except possibly any support vessels), so it is expected that the owners/operators of all the vessels would be required to complete this form. This form would be used to collect information about the fishing authorizations issued by other nations.

NMFS would compile the information from both forms, along with any relevant information collected under the HSFCA, and submit it to the WCPFC as required under the Convention. Vessel owners/operators would be required to keep NMFS informed of any changes to the required pieces of information.

All the required information is expected to be readily available to vessel owners and operators. The costs that would be incurred by an owner/operator to provide the information would include the costs of their labor, roughly estimated at 90 minutes per vessel, and the costs of mailing, roughly estimated at $1 per vessel. Additional costs of the same magnitude would be borne any time the information for a given vessel changes. For any given vessel, such changes can be expected to occur approximately twice every five years. Assuming that the cost of the labor required to complete the necessary forms is $50 per hour, the total cost per vessel would average out to about $30 per year.[59]

The costs of complying with this requirement would be small relative to the total gross revenue earned by each vessel and would not be expected to have any discernable effect on the incentive for purse seine vessels or any associated support vessels to fish in the affected area.

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[59] The labor cost would be $75 per submittal, or $150 every five years, which would average out to $30 annually.

4.1.2.2.3 VMS

U.S. purse seine vessels, as well as any U.S. support vessels that interact with the purse seine fleet, would be required to carry and operate VMS units while on the high seas in the Convention Area. Under the SPTT, U.S. purse seine vessels are already required to install, carry, activate, operate, and maintain a VMS unit at all times while in the SPTT Area. The VMS unit may be shut down while the vessel is in port, but only if vessel position reports are periodically submitted by other means. The type of VMS unit and attendant software currently required under the SPTT would satisfy the requirements that would be established to implement the WCPFC. Currently, purse seine vessels can and do occasionally fish outside the SPTT Treaty Area but still within the Convention Area. At present these vessels probably tend to leave their VMS units on in these circumstances. In short, this action is expected to have no effect on the practices of purse seine vessels relative to the baseline.

The VMS units presently on board the U.S. purse seine vessels are programmed to transmit data directly to the VMS administered by the FFA, and the data are also received by NOAA. Under this alternative, the data would also be transmitted to the WCPFC VMS (but made accessible to the WCPFC only when the vessel is on the high seas in the Convention Area).[60] This alternative would bring no new VMS-related costs to owners or operators of purse seine vessels.

Although there is no history of U.S. support vessels interacting with the purse seine fleet, it is possible that a few such vessels could become active. If so, these vessels would be subject to this VMS requirement. The expected annual costs per vessel would include $250 for VMS unit maintenance, and assuming $1.50 per day in communication costs (based on hourly reporting) and 100 days per year spent on the high seas in the Convention Area, $150 for communication costs. Owners/operators of such vessels would also be responsible for the purchase and installation costs of the VMS units. Those costs are estimated at about $4,000 per VMS unit, and VMS units are expected to typically have four-year lifespans, so averaged over four years, the actual purchase and installation costs would be about $1,000 annually.[61]

Under this alternative, the real-time aspect of VMS data could present some concerns to owners and operators of purse seine vessels and support vessels relative to how well the data are protected. Specifically, owners and operators might be concerned about real-time vessel location information being accessible to their competitors. Competitors could take advantage of such information in terms of fishing success, thus effectively bringing costs to individual U.S. purse seine vessel businesses. The WCPFC has adopted *Rules and Procedures for Protection of, Access*

[60] Under this and the other action alternatives, the communication costs of transmitting the data from the VMS unit to the WCPFC VMS would be borne by the WCPFC budget, to which the WCPFC members, including the United States, contribute. Those costs would not be borne by the vessel owners or operators. In cases where NOAA is not already receiving the VMS data (that is not the case for the purse seine fishery), vessel owners and operators would be responsible for the communication costs of transmitting the data to NOAA. At a reporting frequency of one position report per hour, which is the standard anticipated to be adopted by the WCPFC, the expected costs of those transmissions to NOAA are about $1.50 per vessel per day.

[61] NOAA administers a reimbursement program to help offset the costs of purchasing VMS units. It is not known whether vessel owners subject to this action will be eligible for reimbursement under this program; the cost estimates in this analysis assume they will not be reimbursed.

to, and Dissemination of, Data Compiled by the Commission. Under these rules and procedures, the VMS data received by the WCPFC are defined as non-public domain data, and the dissemination of these data to other parties will be authorized in accordance with the policies of confidentiality and security established in the WCPFC's Information Security Policy. Although this policy is relatively strict in terms of protecting non-public domain data, NOAA would be unable to guarantee that the policy would be implemented perfectly by the WCPFC. Furthermore, the WCPFC has yet to finalize its rules and procedures with respect to certain uses of VMS data, particularly in terms of how data can be used for compliance purposes by the WCPFC. Concerns about the risk of sensitive data being inappropriately disclosed can be considered a cost to vessel owners/operators. A similar "cost" that might bring a disincentive to fish in the affected area is that vessel owners/operators might simply dislike their vessels being monitored by NMFS and/or the WCPFC, even if the data are rigorously protected by those two entities.

This alternative, and the other action alternatives, would require that a vessel operator that becomes aware (either on his or her own or via notification from NOAA or the WCPFC) that the VMS unit is not transmitting position reports properly to contact NOAA and to comply with instructions given by NOAA, which could include ceasing fishing, stowing fishing gear, returning to port, and submitting periodic position reports at specified intervals by other means. To facilitate these communications, vessel operators would be required to carry on board and monitor a communication device capable of two-way real-time communication with NOAA enforcement authorities in Honolulu, and a device capable of one-way communication to the WCPFC in Pohnpei, Micronesia. Those two devices could be one and the same, but the VMS unit could not be used to satisfy these requirements.

All vessels in the purse seine fishery have the necessary communication equipment, so they would bear no additional costs associated with equipment. Under the SPTT, purse seine vessels are currently required to manually submit position reports to the FFA every eight hours in the event of VMS unit failure, so any manual position reports required under this alternative would bring little, if any, additional burden. It is possible that fishing trips could be cut short if NOAA determines that a vessel must stop fishing and proceed to port until the VMS unit is repaired, but such an event is expected to occur only rarely.

In summary, it is expected that the costs to purse seine and support vessel businesses of this VMS alternative, including: (1) the direct financial costs of purchasing, installing, maintaining and operating VMS units (which would be zero in the case of purse seine vessels), (2) the costs they might bear in terms of the risk of the confidentiality of the VMS data not being rigorously maintained, and (3) the costs associated with VMS unit failure, including the possibilities of having to submit manual position reports and having to return to port, would not be large enough to have any discernable effect on the incentive for purse seine vessels or any associated support vessels to fish in the affected area.

4.1.2.2.4 Boarding and Inspection

Vessels in the purse seine fishery, including any support vessels, would, while on the high seas in the Convention Area, be required to accept and facilitate boarding and inspection by duly authorized inspectors of other Contracting Parties to the Convention. Although this would impose an additional burden on the fleet, boardings for any given vessel are expected to be relatively rare,[62] and this requirement is not expected to have any discernable effect on the incentive for purse seine vessels or associated support vessels to fish in the affected area.

4.1.2.2.5 Effects Summary

The four components of this alternative would together bring added costs to purse seine businesses and any associated support vessel businesses, but these costs would be very small compared to the total gross revenue earned by each fishing vessel. Consequently, Alternative B would not be expected to have any effect on the conduct of the purse seine fishery relative to the baseline, including fleet size, the magnitude and distribution of fishing effort, or fishing practices.

4.1.2.3 Alternative C

4.1.2.3.1 Authorization to Fish

No new authorization requirement would be imposed; there would be no effects relative to the baseline.

4.1.2.3.2 Vessel Information Collection

This component of the alternative would be the same as that of Alternative B (see Section 4.1.2.2 for expected effects).

4.1.2.3.3 VMS

This component of the alternative would differ from that of Alternative B only in that the VMS unit would have to be turned on at all times while the vessel is at sea during trips that venture into the Convention Area, rather than just while on the high seas in the Convention Area. As described for Alternative B, this would be a minor change in requirements relative to the current requirements for purse seine vessels under the SPTT. The expected effects would be the same as those for Alternative B (Section 4.1.2.2).

The communication costs borne by any U.S. support vessels that interact with the purse seine fleet would be greater than under Alternative B, since the VMS unit would have to be operated more days per year. Assuming 300 days at sea per year on trips that venture into the Convention Area and communication costs of $1.50 per day, the communication costs would be $450 per year. As for Alternative B, the annual VMS unit maintenance costs would be about $250 per vessel per year and the purchase and installation costs would be about $1,000 per vessel per year.

4.1.2.3.4 Boarding and Inspection

This component of the alternative would be the same as that of Alternative B (see Section 4.1.2.2 for expected effects).

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[62] Due to the large number of fishing vessels and small number of inspection vessels operating in the Convention Area, it is expected that there would be a relatively low probability of any particular fishing vessel experiencing a boarding in, for example, any particular year.

4.1.2.3.5 Effects Summary

Like Alternative B, the four components of this alternative would together bring added costs to purse seine businesses and businesses of any associated support vessels, but these costs would be small compared to the total gross revenue earned by each fishing vessel. Consequently, Alternative C would not be expected to have any effect on the conduct of the purse seine fishery relative to the baseline, including fleet size, the magnitude and distribution of fishing effort, or fishing practices.

4.1.2.4 Alternative D (preferred)

4.1.2.4.1 Authorization to Fish

All the purse seine vessels, including any support vessels that interact with the fleet, used for fishing on the high seas in the Convention Area would be required to obtain a WCPFC Area Endorsement as a supplement to the currently required HSFCA permit. The endorsement application and issuance process would bring costs to the affected vessel owners/operators. The period of validity of an endorsement would be the same as the underlying HSFCA permit, which is five years. The application fee is expected to be about $25 per application;[63] that is, $5 per vessel per year (the costs and associated effects of providing the information required in the application are addressed in the next section, “Vessel Information Collection”). These costs would be small relative to the total gross revenue earned by each fishing vessel and would not be expected to have any discernable effect on the incentive for purse seine vessels or associated support vessels to fish in the affected area.

4.1.2.4.2 Vessel Information Collection

The information required of purse seine and any support vessels used on the high seas in the Convention Area would be collected via the application for a WCPFC Area Endorsement. The information needed for vessels used in the EEZs of other nations in the Convention Area would be collected via a separate form. The entire purse seine fleet fishes on both the high seas and in the EEZs of the Pacific Island Parties to the SPTT, so it is expected that the entire purse seine fleet, and possibly any U.S. support vessels that become active, would have to comply with both components of the information collection. The costs of completing both reporting forms would include labor, estimated at 90 minutes per vessel (1.5 hours per five years per vessel), and mailing costs, estimated at $1 per vessel ($1 per five years per vessel). Additional costs of the same magnitude would be borne any time the required information for a given vessel changes during the period of validity of the WCPFC Area Endorsement. Changes can be expected to occur approximately once during the five-year period of validity. Assuming that the cost of the labor required to complete the necessary forms is $50 per hour, the total cost would average out to about $30 per vessel per year.

The costs of complying with this requirement would be small relative to the total gross revenue earned by each vessel and would not be expected to have any discernable effect on the incentive for purse seine vessels or any associated support vessels to fish in the affected area.

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[63] The cost estimates for the authorization to fish requirement are based upon the administrative cost burden for the agency, which is derived from agency practice and experience.

4.1.2.4.3 VMS

Although the trigger for the VMS requirement (possessing a WCPFC Area Endorsement) would be different than under Alternative C (fishing on the high seas in the Convention Area), the requirement would be effectively the same from the perspective of owners/operators of purse seine vessels, which are expected to spend all days at sea within the Convention Area. The expected effects for purse seine vessels are therefore the same as those for Alternative C (Section 4.1.2.3).

Because any support vessels can be expected to make some trips that do not venture in the Convention Area, and under this alternative they would have to keep the VMS unit turned on at all times at sea, the costs to such vessels can be expected to be slightly more than under Alternative C. Assuming 330 days at sea per year, the annual communication costs would be about $495. Total annual costs, including those for VMS unit purchase, installation, and maintenance, would be about $1,745.

4.1.2.4.4 Boarding and Inspection

From the perspective of purse seine vessels and any support vessels this component of the alternative would be the same as that of Alternatives B and C (see Section 4.1.2.2 for expected effects).

4.1.2.4.5 Effects Summary

Like Alternatives B and C, the four components of this alternative would impose additional costs to purse seine businesses and businesses of any associated support vessels. These costs would be small compared to the total gross revenue earned by each fishing vessel. Consequently, Alternative D would not be expected to have any effect on the conduct of the purse seine fishery relative to the baseline, including fleet size, the magnitude and distribution of fishing effort, or fishing practices.

4.1.2.5 Alternative E

4.1.2.5.1 Authorization to Fish

In order to fish either on the high seas or in foreign EEZs in the Convention Area, purse seine vessels and any associated support vessels would be required to obtain an authorization not connected to the HSFCA permit, a "WCPFC Area Permit." The WCPFC Area Permit application and issuance process would bring costs to the affected vessel owners/operators. The period of validity of the WCPFC Area Permit would be one year, rather than five years for the WCPFC Area Endorsement of Alternative D. The application fee is expected to be about $75 per application, which is substantially more than the expected application fee for the WCPFC Area Endorsement option. This is because the endorsement option, being tied to the HSFCA permit application process, would likely involve lower administrative processing costs. The anticipated costs and associated effects of providing the information required in the WCPFC Area Permit application are addressed in the next section, "Vessel Information Collection." Overall, the projected WCPFC Area Permit cost of $75 per year would be minor relative to the total gross revenue earned by each fishing vessel and would not be expected to have any discernable effect on the incentive for purse seine vessels or any associated support vessels to fish in the affected area.

4.1.2.5.2 Vessel Information Collection

All the needed information would be collected annually from purse seine vessels and any associated support vessels via the application form for the WCPFC Area Permit. The costs to vessel owners/operators would include labor, estimated at 90 minutes per vessel per year, and mailing costs, estimated at $1 per vessel per year. Additional costs of approximately the same magnitude would be borne any time the required information for a given vessel changes during the period of validity of the vessel's WCPFC Area Permit. Given the Permit's one-year period of validity, such changes would be expected to be relatively rare. Assuming that the cost of the labor required to complete the necessary forms is $50 per hour, the total cost would be $76 per year.

The costs of complying with this requirement would be small relative to the total gross revenue earned by each fishing vessel and would not be expected to have any discernable effect on the incentive for purse seine vessels or any associated support vessels to fish in the affected area.

4.1.2.5.3 VMS

The VMS component of this alternative would differ from those of Alternatives C and D in that the VMS unit would have to be turned on at all times, whether at sea or at port. As for Alternatives B-D, this would not bring any significant change relative to the current requirements for purse seine vessels under the SPTT. The expected effects for purse seine vessels are therefore the same as those for Alternatives B-D (Section 4.1.2.2).

Any U.S. support vessels that become active would have to keep their VMS units turned on year-round, rather than during just the 100 days estimated for Alternative B, 300 days estimated for Alternative C, and 330 days estimated for Alternative D, so they would bear annual communication costs of about $548. Total annual costs, including those for VMS unit purchase, installation and maintenance, would be about $1,798.

4.1.2.5.4 Boarding and Inspection

From the perspective of purse seine vessels and any support vessels this component of the alternative would be the same as that of Alternatives B-D (see Section 4.1.2.2 for expected effects).

4.1.2.5.5 Effects Summary

Like Alternatives B-D, the four components of this alternative would together bring added costs to purse seine businesses and businesses of any associated support vessels, but these costs would be small compared to the total gross revenue earned by each fishing vessel. Consequently, Alternative E would not be expected to have any effect on the conduct of the purse seine fishery relative to the baseline, including fleet size, the magnitude and distribution of fishing effort, or fishing practices.

4.1.3 U.S. Longline Fishery

4.1.3.1 Alternative A

Under the no-action alternative, the longline fishery would continue to be subject to the existing management regime, thus it would have no effects relative to the baseline. Baseline conditions are described in detail in Chapter 3, but certain aspects with respect to the longline fishery are highlighted below.

The recent sizes of the longline fleets are probably good indicators of fleet sizes in the near-term future. Specifically, for the western Pacific-based fleets, the number of longline vessels with both a HSFCA permit and any one of the three longline permits under the Western Pacific Pelagics FMP as of March 2008 is considered a good indicator of future activity on the high seas in the Convention Area (138 vessels). For the west coast-based fleet, participation in recent years suggests that approximately one vessel would be active in the future. So the total number of affected longline vessels in any given year in the near-term future is projected to be 139. The total number of individual affected vessels over the course of the near-term future, however, is expected to be slightly more than 139, because of the likelihood of some vessel turnover from year to year. It is further speculated, as there is little historical basis for making a rigorous projection, that as many as 20 longline vessels will be used in the EEZs of other nations in the Convention Area. It is also anticipated that fishing patterns will not deviate much from the patterns in recent years (e.g., see the recent five-year averages of effort and catch in Sections 3.3.2.4.3.3 and 3.3.2.5.3).

As of March 2008 there were nine U.S. vessels with Receiving Vessel Permits, which a vessel must have in order for it to be used to receive longline-caught fish from other vessels in the Western Pacific Management Area. All these receiving vessels also held at least one of the Western Pacific Pelagic FMP longline permits. In other words, they were longline catcher vessels, not vessels intended for use exclusively as fish carriers. Although there is no history of U.S. carriers, bunkers, or other support vessels interacting with the U.S. longline fleet, under the baseline it is anticipated that such vessels could become active in the Convention Area in the near-term future. Given the lack of historical activity and the frequency of transshipping likely to be conducted in the Convention Area by the longline fleet, the number of such vessels is expected to be no more than five.

4.1.3.2 Alternative B

4.1.3.2.1 Authorization to Fish

No new authorization requirement would be imposed; there would be no effects relative to the baseline.

4.1.3.2.2 Vessel Information Collection

To effect the information collection NMFS would develop and use two forms that the owners/operators of vessels in the U.S. longline fishery would be required to complete and submit to NMFS. The requirement would apply to any U.S. carriers, bunkers, or other support vessels that interact with the longline fleet.

The first reporting form would be designed for vessels used to fish on the high seas in the Convention Area. Based on the number of longline vessels that had HSFCA permits as of March 2008 (Sections 3.3.2.4.1, 3.3.2.4.2, and 3.3.2.4.3), approximately 139 longline vessels are expected to be used in any given year in that area. There may also be as many as approximately five support vessels used in the area. This form would serve to collect only the pieces of information required under the Convention that are not already collected under the HSFCA (see Section 2.3).

The second reporting form would be designed for vessels used to fish in the Convention Area in the EEZs of other nations. NMFS does not currently monitor such activity and cannot rigorously estimate the number of affected vessels, but it is anticipated that as many as 20 longline vessels and five associated support vessels could be used in such areas and would be required to complete and submit the second form. This form would be used to collect information about the fishing authorizations issued by other nations.

NMFS would compile the information from both forms, along with any relevant information collected under the HSFCA, and submit it to the WCPFC as required under the Convention. Vessel owners/operators would be required to keep NMFS informed of any changes to the required pieces of information.

All the information required on both forms is expected to be readily available to vessel owners and operators.

For the first form, the costs that would be incurred by the owner/operator of each affected vessel would include the costs of their labor, roughly estimated at 60 minutes per vessel, and the costs of mailing, roughly estimated at $1 per vessel. Additional costs of the same magnitude would be borne any time the information for a given vessel changes. For any given vessel, such changes can be expected to occur approximately twice every five years.

If completion of the second form is also required, the total costs that would be incurred by the owner/operator of each affected vessel would include the costs of their labor, roughly estimated at 90 minutes per vessel, and the costs of mailing, roughly estimated at $1 per vessel. Additional costs of the same magnitude would be borne any time the information for a given vessel changes. For any given vessel, such changes can be expected to occur approximately twice every five years.

Assuming that the cost of the labor required to complete the necessary forms is $50 per hour, the total cost would average out to about $30 per year. The costs of complying with this requirement would be small relative to the total gross revenue earned by each fishing vessel and would not be expected to have any discernable effect on the incentive for longline vessels or any associated support vessels to fish in the affected area.

4.1.3.2.3 VMS

Out of the four U.S. longline fleets that fish in the Convention Area only two, the Mariana Islands[64]-based fleet and the west coast-based fleet, would be substantially affected by

[64] The Mariana Islands include Guam and the CNMI.

implementation of the VMS component of this alternative. Vessels in the Hawaii-based and American Samoa-based fleets, about 135 vessels in total, are currently required to install, maintain, and operate VMS units. In both cases, the units must be turned on at all times while at sea. The type of VMS unit and attendant software currently required would satisfy the requirements that would be established under this alternative. The VMS units on board the longline vessels in these two fleets are programmed to transmit data directly to a VMS administered by NOAA. Under this alternative, the VMS units would have to be reprogrammed so that the data are transmitted to both the WCPFC VMS (but the data would be accessible to the WCPFC only when the subject vessel is on the high seas in the Convention Area) and NOAA (at all times). The costs of transmitting the data to the WCPFC VMS would not be borne by the vessel owners or operators.

It is estimated that about three vessels in the western Pacific (based on the number of vessels with Western Pacific General Longline permits that do not also have either a Hawaii or American Samoa Limited Access Longline permit) and about one west coast-based longline vessel would be substantially affected by this alternative. In other words, as a result of their permit status, approximately four longline vessels are not currently required to carry and operate VMS units, but they would be required to do so under this alternative.

The compliance costs for these approximately four affected longline vessels would include: the purchase and installation of VMS units, estimated at $1,000 per year ($4,000 per unit, with a lifespan of four years), the cost of maintenance of the VMS units, estimated at $250 per vessel per year; and the communication cost of transmitting the automated position reports from the VMS units to NOAA, estimated at $1.50 per vessel per day (based on hourly reporting). Based on an estimate that on average a given vessel will spend 150 days each year on the high seas in the Convention Area, the annual communication cost per vessel would be $225.

Although there is no history of U.S. support vessels interacting with the longline fleet, it is anticipated that as many as five vessels would do so in the near-term future, in which case they would be subject to this VMS requirement. The expected annual costs per vessel would include $1,000 for VMS unit purchase and installation, $250 for VMS unit maintenance, and assuming $1.50 per day in communication costs (based on hourly reporting) and 100 per year spent on the high seas in the Convention Area, $150 for communication costs.

This alternative, and the other action alternatives, would require that a vessel operator that becomes aware (either on his or her own or via notification from NOAA or the WCPFC) that the VMS unit is not transmitting position reports properly to contact NOAA and to comply with instructions given by NOAA, which could include ceasing fishing, stowing fishing gear, returning to port, and submitting periodic position reports at specified intervals by other means. To facilitate these communications, vessel operators would be required to carry on board and monitor a communication device capable of two-way real-time communication with NOAA enforcement authorities in Honolulu, and a device capable of one-way communication to the WCPFC in Pohnpei, Micronesia. Those two devices could be one and the same, but the VMS unit could not be used to satisfy these requirements.

All vessels in the longline fisheries are believed to have the necessary communication equipment, so they would bear no additional costs associated with equipment. Any manual position reports that would be required under this alternative in the event of VMS unit failure would bring communication costs and labor costs (the labor could have otherwise been spent on other productive tasks, such as fishing operations). It is possible that fishing trips could be cut short if

NOAA determines that a vessel must stop fishing and proceed to port until the VMS unit is repaired, but such an event is expected to occur only rarely.

Owners and operators of longline vessels and support vessels might have the same concerns as owners and operators of vessels in the purse seine fishery with respect to the risk of data transmitted from their VMS units not being adequately protected. They also might dislike their vessels being monitored by NOAA and/or the WCPFC, even if the data are rigorously protected by those two entities (Section 4.1.2.2). Such concerns can be considered risks or costs that would be borne by the affected fishing businesses.

In summary, the expected cost to each of the approximately four longline vessels not already required to purchase, install, carry, and operate VMS units would be about $1,475 per year. Any U.S. support vessels that interact with the longline fleet would bear annual costs of approximately $1,400. The expected quantifiable costs for vessels in the Hawaii and American Samoa longline fleets are expected to be zero. Affected vessels might also bear some (unquantifiable) costs associated with the risk of the confidentiality of the VMS data not being rigorously maintained, as well as costs associated with VMS unit failure, including the possibilities of having to submit manual position reports and having to return to port.

4.1.3.2.4 Boarding and Inspection

Vessels in the longline fishery, including any support vessels, would, while on the high seas in the Convention Area, be required to accept and facilitate boarding and inspection by duly authorized inspectors of other Contracting Parties to the Convention. Although this would be an additional burden on the fleet, boardings for any given vessel are expected to be relatively rare, and this requirement is not expected to have any discernable effect on the incentive for longline vessels or support vessels to fish in the affected area.

4.1.3.2.5 Effects Summary

The VMS component of this alternative is the only one that would bring substantial compliance costs to the longline fleet and associated support vessels, but it is likely that only about four longline vessels, and as many as five support vessels, would be subject to those costs. For the longline vessels, the burden could be great enough to affect their decision about if and where to fish. For example, a vessel based on the U.S. west coast could avoid the costs by not venturing as far west as the Convention Area. The viable options for the vessels in the western Pacific are likely to be fewer: they would have to operate only in the U.S. EEZ around the Mariana Islands or venture to the EPO in order to avoid the requirement and associated costs. It is not known whether these would be viable options for the affected longline vessels.

In summary, this alternative can be expected to have a neutral or slightly negative effect (relative to the baseline) on the magnitude of longline fishing effort on the high seas in the Convention Area, and a correspondingly neutral or slightly positive effect on the magnitude of fishing effort in the U.S. EEZ around the Mariana Islands and on the high seas in the EPO. No other changes in fishing practices would be expected.

4.1.3.3 Alternative C

4.1.3.3.1 Authorization to Fish

No new authorization requirement would be imposed; there would be no effects relative to the baseline.

4.1.3.3.2 Vessel Information Collection

This component of the alternative would be the same as that of Alternative B (see Section 4.1.3.2 for expected effects).

4.1.3.3.3 VMS

This component of the alternative differs from that of Alternative B only in that the VMS unit would have to be turned on at all times while the vessel is at sea. In other words, the VMS unit would have to be turned on port-to-port on trips that include the high seas in the Convention Area, rather than just while on the high seas in the Convention Area. The vessels in the Hawaii and American Samoa fleets are already required to operate their VMS units at all times while at sea, so this alternative would be effectively the same for these fleets as Alternative B (Section 4.1.3.2)

For the approximately four western Pacific-based longline vessels that are not currently required to carry and operate VMS units, as well as any support vessels, this alternative would be slightly more costly than Alternative B because of the greater number of days that the VMS unit would have to be operated. Assuming, on average, 250 days per year at sea on trips that include the Convention Area for longline vessels and 300 days for support vessels, and $1.50 per day, the communication costs would be approximately $375 per year for longline vessels and $450 per year for support vessels. The VMS unit purchase, installation, and maintenance costs would be about $1,250 per vessel per year.

4.1.3.3.4 Boarding and Inspection

This component of the alternative would be the same as that of Alternative B (see Section 4.1.3.2 for expected effects).

4.1.3.4 Effects Summary

The effects of Alternative C on the longline fleet and any support vessels are expected to be the same as those for Alternative B. Specifically, the VMS component would bring substantial costs to at least a few longline vessels and possibly a few support vessels, resulting in a neutral or slightly negative effect, relative to the baseline, on the magnitude of longline fishing effort on the high seas in the Convention Area. A correspondingly neutral or slightly positive effect on the magnitude of fishing effort in the U.S. EEZ around the Mariana Islands and on the high seas in the EPO would also be expected. No other changes in fishing practices would be expected.

4.1.3.5 Alternative D (preferred)

4.1.3.5.1 Authorization to Fish

The anticipated 139 or so longline vessels used for fishing on the high seas in the Convention Area, as well as the possible five or so support vessels that interact with the fleet, would be required to obtain a WCPFC Area Endorsement as a supplement to the currently required HSFCA permit. The endorsement application and issuance process would bring costs to the affected vessel owners/operators. The period of validity of an endorsement would be the same as the underlying HSFCA permit, which is five years. The application fee is expected to be about $25 per application; that is, $5 per vessel per year. The costs and associated effects of providing the information required in the application are addressed in the next section, “Vessel Information Collection.”

The anticipated cost to vessel owners/operators of $5 per year would be small relative to the total gross revenue earned by each fishing vessel and would not be expected to have any discernable effect on the incentive for longline vessels or support vessels to fish in the affected area.

4.1.3.5.2 Vessel Information Collection

The information required of longline vessels and any support vessels used on the high seas in the Convention Area would be collected via the application for a WCPFC Area Endorsement. The information needed for vessels used in the EEZs of other nations in the Convention Area would be collected via a separate form.

It is expected that about 139 longline vessels, and as many as five support vessels, would be subject to the high seas portion of the requirement. The costs of compliance would include labor, estimated at 60 minutes per vessel (1 hour per five years per vessel), and mailing costs, estimated at $1 per vessel ($1 per five years per vessel). Additional costs of the same magnitude would be borne any time the required information for a given vessel changes during the period of validity of the WCPFC Area Endorsement. Such changes can be expected to occur approximately once during the five-year period of validity.

It is not known how many vessels have operated or are likely to operate in the future in the EEZs of other nations in the Convention Area, but for the purpose of this analysis it is assumed that as many as 20 longline vessels and five support vessels will do so and consequently be subject to the second information collection requirement. The total costs of compliance for completing both forms would include labor, estimated at 90 minutes per vessel (1.5 hour per five years per vessel), and mailing costs, estimated at $1 per vessel ($1 per five years per vessel). Additional costs of the same magnitude would be borne any time the required information for a given vessel changes. Such changes can be expected to occur approximately twice every five years.

Assuming that the cost of the labor required to complete the necessary forms is $50 per hour, the total cost would average out to about $30 per year. The costs of complying with this requirement would be small relative to the total gross revenue earned by each fishing vessel and would not be expected to have any discernable effect on the incentive for longline vessels or support vessels to fish in the affected area.

4.1.3.5.3 VMS

Although the trigger for the VMS requirement (possessing a WCPFC Area Endorsement) would be different than under Alternative C (fishing on the high seas in the Convention Area), the requirement would be effectively the same from the perspective of owners/operators of longline vessels, all trips for which include the Convention Area, with the exception of west coast-based longliners. The expected effects are therefore the same as those for Alternative C (see Section 4.1.3.3). West coast-based longliners might bear slightly greater costs than under Alternative C because they might have to keep the VMS unit turned on more days per year.

Because any support vessels can be expected to make some trips that do not venture in the Convention Area, and under this alternative they would have to keep the VMS unit turned on at all times at sea, the costs to such vessels would be expected to be slightly more than under Alternative C. Assuming 330 days at sea per year, the annual communication costs would be about $495. The total annual costs, including VMS unit purchase, installation and maintenance, would be about $1,745.

4.1.3.5.4 Boarding and Inspection

From the perspective of longline vessels and support vessels this component of the alternative would be the same as that of Alternatives B and C (see Section 4.1.3.2 for expected effects).

4.1.3.5.5 Effects Summary

The effects of Alternative D on the longline fleet are expected to be similar to those of Alternatives B and C; specifically, the VMS component would bring substantial costs to at least a few vessels, resulting in a neutral or slightly negative effect, relative to the baseline, on the magnitude of longline fishing effort on the high seas in the Convention Area. A correspondingly neutral or slightly positive effect on the magnitude of fishing effort in the U.S. EEZ around the Mariana Islands and on the high seas in the EPO would also be expected. No other changes in fishing practices would be expected.

4.1.3.6 Alternative E

4.1.3.6.1 Authorization to Fish

In order to fish either on the high seas or in foreign EEZs in the Convention Area, longline vessels and any support vessels would be required to obtain an authorization not connected to the HSFCA permit, a "WCPFC Area Permit." The WCPFC Area Permit application and issuance process would bring costs to the affected vessel owners/operators. The period of validity of the permit would be one year, rather than five years for the WCPFC Area Endorsement of Alternative D. The application fee is expected to be about $75 per application. This is substantially more than the expected application fee for the WCPFC Area Endorsement of Alternative D because the endorsement, being tied to the HSFCA permit application process, would bring lower administrative processing costs. The costs and associated effects of providing the information required in the application are addressed in the next section, "Vessel Information Collection".

The anticipated costs to vessel owners/operators under this alternative, although higher than for this component of Alternative D, are small relative to the total gross revenue earned by each fishing vessel and would not be expected to have any discernable effect on the incentive for longline vessels or support vessels to fish in the affected area.

4.1.3.6.2 Vessel Information Collection

All the needed information would be collected annually from longline vessels and any support vessels via the application form for WCPFC Area Permits. The costs to vessel owners/operators would include labor, estimated at 90 minutes per vessel per year, and mailing costs, estimated at $1 per vessel per year. Additional costs of approximately the same magnitude would be borne any time the required information for a given vessel changes during the period of validity of the vessel's WCPFC Area Permit. Given the Permit's one-year period of validity, such changes would be relatively rare.

Assuming that the cost of the labor required to complete the necessary forms is $50 per hour, the total cost would be $76 per year. The costs of complying with this requirement would be small relative to the total gross revenue earned by each fishing vessel and would not be expected to have any discernable effect on the incentive for longline vessels or support vessels to fish in the affected area.

4.1.3.6.3 VMS

The VMS component of this alternative would differ from those of Alternatives C and D in that the VMS unit would have to be turned on at all times, whether at sea or at port.

For the Hawaii and American Samoa-based fleets, this would bring additional communication costs because of the additional time during which the VMS unit must be turned on. Assuming that these vessels spend about 250 days at sea each year, the additional reporting period each year would be 115 days (365 less 250). Based on hourly reporting, the daily cost would be about $1.50, or a total of about $173 per vessel per year.

The approximately four affected vessels in the Mariana Islands and west coast fleets would bear communication costs of about $548 per vessel per year, and VMS unit purchase, installation, and maintenance costs of about $1,250 per vessel per year.

The expected annual costs for any support vessel that becomes active would include $1,250 for VMS unit purchase, installation, and maintenance, and assuming $1.50 per day in communication costs (based on hourly reporting) at 365 per year, $548 for communication costs.

In addition, all longline vessels and support vessels would be required to maintain power to the VMS unit during their time in port. Some vessels, particularly the smaller vessels, do not currently maintain continuous power while in port and would require changes to their battery systems or shore power arrangements to do so.

4.1.3.6.4 Boarding and Inspection

From the perspective of longline vessels and support vessels this component of the alternative would be the same as that of Alternatives B-D (see Section 4.1.3.2 for expected effects).

4.1.3.6.5 Effects Summary

The effects of Alternative E on longline vessels and support vessels are expected to be similar to those for Alternatives B-D in that the VMS component would bring substantial costs to some vessels. However, the number of vessels that would bear substantial costs would be greater under this alternative: it would include all longline vessels that fish on the high seas in the Convention Area, as well as any support vessels. The per-vessel costs would also be greater than under Alternatives B-D. The overall effect would likely be the same as Alternatives B-D: a neutral or slightly negative effect, relative to the baseline, on the magnitude of longline fishing effort on the high seas in the Convention Area, and a correspondingly neutral or slightly positive effect on the magnitude of fishing effort in the U.S. EEZ around the Mariana Islands and on the high seas in the EPO. No other changes in fishing practices would be expected.

4.1.4 U.S. Albacore Troll Fishery

4.1.4.1 Alternative A

Under the no-action alternative, the albacore troll fishery would continue to be subject to the existing management regime, thus it would have no effects relative to the baseline. Baseline conditions are described in detail in Chapter 3, but certain aspects with respect to the albacore troll fishery are highlighted below.

The number of albacore troll vessels active in the Convention Area has been declining in recent years, along with fishing effort and catches (Section 3.3.2.5). For the purpose of analyzing the effects of the action alternatives, it is assumed that the peak number of albacore troll vessels active in the Convention Area in the last five years (2003-2007) is a reasonable indicator of activity in the Convention Area in the near-term future. As indicated in Section 3.3.2.5.3, that peak number was 69 (in 2003). All 69 of those vessels fished in the North Pacific in the Convention Area; 14 fished in the South Pacific in the Convention Area.

Based on historical fishing patterns (Childers and Betcher 2007), it is projected under the baseline that on average, a vessel that fishes in the North Pacific in the Convention Area will, during the North Pacific season, spend 120 days each year on the high seas in the Convention Area and 180 days at sea during trips that venture into the Convention Area. It is projected that a vessel that fishes in the South Pacific in the Convention Area will, during the South Pacific season, spend about an estimated 160 days on the high seas in the Convention Area and 170 days at sea during trips that venture into the Convention Area.

There is no history of U.S. carriers, bunkers, or other support vessels interacting with the U.S. albacore troll fleet, but under the baseline it is expected that such vessels could become active in the Convention Area in the near-term future. Given the lack of participation by such vessels in the past, it is anticipated that no more than five U.S. support vessels are likely to participate in the near-term future.

4.1.4.2 Alternative B

4.1.4.2.1 Authorization to Fish

No new authorization requirement would be imposed; there would be no effects relative to the baseline.

4.1.4.2.2 Vessel Information Collection

To effect the information collection NMFS would develop and use two forms that the owners/operators of vessels in the U.S. albacore troll fishery would be required to complete and submit to NMFS. The requirement would apply to any U.S. carriers, bunkers, or other support vessels that interact with the U.S. albacore troll fleet.

The first reporting form would be designed for vessels used to fish on the high seas in the Convention Area. Based on the peak annual number of albacore troll vessels that fished in the Convention Area in the last five years (see Section 3.3.2.5), approximately 69 albacore troll vessels are expected to be used in that area and would be subject to this requirement. As many as five associated support vessels are also expected to be used in the area. This would serve to collect only the pieces of information required under the Convention that are not already collected under the HSFCA (see Section 2.3).

The second reporting form would be designed for vessels used to fish in the Convention Area in the EEZs of other nations. NMFS does not currently monitor such activity and cannot rigorously estimate the number of affected vessels, but it is anticipated that as many as 20 albacore troll vessels and five associated support vessels could be used in such areas and would be required to complete and submit the second form. This form would be used to collect information about the fishing authorizations issued by other nations.

NMFS would compile the information from both forms, along with any relevant information collected under the HSFCA, and submit it to the WCPFC as required under the Convention. Vessel owners/operators would be required to keep NMFS informed of any changes to the required pieces of information.

All the information required on both forms is expected to be readily available to vessel owners and operators.

For the first form, the costs that would be incurred by the owner/operator of each affected vessel would include the costs of their labor, roughly estimated at 60 minutes per vessel, and the costs of mailing, roughly estimated at $1 per vessel. Additional costs of the same magnitude would be borne any time the information for a given vessel changes. For any given vessel, such changes can be expected to occur approximately twice every five years.

If the second form is required, the total costs that would be incurred by the owner/operator of each affected vessel would include the costs of their labor, roughly estimated at 90 minutes per vessel, and the costs of mailing, roughly estimated at $1 per vessel. Additional costs of the same magnitude would be borne any time the information for a given vessel changes. For any given vessel, such changes can be expected to occur approximately twice every five years.

Assuming that the cost of the labor required to complete the necessary forms is $50 per hour, the total cost would average out to about $30 per year. The costs of complying with this requirement would be small relative to the total gross revenue earned by each fishing vessel and would not be expected to have any discernable effect on the incentive for albacore troll vessels or any associated support vessels to fish in the affected area.

4.1.4.2.3 VMS

Only the subset of vessels in the U.S. albacore troll fleet that are used to fish in the Convention Area, would be affected by the VMS component of this alternative. Based on the peak annual number of albacore troll vessels that fished in the Convention Area in the last five years (Section 3.3.2.5), approximately 69 albacore troll vessels are expected to be used in that area in the near-term future. Owners/operators of affected vessels would have to purchase, install, maintain, and operate VMS units.

The compliance costs for affected vessels would include: the purchase and installation of VMS units, estimated at $1,000 per vessel per year ($4,000 per unit, with an expected lifespan of four years), maintenance of the VMS unit, estimated at $250 per vessel per year, and the communication cost of transmitting the automated position reports from the VMS units, estimated at $1.50 per vessel per day (based on hourly reporting).

Given the expected number of days that vessels will spend on the high seas in the Convention Area during each of the two fishing seasons, as described for the baseline in Section 4.1.4.1, vessels that fish just the North Pacific season, expected to be about 55 under the baseline, would be required to operate the VMS unit 120 days per year. Vessels that fish just the South Pacific season, expected to be about zero, would have to do so 160 days per year. Vessels that fish both seasons, expected to be about 14, would have to do so 280 days per year.

Based on the foregoing projections, the total estimated annual costs of compliance for vessels in each of the three categories would be: $1,430 for vessels that fish just the North Pacific, $1,490 for vessels that fish just the South Pacific, and $1,670 for vessels that fish both.

Although there is no history of U.S. support vessels interacting with the albacore troll fleet, it is projected under the baseline that as many as five vessels would do so in the near-term future, in which case they would be subject to this VMS requirement. The expected annual costs per vessel would include $1,250 for VMS unit purchase, installation, and maintenance. Assuming $1.50 per day in communication costs (based on hourly reporting) and 100 days per year spent on the high seas in the Convention Area, they would bear about $150 per vessel per year in communication costs.

This alternative, and the other action alternatives, would require that a vessel operator that becomes aware (either on his or her own or via notification from NOAA or the WCPFC) that the VMS unit is not transmitting position reports properly to contact NOAA and to comply with instructions given by NOAA, which could include ceasing fishing, stowing fishing gear, returning to port, and submitting periodic position reports at specified intervals by other means. To facilitate these communications, vessel operators would be required to carry on board and monitor a communication device capable of two-way real-time communication with NOAA enforcement authorities in Honolulu, and a device capable of one-way communication to the WCPFC in Pohnpei, Micronesia. Those two devices could be one and the same, but the VMS unit could not be used to satisfy these requirements.

All vessels in the albacore troll fishery are believed to have the necessary communication equipment, so they would bear no additional costs associated with equipment. Any manual position reports that would be required under this alternative in the event of VMS unit failure would bring communication costs and labor costs (the labor could have otherwise been spent on other productive tasks, such as fishing operations). It is possible that fishing trips could be cut short if NOAA determines that a vessel must stop fishing and proceed to port until the VMS unit is repaired, but such an event is expected to occur only rarely.

Owners and operators of albacore troll vessels and support vessels might have the same concerns as owners and operators of purse seine and longline vessels with respect to the risk of data transmitted from their VMS units not being adequately protected. They might also dislike their vessels being monitored by NMFS and/or the WCPFC, even if the data are rigorously protected by those two entities (see Section 4.1.2.2). Such concerns can be considered risks or costs that would be borne by the affected fishing businesses.

In summary, in addition to the direct costs of purchasing, installing, maintaining and operating the VMS units, affected vessels might also bear some (unquantifiable) costs associated with the risk of the confidentiality of the VMS data not being rigorously maintained, as well as costs associated with VMS unit failure, including the possibilities of having to submit manual position reports and having to return to port.

4.1.4.2.4 Boarding and Inspection

Vessels in the albacore troll fishery, including any support vessels, would, while on the high seas in the Convention Area, be required to accept and facilitate boarding and inspection by duly authorized inspectors of other Contracting Parties to the Convention. Although this would be an additional burden on the fleet, boardings for any given vessel are expected to be relatively rare. Thus, this requirement is not expected to have any discernable effect on the incentive for U.S. albacore troll vessels or support vessels to fish in the affected area. Accordingly, this alternative would not be expected to have any effect on the conduct of the albacore troll fishery relative to the baseline.

4.1.4.2.5 Effects Summary

The VMS component of this alternative is the only one that would impose substantial compliance costs. The quantifiable costs to vessels that choose to fish as far west as the Convention Area would likely be $1,400-$1,700 per year. Those costs could be great enough to affect vessel owners'/operators' decisions about whether or not to fish in the Convention Area. The number of albacore troll vessels entering the Convention Area has declined from 69 in 2003 to six in 2007. There are a number of reasons for this trend (see Section 3.3.2.5). The additional regulatory burden posed by this alternative, particularly that of the VMS component, although not large compared to total revenues or fishing costs, could add another reason not to fish in the Convention Area. The alternative would have a similar effect on support vessels, but the costs of compliance for such vessels are expected to be small relative to total gross revenue earned by each vessel.

In summary, this alternative can be expected to have a neutral or slightly negative effect, relative to the baseline, on the magnitude of albacore troll fishing effort on the high seas in the Convention Area. A correspondingly neutral or slightly positive effect on the magnitude of fishing effort in the EPO would be anticipated. No other changes in fishing practices would be expected.

4.1.4.3 Alternative C

4.1.4.3.1 Authorization to Fish

No new authorization requirement would be imposed; there would be no effects relative to the baseline.

4.1.4.3.2 Vessel Information Collection

This component of the alternative would be the same as that of Alternative B (Section 4.1.4.2 for expected effects).

4.1.4.3.3 VMS

This component of the alternative differs from that of Alternative B in that the VMS unit would have to be turned on at all times while the vessel is at sea. In other words, the VMS unit would have to be turned on port-to-port on trips that include the high seas in the Convention Area, rather than just while on the high seas in the Convention Area.

Albacore troll vessels that venture into the Convention Area typically make a single trip during each of the two fishing seasons (in the North Pacific and South Pacific, respectively). Under this alternative such vessels would have to operate their VMS units at all times during these trips, so their communication costs, as well as those of any support vessels, would be greater than under Alternative B.

Given the expected number of days that vessels will spend at sea during each of the two fishing seasons, as described for the baseline in Section 4.1.4.1, vessels that fish just the North Pacific season, expected to be about 55 under the baseline, would be required to operate the VMS unit 180 days per year. Vessels that fish just the South Pacific season, expected to be about zero, would have to do so 170 days per year. Vessels that fish both seasons, expected to be about 14, would have to do so 350 days per year.

Based on a daily communication cost of $1.50 and annual VMS unit purchase, installation, and maintenance costs of $1,250, the total estimated annual costs of compliance for vessels in each of the three categories would be: $1,520 for vessels that fish just the North Pacific, $1,505 for vessels that fish just the South Pacific, and $1,775 for vessels that fish both.

It is roughly projected that any U.S. support vessels that become active in the fishery would spend 300 days at sea on trips that include the high seas in the Convention Area. The annual communication costs for such vessels, at $1.50 per day based on hourly reporting, would be about $450. Annual VMS unit purchase, installation, and maintenance costs would be about $1,250.

The costs associated with the risk or perceived risk of VMS data not being rigorously protected, as well as the costs associated with VMS unit failure, would be the same as those under Alternative B.

4.1.4.3.4 Boarding and Inspection

This component of the alternative would be the same as that of Alternative B (see Section 4.1.4.2 for expected effects).

4.1.4.3.5 Effects Summary

The effects of Alternative C on the albacore troll fleet are expected to be similar to those for Alternative B. The costs of the VMS component to vessels that choose to fish as far west as the Convention Area would be slightly more than those under Alternative B. The quantifiable costs would likely be $1,500-$1,800 per year. These costs, although not large compared to the total gross revenue earned by each fishing vessel, could reduce the incentive for a given vessel to fish in the Convention Area.

The expected effect relative to the baseline is a neutral or slightly negative effect on the magnitude of albacore troll fishing effort on the high seas in the Convention Area. A correspondingly neutral or slightly positive effect on the magnitude of fishing effort in the EPO would be expected. No other changes in fishing practices would be expected.

4.1.4.4 Alternative D (preferred)

4.1.4.4.1 Authorization to Fish

Under this alternative, all albacore troll vessels used for fishing on the high seas in the Convention Area, as well as any support vessels that interact with the fleet, would be required to obtain a WCPFC Area Endorsement as a supplement to the currently required HSFCA permit. The numbers of such vessels are anticipated to be approximately 69 and five, respectively, for a total of about 74. The endorsement application and issuance process would bring costs to the affected vessel owners/operators. The period of validity of an endorsement would be the same as the underlying HSFCA permit, which is five years. The application fee is expected to be about $25 per application; that is, $5 per vessel per year. The costs and associated effects of providing the information required in the application are addressed in the next section, “Vessel Information Collection.”

The anticipated cost to vessel owners/operators of $5 per year would be small relative to the total gross revenue earned by each fishing vessel and would not be expected to have any discernable effect on the incentive for albacore troll vessels or support vessels to fish in the affected area.

4.1.4.4.2 Vessel Information Collection

The information required of albacore troll vessels and any support vessels used on the high seas in the Convention Area would be collected via the application for a WCPFC Area Endorsement. The information needed for vessels used in the EEZs of other nations in the Convention Area would be collected via a separate form.

It is expected that about 69 albacore troll vessels, and as many as five support vessels, would be subject to the high seas portion of the requirement. The costs of compliance would include labor, estimated at 60 minutes per vessel (one hour per five years per vessel), and mailing costs, estimated at $1 per vessel ($1 per five years per vessel). Additional costs of the same magnitude would be borne any time the required information for a given vessel changes.

It is not known how many vessels have operated or are likely to operate in the future in the EEZs of other nations in the Convention Area, but for the purpose of this analysis it is assumed that as many as 20 albacore troll vessels and five support vessels will do so and consequently be subject to the second information collection requirement. If the second form is required, the total costs of compliance would include labor, estimated at 90 minutes per vessel (1.5 hours per five years per vessel), and mailing costs, estimated at $1 per vessel ($1 per five years per vessel). Additional costs of the same magnitude would be borne any time the required information for a given vessel changes during the period of validity of the WCPFC Area Endorsement. Such changes can be expected to occur approximately twice every five years.

Assuming that the cost of the labor required to complete the necessary forms is $50 per hour, the total cost would average out to about $30 per year. The costs of complying with this requirement would be small relative to the total gross revenue earned by each fishing vessel and would not be expected to have any discernable effect on the incentive for albacore troll vessels or support vessels to fish in the affected area. Accordingly, this alternative would be expected to have no effect on the conduct of the albacore troll fishery relative to the baseline.

4.1.4.4.3 VMS

The trigger for the VMS requirement (possessing a WCPFC Area Endorsement) would be different than under Alternative C (fishing on the high seas in the Convention Area), and the VMS unit would have to be turned on at all times while at sea. So the cost to most affected albacore troll vessels would be greater than under Alternative C. Assuming 310, 330, and 350 days at sea per year for albacore troll vessels that fish only in the North, only in the South, and both, respectively, the estimated annual compliance costs, including $1,250 for VMS unit purchase, installation, and maintenance, would be about $1,715, $1,745, and $1,775, respectively.

Because any support vessels can be expected to make some trips that do not venture in the Convention Area, and under this alternative they would have to keep the VMS unit turned on at all times at sea, the costs to such vessels can be expected to be slightly more than under Alternative C. Assuming 330 days at sea per year, the annual communication costs would be about $495. The total annual (quantifiable) costs, including VMS unit purchase, installation, and maintenance, would be about $1,745.

4.1.4.4.4 Boarding and Inspection

From the perspective of albacore troll vessels and support vessels this component of the alternative would be the same as that of Alternatives B and C (see Section 4.1.4.2 for expected effects).

4.1.4.4.5 Effects Summary

The effects of Alternative D on the albacore troll fleet are expected to be the same as those of Alternative C and similar to those of Alternative B. Specifically, the quantifiable costs of the VMS component to vessels that choose to fish as far west as the Convention Area would likely be $1,700-$1,800 per year. These costs, although not large compared to total gross revenue earned by each fishing vessel, could reduce the incentive for a given vessel to fish in the Convention Area.

The expected effect relative to the baseline is a neutral or slightly negative effect on the magnitude of albacore troll fishing effort on the high seas in the Convention Area. A correspondingly neutral or slightly positive effect on the magnitude of fishing effort in the EPO would be expected. No other changes in fishing practices would be expected.

4.1.4.5 Alternative E

4.1.4.5.1 Authorization to Fish

In order to fish either on the high seas or in foreign EEZs in the Convention Area, U.S. albacore troll vessels and any support vessels would be required to obtain an authorization not connected to the HSFCA permit, a "WCPFC Area Permit." The WCPFC Permit application and issuance process would bring costs to the affected vessel owners/operators. The period of validity of the permit would be one year, rather than five years for the WCPFC Area Endorsement of Alternative D. The application fee is expected to be about $75 per application. This is substantially more than the expected application fee for the WCPFC Area Endorsement of Alternative D because the latter, being tied to the HSFCA permit application process, would bring lower administrative processing costs. The costs and associated effects of providing the information required in the application are addressed in the next section, "Vessel Information Collection."

The anticipated costs to vessel owners/operators under this alternative, although higher than for this component of Alternative D, are small relative to the total gross revenue earned by each fishing vessel and would not be expected to have any discernable effect on the incentive for albacore troll vessels or support vessels to fish in the affected area.

4.1.4.5.2 Vessel Information Collection

All the needed information would be collected annually from albacore troll vessels and any support vessels via the application form for WCPFC Area Permits. The costs to vessel owners/operators would include labor, estimated at 90 minutes per vessel per year, and mailing costs, estimated at $1 per vessel per year. Additional costs of approximately the same magnitude would be borne any time the required information for a given vessel changes during the period of validity of the vessel's WCPFC Area Permit. Given the Permit's one-year period of validity, such changes would be relatively rare.

The costs of complying with this requirement would be small relative to the total gross revenue earned by each fishing vessel and would not be expected to have any discernable effect on the incentive for U.S. albacore troll vessels or support vessels to fish in the affected area.

4.1.4.5.3 VMS

The VMS component of this alternative would differ from those of Alternatives C and D in that the VMS unit would have to be turned on at all times, whether at sea or at port.

Assuming a daily communication cost of $1.50 (based on hourly reporting), the albacore troll fleet would bear communication costs of about $548 per vessel per year. VMS unit purchase, installation, and maintenance costs would be about $1,250 per vessel per year. The total compliance costs would be about $1,798 per year, on average.

The expected annual costs for any support vessel that becomes active, at 365 days per year and $1.50 per day in communication costs, and $1,250 per year for VMS unit purchase, installation, and maintenance, would be about $1,798 per year.

In addition, all albacore troll vessels and support vessels would be required to maintain power to the VMS unit during their time in port. Some vessels, particularly the smaller vessels, do not currently maintain continuous power while in port and would require changes to their battery systems or shore power arrangements to do so.

4.1.4.5.4 Boarding and Inspection

From the perspective of albacore troll vessels and support vessels this component of the alternative would be the same as that of Alternatives B-D (see Section 4.1.4.2 for expected effects).

4.1.4.5.5 Effects Summary

The effects of Alternative E on albacore troll vessels and support vessels are expected to be similar to those of Alternatives B-D. Specifically, the VMS component imposes on owners of vessels that choose to fish as far west as the Convention Area quantifiable costs of about $1,800 per year. These costs, although not large compared to total gross revenue earned by each fishing vessel, could reduce the incentive for a given vessel to fish in the Convention Area.

The expected effect relative to the baseline is a neutral or slightly negative effect on the magnitude of albacore troll fishing effort on the high seas in the Convention Area. A correspondingly neutral or slightly positive effect on the magnitude of fishing effort in the EPO would be expected. No other changes in fishing practices would be expected.

4.1.4.6 Summary

As discussed in the introduction to Section 4.1, the main effect of each of the action alternatives in terms of potential environmental impacts is that it would, to varying degrees, make it more costly to fish, and thus possibly provide a disincentive to fish, at least in the area of application of the requirement. The analysis in Section 4.1 has consequently focused on the compliance costs of each of the alternatives. Those costs are summarized in Table 38, where the estimated average per-vessel costs of complying with each of the four elements of the proposed action are indicated for each affected vessel type. In Table 39 is a summary of the alternatives' expected effects on the magnitude and location of fishing effort. None of the action alternatives is expected to result in any changes in fishing practices such as gear configurations, fishing techniques, or fishing times.

Table 38 Estimated average annual compliance costs per vessel, by vessel type, in dollars

Element of Proposed Action, and Vessel Type[a]	Action Alternatives			
	B	C	D	E
1. Authorization to fish				
Purse seine (40)	0	0	5	75
Longline (139)	0	0	5	75
Albacore troll (69)	0	0	5	75
Support[b] (5)	0	0	5	75
2. Vessel information[c]				
Purse seine (40)	30	30	30	76
Longline (139)	30	30	30	76
Albacore troll (69)	30	30	30	76
Support[b] (5)	30	30	30	76
3. VMS[d]				
Purse seine (40)	0	0	0	0
Longline – Hawaii, Am. Samoa (135)	0	0	0	173
Longline – other (4)	1,475	1,625	1,625	1,798
Albacore troll – North only (55)	1,430	1,520	1,715	1,798
Albacore troll – South only (0)	1,490	1,505	1,745	1,798
Albacore troll – North and South (14)	1,670	1,775	1,775	1,798
Support[b] (5)	1,400	1,700	1,745	1,798
4. Boarding and inspection[e]				
Purse seine (40)	NQ	NQ	NQ	NQ
Longline (139)	NQ	NQ	NQ	NQ
Albacore troll (69)	NQ	NQ	NQ	NQ
Support[b] (5)	NQ	NQ	NQ	NQ

[a] The approximate number of vessels affected in any given year under the baseline is indicated in parentheses for each vessel type.
[b] Elsewhere in this document, including in Table 39 that follows, support vessels are treated as being part of a given "fishery." In this table, they are treated separately from the catcher vessels in a given fishery, only because their compliance costs might differ from those of the catcher vessels. Note that although the expected number of support vessels in any of the three fisheries under the baseline is as many as five, as indicated here, the total expected number of support vessels in all three fisheries combined is also five.
[c] Assumes that vessels would fish in the EEZs of other nations, as well as on the high seas, and assumes that the value/cost of the labor required to complete the necessary forms is $50 per hour.
[d] In addition to the costs indicated in this table, all affected fishing businesses would be subject to (unquantifiable) costs associated with the risk of the confidentiality of the VMS data not being rigorously maintained, and costs associated with potential VMS unit failure, including the possibilities of having to submit manual position reports and having to return to port; these costs are the same for all the action alternatives – see text for qualitative descriptions of these expected burdens.
[e] "NQ" means not quantifiable – see text for qualitative descriptions of the expected burdens, which are modest.

Table 39 Expected effects on fishing effort, relative to the baseline, of the action alternatives, by fishery

Fishery	Action Alternatives			
	B	C	D	E
Purse seine	No effect	No effect	No effect	No effect
Longline	Neutral or slight negative effect on high seas in Convention Area; neutral or slight positive effect in U.S. EEZ around Mariana Islands and on high seas in EPO (due to substantial costs for about 4 longline vessels and up to 5 support vessels)	Neutral or slight negative effect on high seas in Convention Area; neutral or slight positive effect in U.S. EEZ around Mariana Islands and on high seas in EPO (due to substantial costs for about 4 longline vessels and up to 5 support vessels)	Neutral or slight negative effect on high seas in Convention Area; neutral or slight positive effect in U.S. EEZ around Mariana Islands and on high seas in EPO (due to substantial costs for about 4 longline vessels and up to 5 support vessels)	Neutral or slight negative effect on high seas in Convention Area; neutral or slight positive effect in U.S. EEZ around Mariana Islands and on high seas in EPO (due to substantial costs for about 139 longline vessels and up to 5 support vessels)
Albacore troll	Neutral or slight negative effect on high seas in Convention Area; neutral or slight positive effect in EPO (due to substantial costs for about 69 albacore troll vessels and up to 5 support vessels)	Neutral or slight negative effect on high seas in Convention Area; neutral or slight positive effect in EPO (due to substantial costs for about 69 albacore troll vessels and up to 5 support vessels)	Neutral or slight negative effect on high seas in Convention Area; neutral or slight positive effect in EPO (due to substantial costs for about 69 albacore troll vessels and up to 5 support vessels)	Neutral or slight negative effect on high seas in Convention Area; neutral or slight positive effect in EPO (due to substantial costs for about 69 albacore troll vessels and up to 5 support vessels)

4.2 Environmental Impacts of the Alternatives

The following discussion assesses whether the potential environmental impacts of the alternatives are significant. Both CEQ and NOAA set forth guidelines for determining whether an impact can be considered significant for the purposes of a NEPA environmental analysis. According to CEQ regulations (40 CFR 1508.27) and NOAA's Administrative Order (NAO 216-6) the determination of a significant impact is a function of both context and intensity. Context is defined as the significance of an action that must be analyzed in several contexts such as society as a whole, the affected region, the affected interests, and the locality. Intensity refers to the severity of the impact. To determine significance, the severity of the impact must be examined in terms of the type, quality, and sensitivity of the resource involved; the location of the proposed project; the duration of the effect (short- or long-term), and other consideration of context. Significance of the impact will vary with the setting of the proposed action and the surrounding area (including residential, industrial, commercial, and natural sites).

4.2.1 Target Species

As described in Section 4.1 and summarized in Table 39, none of the alternatives are expected to have substantial effects on fishing patterns. Each action alternative would bring costs to fishermen that might influence how much and where some of them fish, but the overall effect is expected to be nil or slight. At most, they would result in slight decreases in longline and/or albacore troll fishing effort on the high seas in the Convention Area, and correspondingly slight increases in other areas. Although the costs to fishermen differ among the action alternatives, the differences are not great enough to cause meaningfully different responses in terms of fishing effort.

In the case of the longline fishery, any shift in fishing effort within the WCPO would, given the available information about the stock structure of the main target species (bigeye tuna, yellowfin tuna, and swordfish), constitute a shift within the same stocks. A shift from the WCPO to the EPO could mean a shift from WCPO stocks to EPO stocks, but it would be a shift in the fishing effort of the west-coast based fleet, which is small, so the magnitude of the shift and any consequent impacts on target stocks would be minor.

In the case of the albacore troll fishery, a shift in fishing effort in the North Pacific from the WCPO to the EPO would constitute a shift within the same stock of North Pacific albacore. Vessels that fish in the South Pacific generally also fish in the North Pacific in any given year (each area during their respective seasons), so a decrease in fishing effort in the South Pacific would not result in a corresponding increase in fishing effort in the North Pacific. It is possible that such vessels would shift some of their effort to other fisheries and stocks, but again, the magnitude of any such shift is expected to be small.

In summary, none of the alternatives would be expected to jeopardize the sustainability of any target species. No significant impacts on any target species would be expected under any of the alternatives.

4.2.2 Non-Target Fish Species

As described in Section 4.2.1 for target species, none of the alternatives are expected to have substantial effects on fishing patterns. At most, they would result in slight decreases in longline and/or albacore troll fishing effort on the high seas in the Convention Area, and correspondingly slight increases in other areas, including the high seas in the EPO and the U.S. EEZ around the Mariana Islands. These effects, to the extent they occur at all, are not expected to differ markedly among the four action alternatives.

In the case of the longline fishery, any shift in fishing effort within the WCPO would, for most non-target fish species, probably constitute a shift within the same stocks. A shift from the WCPO to the EPO could mean a shift from WCPO stocks to EPO stocks, but it would be a shift in fishing effort of the west-coast based fleet, which is small, so the magnitude of the shift and any consequent impacts on non-target fish stocks would be minor.

The albacore troll fishery has very little catch of any species other than albacore, so any changes in fishing effort on, and catches of, non-target fish species (e.g., from a stock in the WCPO to a different stock in the EPO) would be small. It is possible that some albacore troll vessels would shift some of their effort to other fisheries and species (including other non-target stocks), but again, the magnitude of any such shift is expected to be small.

None of the action alternatives is expected to result in any changes in fishing practices such as gear configuration, gear deployment, fishing times, or fish handling practices, so no impacts to non-target fish species as a result of such changes are expected.

In summary, none of the alternatives would be expected to jeopardize the sustainability of any non-target fish species. No significant impacts on any non-target fish species would be expected under any of the alternatives.

4.2.3 Endangered or Threatened Species, Marine Mammals, or Critical Habitat of these Species

As described in Section 4.2.1 for target species, none of the alternatives are expected to have substantial effects on fishing patterns. At most, they would result in slight decreases in longline and/or albacore troll fishing effort on the high seas in the Convention Area, and correspondingly slight increases in other areas, including the high seas in the EPO and the U.S. EEZ around the Mariana Islands. These effects, to the extent they occur at all, are not expected to differ markedly among the four action alternatives.

In the case of the longline fishery, a shift in fishing effort from the high seas in the WCPO to the U.S. EEZ around the Mariana Islands could result in slightly different interaction patterns with sea turtles and marine mammals, but given that any such shift would involve only a portion of the fishing effort of just a few vessels, any consequent impacts on those species – whether adverse or beneficial, is expected to be very small. A shift in fishing effort from the WCPO to the EPO is possible, but it would be a shift in the fishing effort of the west-coast based fleet, which is small, so the magnitude of the shift and any consequent impacts on protected species would be trivial.

The albacore troll fishery has very few interactions with protected species in both the WCPO and EPO, so any geographical shift in fishing effort is not likely to result in any change in interaction patterns with any protected species. It is possible that some albacore troll vessels would shift some of their effort to other fisheries, but again, the magnitude of any such shift is expected to be small.

None of the action alternatives is expected to result in any changes in fishing practices such as gear configuration, gear deployment, fishing times, or catch handling practices, so no impacts to protected species or critical habitat as a result of such changes are expected.

In summary, none of the alternatives would be expected to adversely affect any endangered or threatened species, any marine mammal species, or critical habitat of such species. No significant impacts on any such species or their critical habitat would be expected under any of the alternatives.

4.2.4 Non-indigenous Species

None of the action alternatives is expected to result in any changes in fishing patterns or practices that could be related to the introduction, spread, or distribution of non-indigenous species. For example, the frequency and locations of port calls by fishing vessels are not expected to be affected. Although slight shifts in the geographical distribution of fishing effort might occur under the action alternatives, none of the shifts would involve movement of fishing vessels into areas that are not already routinely visited and fished.

No significant impacts related to the introduction or spread of non-indigenous species would be expected under any of the alternatives.

4.2.5 Biodiversity and Ecosystem Function

In general, the greater the fishing effort in any given location, the greater the possibility of the consequent fishing mortality (on target and non-target species) affecting biodiversity and ecosystem function. As described in Section 4.2.1 for target species, none of the alternatives are expected to have substantial effects on fishing patterns. At most, they would result in slight decreases in longline and/or albacore troll fishing effort on the high seas in the Convention Area, and correspondingly slight increases in other areas, including the high seas in the EPO and the U.S. EEZ around the Mariana Islands. These effects, to the extent they occur at all, are not expected to differ markedly among the four action alternatives. Any shift in fishing effort as a result of any of the action alternatives would likely be too small to have any discernible effect on biodiversity or ecosystem function.

None of the alternatives would be expected to have a substantial impact on biodiversity or ecosystem function within the affected area. No significant impacts on biodiversity or ecosystem function would be expected under any of the alternatives.

4.2.6 Ocean and Coastal Habitats, Essential Fish Habitat, National Wildlife Refuges, and National Monuments

None of the action alternatives is expected to result in any changes in fishing patterns or practices that could cause impacts to coastal or nearshore areas or habitats. For example, none of the alternatives would be expected to affect the frequency or locations of port calls by fishing vessels or to result in fishing vessels spending more time in nearshore or shallow waters.

With respect to ocean habitats, the fisheries affected by the proposed action operate in relatively shallow waters – the deepest that fishing gear is deployed is about 300 meters (longline gear). None of the action alternatives is expected to impact the ocean's benthic habitats or any habitats deeper than about 300 meters. In general, the greater the fishing effort in any given area, the greater the possibility of effects in the shallow zone of the water column. For example, fishing vessels emit waste products that could adversely affect plankton in the top-most water layer. As described in Section 4.2.1 for target species, none of the alternatives are expected to have substantial effects on fishing patterns. At most, they would result in slight decreases in longline and/or albacore troll fishing effort on the high seas in the Convention Area, and correspondingly slight increases in other areas, including the high seas in the EPO and the U.S. EEZ around the Mariana Islands. These effects, to the extent they occur at all, are not expected to differ markedly among the four action alternatives. Any shift in fishing effort as a result of any of the action alternatives would likely be too small to have any discernible effect on ocean habitats.

The relevant areas of EFH and HAPC are described in Section 3.1.2. Under the action alternatives, only the portion of the U.S. EEZ around the Mariana Islands could experience a slight increase in fishing effort, and, as stated above, this shift in fishing effort would likely be too small to have a substantial effect on ocean habitat.

Thus, none of the alternatives would be expected to cause substantial damage to ocean or coastal habitats, EFH, or HAPC. No significant impacts on such habitats would be expected under any of the alternatives.

None of the action alternatives is expected to result in any changes in fishing patterns or practices that could cause significant impacts to NWRs or the waters surrounding them. As discussed above, potential changes in fishing patterns would be limited to slight decreases in longline and/or albacore troll fishing effort on the high seas in the Convention Area, and correspondingly slight increases in other areas, including the high seas in the EPO and the U.S. EEZ around the Mariana Islands. Aside from the Guam National Wildlife Refuge, the refuges described in Section 3.1.3 are not located in the areas where there could be slight changes in fishing effort, and the potential slight increase in fishing effort in the U.S. EEZ of the Mariana Islands would likely be too small to have a significant adverse effect on the Guam National Wildlife Refuge. Of the National Monuments described in Section 3.1.3, the Marianas Trench Marine National Monument is the only one that is located in an area that could experience slight changes in fishing effort. However, as for the Guam National Wildlife Refuge, this slight change in fishing effort likely would be too small to adversely affect the monument.

4.2.7 Climate

Fishing vessels emit so-called greenhouse gases, which could lead to impacts on climate. In any given fishery, the rate of such emissions is generally positively correlated with fishing effort. Although the action alternatives could result in a geographical shift in fishing effort in the longline and albacore troll fisheries, none are expected to have a discernible effect on the magnitude of fishing effort in any fisheries.

No significant impacts on climate would be expected under any of the alternatives.

4.2.8 Unique Characteristics

Unique characteristics of geographic areas are defined in CEQ's regulations (40 CFR 1508.27) to include characteristics such as historic or cultural resources; park land, prime farmlands, wetlands, recreation or refuge lands; wilderness areas, and ecologically critical areas. The area of the proposed action, particularly the Convention Area, includes many oceanic, nearshore, and coastal areas with some of these attributes, including coral reefs. The fishing grounds of the affected fisheries, however, do not include any such areas, and some such areas are legally protected from fishing, some including buffer zones in which particular types of fishing vessels or fishing methods are not allowed. An example is the Papahanaumokuakea Marine National Monument in the Northwestern Hawaiian Islands, the boundaries of which are approximately 50 nautical miles from the islands, and in which pelagic fishing is prohibited.

Fishing vessels that would be affected by this proposed action might transit close to unique characteristics when approaching and departing ports, but none of the action alternatives would be expected to affect the location or frequency of port calls.

No significant impacts on unique characteristics of geographic areas would be expected under any of the alternatives.

4.2.9 Public Health and Safety

None of the action alternatives propose anything that would make fishermen act in any way that would be considered less safe to themselves or others relative to the baseline. An example of an action that might bring safety risks to fishermen is a temporal or quota-driven fishing closure that compels fishermen to rush to fish or to fish during weather conditions in which they otherwise would not. The VMS element of the action alternatives might bring positive impacts with respect to safety at sea, particularly for search and rescue, since vessels' positions would periodically be transmitted to NOAA. Also, VMS units often have built-in Emergency Position Indicating Radio Beacons that indicate the last reported location of the vessel.

None of the action alternatives would have any effects on the way the catch is captured, handled, or processed such that product quality would be affected, so none of the alternatives would have any impacts in terms of the safety of seafood that reaches the public.

None of the alternatives would be expected to have a substantial adverse on public health or safety. No significant impacts on public health or safety would be expected under any of the alternatives.

4.2.10 Socioeconomic impacts

This EA does not include an explicit analysis of the economic and social impacts of the proposed action or its alternatives. However, as discussed throughout this chapter, the economic burden on vessel owners/operators of the action alternatives could be sufficient to change their behavior (i.e. fishing patterns) and as a consequence possibly cause impacts to the natural and physical environments. Those economic burdens are described in Section 4.1 and the expected consequent environmental impacts are described throughout this Section 4.2.

None of the alternatives would be expected to have significant social or economic impacts.

4.2.11 Controversial impacts

None of the alternatives considered in this analysis would be expected to have impacts of a controversial nature.

4.2.12 High uncertainty

As indicated throughout Section 4.1, there is uncertainty in the analyses of expected effects on fisheries of the proposed action. For example, it is not very certain as to how many owners/operators of vessels in the albacore troll fishery would change their fishing patterns as a result of each of the action alternatives or to what degree the patterns would change (e.g., how much fishing effort would shift from the Convention Area to the EPO, relative to the baseline). It is fairly certain that there would be little difference among the four action alternatives in terms of fishermen's behavioral responses and any consequent environmental impacts.

Although the degree of uncertainty in the analyses is fairly large, the analyses identify what are reasonable upper bounds of the expected effects on the fisheries, and as indicated throughout this Section 4.2, even assuming that the upper bounds in fact occur, the environmental consequences are expected to be benign. Furthermore, the degree of uncertainty associated with the baseline (e.g., how much and where fishing effort will occur in each affected fishery in the future) is much greater than the uncertainty associated with the expected effects of the proposed action.

4.2.13 Cumulative impacts

"Cumulative impact" is defined by CEQ's regulations (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 (Council on Environmental Quality 1997). The geographic area of the analysis here is the Pacific Ocean area as described in Chapter 3. The time frame for this analysis is from the present to some years into the future. This is because for the purposes of this analysis, the past actions are all the fishery management actions that have been taken in the affected area to date, which together have resulted in the current management regime and current fishing patterns. The effects of those actions are reflected in the baseline and implicitly accounted for in the analyses of the effects of the action alternatives.

4.2.13.1 Other present actions

The other present actions are the non-discretionary elements of the rule of which this proposed action would be a part. As described in Chapter 1, those elements, which are listed in Appendix I, would be implemented simultaneously with this proposed action. As discussed above, the proposed action, under any of the action alternatives, would impose a regulatory burden on fishermen and thereby make it more costly to operate in the affected area, possibly leading to a reduction or geographical shift in fishing effort. As shown in Table 40 the non-discretionary elements would also impose a burden on fishermen, but the expected burden is minor relative to the total gross revenue earned by each fishing vessel. Accordingly, the burden of the non-discretionary elements, added to that of the proposed action, would enhance the likelihood and/or magnitude of the expected impacts of the proposed action, but only slightly so.

Table 40 Other Present Actions: Approximate burdens on fishermen of the non-discretionary elements of the rule

Element	Cost/burden
Accept and accommodate vessel observers	Longline vessels based in Hawaii or American Samoa: Minimal or no costs. Longline vessels based in Mariana Islands or on U.S. west coast: about $250 per year. Purse seine vessels: about $32,000 to $40,000 per year. Albacore troll vessels: about $170 to $350 per year. Support vessels: about $300 per year.
Mark vessel in accordance with Convention requirements	One-time cost of about $250 per vessel (except $0 for purse seine vessels): All affected vessels are already required to be marked in a specific way; this requirement would modify the specific markings that are required but not affect the periodic burden of having to repaint the markings; it would, however, impose the initial, one-time burden of immediately having to repaint the markings, estimated at $250 per vessel (with the exception of purse seine vessels, which are already required to be marked in a manner that comports with this new requirement).
Do not transship at sea from purse seine vessels	None: Vessels in the purse seine fishery are already subject to a prohibition against at-sea transshipping under the regulations implementing the SPTT; although those regulations allow for exceptions in some circumstances, vessels in the fishery have not transshipped at sea.
Report fishing effort and catch	None: All affected vessels are already subject to existing requirements that would fulfill this new requirement.
Comply with laws of other WCFPC members when in their jurisdiction	None: It is presumed that all affected vessels already operate in conformance with this requirement.
Accept and accommodate transshipment inspectors	Difficult to quantify, but minor: The frequency of such inspections is not possible to predict, but like inspections conducted under the WCPFC's high seas boarding and inspection procedures, they are expected to be rare, and they are not expected to unduly divert vessel operators or crew members from their normal activities.
Monitor specific radio frequencies	Minor: All affected vessels are already subject to a requirement to monitor the international safety and calling frequency 156.8 MHz (Channel 16, VHF-FM), and they would be required to monitor the international distress and calling frequency 2.182 MHz (HF) only if the vessel is equipped to do so.
Carry on board and make accessible International Code of Signals	Minor
Stow fishing gear when in areas in which not authorized to fish	Minor

4.2.13.2 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.

Future actions in the first category include actions taken by the United States and other nations to manage their fisheries in the WCPO, and to some extent, in the Pacific Ocean as a whole, particularly their 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, and the WCPFCIA to implement the decisions of the WCPFC). Internationally and as a whole, such actions can be expected to be driven largely by internationally agreed measures, including those adopted by WCPFC and IATTC. It is not possible to predict what specific measures will be adopted, but for the most part, given the marginal status of many of the target stocks of HMS in the Pacific Ocean, they can be 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). The cumulative impacts of the proposed action in combination with future fishery management actions are therefore not expected to be adverse.

The second category of future actions are actions that contribute to changes in oceanographic conditions. As discussed in Section 3.1.1.2, there is substantial evidence that changing climate conditions are 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 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.

Thus, actions that contribute to climate change could contribute to cumulative adverse effects on target or non-target species, although predicting any such effect with specificity would be speculative at this time. However, as discussed above, none of the action alternatives would cause significant adverse impacts on target or non-target species or increase the level of fishing effort.

Accordingly, none of the action alternatives would be expected to contribute significantly to the possible impacts of climate change on marine systems.

In summary, then, none of the action alternatives would be expected to contribute to significant cumulative adverse effects.

4.2.14 Violation of Federal, State, or Local Environmental Law

None of the alternatives would be expected to result in violations of any federal, state, or local environmental law.

4.2.15 Precedent for Future Actions

None of the alternatives would be expected to create precedent for future actions.

4.3 Mitigation Measures

No mitigation measures are required or proposed at this time.

CHAPTER 5

REASONS FOR SELECTING THE PREFERRED ALTERNATIVE

5 Reasons for Selecting the Preferred Alternative

Any of the four action alternatives would, if fully implemented, fulfill the international obligations of the United States under the Convention and be consistent with the WCPFCIA. The no-action alternative would not. Among the four action alternatives, NMFS prefers Alternative D because it would achieve what NMFS believes is the best balance between the compliance costs that would be imposed on fishermen and the effectiveness of the resulting management regime.

With respect to fishing authorizations, creating a "WCPFC Area Endorsement" that is linked to the existing HSFCA permits would provide the advantages (unlike Alternatives B and C) of being able to tie a variety of Convention-related fishing requirements to an authorization without having to create an entirely new, and more costly, permit (as in Alternative E). The advantages of making other requirements, such as VMS requirements, conditions of an authorization include: (1) identifying the pool of vessels/people that are subject to those requirements, which is important for outreach and enforcement; and (2) giving fishermen further incentive to comply with those requirements, since the authorization could be revoked if the requirements are not met. The WCPFC Area Endorsement would also provide a cost-effective and fairly reliable means of collecting the required vessel information.

With respect to the VMS, making the requirement a condition of holding a particular authorization (Alternatives D and E) would, as described above, have advantages in terms of outreach and compliance with the VMS requirement. Requiring the VMS unit to be turned on at all times while the vessel is at sea would enhance the likelihood of compliance with the requirement relative to the alternative of allowing the VMS unit to be turned on and off depending where at sea the vessel is (Alternative B). Requiring the VMS units to be turned on at all times, even at port (Alternative E), would be even more rigorous in that respect, but NMFS finds that the marginal benefit would not outweigh the costs to fishermen of having to keep the unit turned on while the vessel is, for example, at port for an extended time.

With respect to boarding and inspection, the choice of the alternative will not affect which vessels actually get boarded or the frequency of such boardings. Although the Convention's boarding and inspection scheme is focused on HMS fishing vessels, it is possible that the inspectors of other nations will attempt to board and inspect non-HMS fishing vessels. For example, they might find it necessary to board and inspect a given vessel in order to determine whether it is being used to fish for HMS. In that respect, requiring that non-HMS fishing vessels accept and accommodate boarding by inspectors of other nations would serve to advise the owners and operators of such vessels of that possibility. If the requirement were not extended to non-HMS fishing vessels (Alternatives B and C), the owners and operators of non-HMS vessels might not become aware of the possibility of an attempted boarding. In that case, they might hesitate to comply, which could lead to conflict with the inspectors, which could bring risk to the vessel's crew. Therefore, NMFS is designating Alternative D as the preferred alternative at this time.

6 Consultation

NAO 216-6 requires a listing of the agencies and persons who were consulted while preparing the EA. Table 41 lists the agencies, NOAA units, and entitites that were contacted for information. Table 42 lists the names of the individuals who were responsible for the preparation of this document.

Table 41 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
NOAA - General Counsel for Enforcement and Litigation, Pacific Islands Region
Pacific Fishery Management Council
U.S. Coast Guard
Western Pacific Fishery Management Council

7 List of Preparers

Table 42 is a list of the preparers of this document.

Table 42 List of preparers of the environmental assessment

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CHAPTER 8
LITERATURE CITED

8 Literature Cited

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9 Appendix I: Non-discretionary Provisions of the Convention

Listed in Table 43 are the provisions of the Convention that are ready for implementation but for which NMFS has no discretion in how they are implemented. These provisions are not part of the proposed action considered in this EA, but NMFS intends to implement them together with the proposed action as part of the same rule.

Table 43 Non-discretionary provisions of the Convention

Convention Provision (paraphrased from the Convention language, as each would be implemented by NMFS with respect to U.S. fishing vessels)	Convention Article No.
The owner and operator of any U.S. vessel authorized to commercially fish for HMS on the high seas in the WCPF Convention Area would, as a condition of such authorization, be required to:	
- not fish in areas under the jurisdiction of other nations if not authorized to do so by such nations;	24.3
- operate the vessel in compliance with the relevant laws of other WCPFC members when in their areas of jurisdiction;	24.3; Annex III.2
- accept and accommodate transshipment inspectors authorized by the WCPFC or other WCPFC members;	24.3; Annex III.4.2
- carry on board and make available to authorized officers of the United States and, when on the high seas or in areas under the jurisdiction of other WCPFC members, authorized officers of such members, any fishing authorization issued by the United States or such WCPFC member;	24.3; Annex III.6.1
- mark the vessel in conformance with the WCPFC's requirements, which are essentially the FAO Standard Specifications for the Marking and Identification of Fishing Vessels, which would require that the vessel be marked with its international radio call sign, or if not assigned an international radio call sign, with its federal or state vessel documentation number, preceded by the characters "USA-";	24.3; Annex III.6.3
- ensure the continuous monitoring of the international safety and calling frequency 156.8 MHz (Channel 16, VHF-FM) and, if the vessel is equipped to do so, the international distress and calling frequency 2.182 MHz (HF);	24.3; Annex III.6.4
- ensure that an up-to-date copy of the International Code of Signals is on board and accessible.	24.3; Annex III.6.5
The operator and crew of any U.S. vessel that is: (1) authorized to commercially fish for HMS on the high seas in the Convention Area or (2) used for commercial	24.3; 28.4; 28.6; Annex III.3

fishing for HMS in the Convention Area in areas under the jurisdiction of another member of the WCPFC would be required, when in the Convention Area, to accept and accommodate observers from the WCPFC observer program.[*]	
The owner and operator of any U.S. vessel used for commercial fishing for HMS in the Convention Area would be required to stow the fishing gear when in areas in which the vessel is not authorized to fish.	24.3; Annex III.6.6
The owner and operator of any U.S. vessel used for commercial fishing for HMS in the Convention Area would be prohibited to engage in at-sea transshipments of HMS from purse seine vessels in the Convention Area.	29.5
The owner and operator of any U.S. vessel used to commercially fish for HMS anywhere in the Pacific Ocean would be required to maintain and submit to NMFS information about fishing effort and catch.	Annex III.5
The owner and operator of any U.S. vessel used for commercial fishing for HMS in the Convention Area in areas under the jurisdiction of another member of the WCPFC would be required to operate the vessel in compliance with the relevant laws of such member, including any laws requiring the use of VMS units.	24.3; 24.9; Annex III.2

[*] Observer deployment rates would be determined by the WCPFC; its current target coverage level for most fleets is 5%; however, the WCPFC has mandated 100% coverage in 2010 and 2011 for purse seine vessels.

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Finding of No Significant Impact

Initial Implementation of the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean

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 (NOAA) Administrative Order (NAO 216-6, May 20, 1999). The FONSI is based on the Environmental Assessment (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-AX63), "Initial Implementation of the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean."

Background

The Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (Convention) was signed in Honolulu in September 2000 and came into force in June 2004. The Convention was ratified by, and came into force for, the United States in 2007. As a Party to the Convention, the United States has an international obligation to implement the Convention's provisions. The authority to do so is established by the Western and Central Pacific Fisheries Convention Implementation Act, Pub. L. 109-479, Sec 501, et seq., and codified at 16 U.S.C. § 6901 et seq. (WCPFCIA), which became law in 2007. Pursuant to the WCPFCIA, NMFS is promulgating regulations that would implement the provisions of the Convention that are fully specified; that is, provisions for which no further action is required by the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC) prior to implementation.

The regulations would establish requirements related to the operation of U.S. fishing vessels that are used for commercial fishing for highly migratory species (HMS) in the area of application of the Convention (Convention Area). U.S. vessels from three major sectors, purse seine, longline, and albacore troll, engage in HMS fishing on the high seas in the Convention Area. U.S. vessels from other sectors, including pole-and-line, handline, and tropical troll, may also be affected by the rule, as may U.S. support vessels, such as fish carriers and bunkers. The dominant U.S. fisheries for HMS in the Convention Area target skipjack tuna (*Katsuwonus pelamis*), yellowfin tuna (*Thunnus albacares*), bigeye tuna (*Thunnus obesus*), albacore (*Thunnus alalunga*), and swordfish (*Xiphias gladius*). The total catch of tuna made by the United States in the Convention Area is about four percent of the total tuna catch made by all nations operating in the area, as indicated in Table 20 of the EA.

The Convention's provisions to be implemented in the rule (hereafter "U.S. Initial Implementation Rule") fit into one of two categories: (1) provisions that allow NMFS discretion in methods and means to implement them, or provisions for which reasonable and feasible alternatives can be considered and analyzed; and (2) provisions that do not afford such discretion, or provisions for which no reasonable and feasible alternatives exist. The EA analyzed four action alternatives for the provisions in the discretionary category and considered the non-discretionary provisions as part of the cumulative impacts analysis, essentially as separate present actions for the purposes of the analysis. The discretionary provisions are as follows: (1) requiring U.S. commercial fishing vessels fishing for HMS on the high seas in the Convention Area to obtain an authorization-to-fish; (2) requiring the collection of information specified under Annex IV to the Convention for all U.S. vessels authorized to commercially fish for HMS in the Convention Area beyond the area of U.S. jurisdiction; (3) requiring VMS units to be carried and used by all U.S.-flagged vessels commercially fishing for HMS on the high seas in the Convention Area; and (4) requiring that U.S.-flagged commercial fishing vessels, when on the high seas in the Convention Area, accept boarding and inspection from authorized inspectors in accordance with procedures established by the WCPFC. The non-discretionary provisions, or provisions for which no reasonable and feasible alternatives exist, include the following: (1) requiring U.S. commercial fishing vessels fishing for HMS on the high seas in the Convention Area to accept on board and accommodate observers deployed as part of the WCPFC Regional Observer Program; (2) requiring commercial fishing vessels fishing for HMS on the high seas in the Convention Area to include specific identification markings; (3) prohibiting transshipment activities for U.S. purse seine vessels operating in the Convention Area; (4) requiring U.S. vessels used for commercial fishing for HMS anywhere in the Pacific Ocean to maintain and submit to NMFS information on fishing effort and catch; (5) requiring U.S. vessels used for commercial fishing for HMS in the Convention Area to comply with the relevant laws of other nations; and (6) procedures for protecting the confidentiality of information.

As stated above, NMFS analyzed four action alternatives in the EA, as well as the No-Action or baseline alternative. The action alternatives were crafted with two objectives in mind. First, they captured a wide range of possible combinations of the discretionary provisions in terms of their degree of restrictiveness, so as to facilitate analysis of a wide range of possible environmental consequences as well as a range of burdens on fishermen and effectiveness in terms of fishery management objectives. Second, the alternatives were crafted to identify combinations that make good practical sense. The U.S. Initial Implementation Rule implements Alternative D as the preferred alternative because it would achieve what NMFS believes is the best balance between the compliance costs that would be imposed on fishermen and the effectiveness of the resulting management regime.

As set forth below, this FONSI discusses the potential environmental impacts – including direct, indirect, and cumulative impacts – that could be caused by the U.S. Initial Implementation Rule's implementation of the discretionary provisions under Alternative D and the non-discretionary provisions, as analyzed in the cumulative impacts analysis.

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 (CEQ) 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 the implementation of the U.S. Initial Implementation Rule 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?

<u>Response</u>: No. Skipjack tuna, yellowfin tuna, bigeye tuna, albacore, and swordfish are the principal target species that would be affected by the implementation of Alternative D, as shown in Table 5 in Section 3.2.1 of the EA. As stated in Section 4.1 of the EA, the main effect of the discretionary requirements is

that they would, to varying degrees, make it more costly to fish, and thus provide a disincentive to fish, at least in the area of application of the requirement. However, the magnitude of the potential increases in fishing costs for any given vessel or fishing business are expected to be quite small relative to the total costs of fishing. Thus, the resulting disincentive to fish in the proposed requirements' area of application is expected to be correspondingly small. None of the requirements would directly control fishing practices per se, such as how much fishing effort is exerted, how much of a given resource may be caught, where fishing may take place, what type of fishing gear may be used, or how fishing gear may be deployed. None of the requirements would authorize or open up the possibility for a new fishery or expand fishing opportunities. None of the requirements would be anticipated to result in an increase in fishing effort in the Convention Area, and none would be expected to result in marked changes in fishing patterns anywhere. As shown in Table 40 of the EA, the non-discretionary provisions would also impose an economic burden on fishermen, but the expected burden is minor relative to the total gross revenue earned by each fishing vessel. Accordingly, the burden of the nondiscretionary provisions, added to that of the discretionary provisions, would enhance the likelihood and/or magnitude of the expected impacts of the discretionary provisions, but only slightly so.

At most, the requirements would result in slight decreases in longline and/or albacore troll fishing effort on the high seas in the Convention Area, and correspondingly slight increases in other areas. In the case of the longline fishery, any shift in fishing effort within the western and central Pacific Ocean (WCPO) would, given the available information about the stock structure of the main target species (bigeye tuna, yellowfin tuna, and swordfish), constitute a shift within the same stocks. A shift from the WCPO to the eastern Pacific Ocean (EPO) could mean a shift from WCPO stocks to EPO stocks, but it would be a shift in the fishing effort of the west-coast based fleet, which is small, so the magnitude of the shift and any consequent impacts on target stocks would be expected to be minor.

In the case of the albacore troll fishery, a shift in fishing effort in the North Pacific from the WCPO to the EPO would constitute a shift within the same stock of North Pacific albacore. Vessels that fish in the South Pacific generally also fish in the North Pacific in any given year (each area during their respective seasons), so a decrease in fishing effort in the South Pacific would not result in a corresponding increase in fishing effort in the North Pacific. It is possible that such vessels would shift some of their effort to other fisheries and stocks, but again, the magnitude of any such shift is expected to be small. Thus, overall, the implementation of the U.S. Initial Implementation Rule would not affect the sustainability of any target species.

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

<u>Response</u>: No. As described in the response to question 1, above, none of the requirements are expected to have substantial effects on fishing patterns. At most, they would result in slight decreases in longline and/or albacore troll fishing effort on the high seas in the Convention Area, and correspondingly slight increases in other areas.

As for the target species, in the case of the longline fishery, any shift in fishing effort within the WCPO would, for most non-target fish species, probably constitute a shift within the same stocks. A shift from the WCPO to the EPO could mean a shift from WCPO stocks to EPO stocks, but it would be a shift in fishing effort of the west-coast based fleet, which is small, so the magnitude of the shift and any consequent impacts on non-target fish stocks would be expected to be minor.

The albacore troll fishery has very little catch of any species other than albacore, so any changes in fishing effort on, and catches of, non-target fish species (e.g., from a stock in the WCPO to a different stock in the EPO) would be small. It is possible that some albacore troll vessels would shift some of their effort to other fisheries and species (including other non-target stocks), but again, the magnitude of any such shift is expected to be small.

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

Response: No. As described in Section 4.2.6 of the EA, implementation of Alternative D would not cause any adverse impacts to areas designated as EFH or Habitat Areas of Potential Concern (HAPC) under MSA provisions, or to ocean and coastal habitats. None of the requirements are expected to have substantial effects on fishing patterns and any geographical shifts in fishing effort would be minor and increased fishing effort would not occur in areas designated as EFH, HAPC, or ocean and coastal habitats. For example, none of the requirements would be expected to affect the frequency or locations of port calls by fishing and support vessels, or to result in fishing vessels or support vessels spending more time in nearshore or shallow waters.

With respect to ocean habitats, the deepest that fishing gear is deployed by the fisheries affected by the proposed action is about 300 meters (longline gear). None of the requirements is expected to impact the ocean's benthic habitats or any habitats deeper than about 300 meters. As described above, none of the requirements are expected to have substantial effects on fishing patterns. At most, they would result in slight decreases in longline and/or albacore troll fishing effort on the high seas in the Convention Area, and correspondingly slight increases in other areas. Any shift in fishing effort as a result of the implementation of Alternative D would likely be too small to have any discernible effect on ocean habitats.

The relevant areas of EFH and HAPC are described in Section 3.1.2. Any shift in fishing effort in these areas would likely be small and thus, would cause no substantial damage.

As discussed above, the economic burden of the nondiscretionary provisions, added to that of the discretionary provisions, would enhance the likelihood and/or magnitude of the expected impacts of the discretionary provisions, but only slightly so.

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

Response: No. As indicated in Section 4.2.9 in the EA none of the requirements propose anything that would make fishermen act in any way that would be considered less safe to themselves or others. The VMS element of the requirements might bring positive impacts with respect to safety at sea, particularly for search and rescue, since vessels' positions would periodically be transmitted to NOAA and VMS units often have built-in Emergency Position Indicating Radio Beacons that indicate the last reported location of the vessel. None of the requirements would have any effects on the way the catch is captured, handled, or processed such that product quality would be affected, so none of the requirements would have any impacts in terms of the safety of seafood that reaches the public. Substantial adverse impacts on public health or safety are not anticipated to result from the implementation of the discretionary provisions under Alternative D or from the nondiscretionary provisions.

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 described above, none of the requirements are expected to have substantial effects on fishing patterns. At most, fishing patterns would result in slight decreases in longline and/or albacore troll fishing effort on the high seas in the Convention Area, and correspondingly slight increases in other areas.

In the case of the longline fishery, a shift in fishing effort could result in slightly different interaction patterns with sea turtles and marine mammals, but given that such a shift would involve only a portion of the fishing effort of just a few vessels, any consequent impacts on those species – whether adverse or beneficial, is expected to be very small. A shift in fishing effort from the WCPO to the EPO is possible, but it would be a shift in the fishing effort of the west-coast based fleet, which is small, so the magnitude of the shift and any consequent impacts on protected species would be minor.

As described in Section 3.2.3 of the EA the albacore troll fishery has very few interactions with protected species in both the WCPO and EPO, so any geographical shift in fishing effort is not likely to result in any change in interaction patterns with any protected species. It is possible that some albacore troll vessels would shift some of their effort to other fisheries, but again, the magnitude of any such shift is expected to be small.

None of the requirements is expected to result in any changes in fishing practices such as gear configuration, gear deployment, fishing times, or catch handling practices, so no impacts to protected species or critical habitat as a result of such changes are expected.

Via correspondence dated October 22, 2008, the International Fisheries Program of NMFS Pacific Islands Regional Office (PIRO) requested initiation of informal consultation with the Protected Resources Division of PIRO and the U.S. Fish and Wildlife Service with respect to the U.S. Implementation Rule under Section 7(a)(2) of the Endangered Species Act (ESA) and its implementing regulations. By letter dated January 28, 2009, the U.S. Fish and Wildlife Service (USFWS) concluded the Section 7 informal consultation process for species under its jurisdiction, by concurring with NMFS' determination that the U.S. Initial Implementation Rule would not be likely to adversely affect ESA-listed species under the jurisdiction of USFWS.

The Protected Resources Division of PIRO reviewed the request for initiation of informal consultation and by memorandum dated November 3, 2008, determined that the U.S. Initial Implementation Rule would not modify fishery operations in any manner affecting ESA-listed marine species or their designated critical habitat that was not considered in prior consultation, and that therefore initiation or reinitiation of ESA Section 7 consultation was not required. The Protected Resources Division of PIRO stated that the U.S. fisheries to which the Convention applies have already undergone the following six ESA consultations by NMFS: (1) formal consultation on implementation of the Pelagics Fisheries Management Plan for the Western and Central Pacific (covering longline, trolling, pole-and-line, and handline fisheries in the Western Pacific) (completed in 2004); (2) formal consultation on implementation of the U.S. West Coast Highly Migratory Species Fisheries Management Plan (covering the west coast drift gillnet and north Pacific albacore trolling fisheries (completed in 2004); (3) informal consultation on the south Pacific albacore trolling fishery (completed in 2004); (4) formal consultation on the Hawaii deep-set longline fishery (completed in 2005); (5) formal consultation on the Western and Central Pacific purse seine fishery (completed in 2006); and (6) formal consultation on the Hawaii shallow-set longline fishery (completed in 2008). In addition, by memorandum dated November 3, 2008, the Protected Resources Division of PIRO determined that the U.S. Initial Implementation Rule would not cause any impacts to marine mammals not previously considered or authorized by the commercial taking exemption under section 118 of the Marine Mammal Protection Act.

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. As indicated in Section 4.2.5 of the EA, in general, an increase in fishing effort in any given location, leads to an increase in the consequent fishing mortality (on target and non-target species) affecting biodiversity and ecosystem function. However, as described above, Alternative D is not expected to have substantial effects on fishing patterns. At most, it would result in slight decreases in longline and/or albacore troll fishing effort in current fishing areas and correspondingly slight increases in other areas. Any shift in fishing effort as a result of any of the proposed requirements would likely be too small to have any discernible effect on biodiversity or ecosystem function. As discussed above, the economic burden of the nondiscretionary provisions, added to that of the discretionary provisions, would enhance the likelihood and/or magnitude of the expected impacts of the discretionary provisions, but only slightly so.

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

Response: No. Based on the economics of the different fleets, as described in Sections 3.3.2.3.4, 3.3.2.4.1.4, 3.3.2.4.2.4, 3.3.2.4.3.4, and 3.3.2.5.4 of the EA and as discussed throughout Chapter 4 of the EA, the economic burden on vessel owners/operators from implementing the discretionary provisions under Alternative D or the nondiscretionary provisions could be sufficient to change the behavior (i.e. fishing patterns) of some of those owners/operators and as a consequence possibly cause impacts to the natural and physical environments. However, as indicated in Tables 38, 39, and 40 of the EA, the compliance costs would not be substantial and the resulting environmental effects would likely be minor, as described throughout Chapter 4 of the EA and in the responses to the preceding questions.

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

Response: No. The EA was issued for public comment for a period of 30 days. Three comment letters were received in response to the proposed rule, one of which raised matters pertaining to the EA. The comment letter requested that the EA include additional information on the following matters: (1) certain costs that the U.S. Initial Implementation Rule would impose on fishermen; (2) additional description or analysis of the non-discretionary provisions of the rule; (3) specific information on the reporting and recordkeeping requirements of the rule; (4) information regarding outreach to inform vessel owners and operators of possible boarding and inspection by non U.S. parties; and (5) clarification regarding Table 41 of the EA. The comments have been addressed in the preamble to the final rule – please see Comment 1, Comment 9, Comment 11, Comment 20, Comment 21, Comment 22, Comment 24, Comment 27, and Comment 28 – and do not indicate that the effects on the quality of the human environment from the proposed action are likely to be highly controversial.

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 3.1.3 of the EA, there are several National Wildlife Refuges and National Marine Monuments in the affected environment. As indicated in Section 4.2.6 of the EA, aside from the Guam National Wildlife Refuge, the refuges described in Section 3.1.3 are not located in areas where there could be changes in fishing effort, and the potential slight increase in fishing effort in the area near the Guam National Wildlife Refuge would likely be too small to have a substantial impact on the Guam National Wildlife Refuge. Of the National Monuments described in Section 3.1.3, the Marianas Trench Marine National Monument is the only one that is located in an area that could experience slight changes in fishing effort. However, as for the Guam National Wildlife Refuge, this slight change in fishing effort likely would be too small to adversely affect the monument.

Fishing vessels that would be affected by this proposed action might transit close to National Wildlife Refuges or National Marine Monuments when approaching and departing ports, but the U.S. Initial Implementation Rule is not expected to affect the location or frequency of port calls, so no effects stemming from such transit are expected as a result of this action.

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 EA, 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 with a useful degree of certainty. As indicated in Section 4.2.12 of the EA, there is some uncertainty in the analyses of expected effects on fisheries from the implementation of Alternative D, such as, it is not very certain as to how many owners/operators of vessels in the albacore troll fishery would change their fishing patterns as a result of each of the requirements or to what degree the patterns would change.

As stated above, the main effect of the discretionary requirements under Alternative D is that they would, to varying degrees, make it more costly to fish, and thus provide a disincentive to fish, at least in the area of application of the requirement. However, the magnitude of the potential increases in fishing costs for any given vessel or fishing business are expected to be quite small relative to the total costs of fishing. Thus, the resulting disincentive to fish in the proposed requirements' area of application is expected to be correspondingly small and at the most, the requirements would result in slight decreases in longline and/or albacore troll fishing effort on the high seas in the Convention Area, and correspondingly slight increases in other areas. Because Alternative D would result in no anticipated changes in fishing practices and only slight changes in fishing effort, the effects on the human environment are not expected to be highly uncertain or involve unique or unknown risks. As shown in Table 40 of the EA, the non-discretionary provisions would also impose an economic burden on fishermen, but the expected burden is minor relative to the total gross revenue earned by each fishing vessel. Accordingly, the burden of the nondiscretionary provisions, added to that of the discretionary provisions, would enhance the likelihood and/or magnitude of the expected impacts of the discretionary provisions, but only slightly so.

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

Response: No. Section 4.2.13 of the EA presents the cumulative impacts analysis. The potential environmental impacts of the non-discretionary provisions of the U.S. Initial Implementation Rule were analyzed as other present actions as part of the cumulative impacts analysis. The implementation of Alternative D in combination with other past, present and all reasonably foreseeable future actions would likely impose a burden on fishermen that would be greater than if Alternative D were implemented alone, but the expected burden is minor relative to the total gross revenue earned by individual fishing vessels. Accordingly, the burden of all the actions combined would enhance the likelihood and/or magnitude of the expected impacts of the proposed action, but only slightly so. Thus, the overall cumulative impacts are not expected to be significant or adverse.

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

Response: No. Items eligible for listing or listed in the National Register of Historic Places or significant scientific, cultural, or historical resources are not located in the affected environment, and thus, would not be affected by the implementation of the U.S. Initial Implementation Rule.

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

Response: No. As indicated in Section 4.2.4 of the EA, the discretionary requirements are not expected to result in any changes in fishing patterns or practices that could be related to the introduction, spread, or distribution of non-indigenous species. The frequency and locations of port calls by fishing vessels are not expected to be affected and although slight shifts in the geographical distribution of fishing effort might occur, none of the shifts would involve movement of fishing vessels into areas that are not already routinely visited and fished. As discussed above, the nondiscretionary provisions, added to that of the discretionary provisions, would enhance the likelihood and/or magnitude of the expected impacts of the discretionary provisions, but only slightly so.

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. Implementation of the U.S. Initial Implementation Rule would establish the initial set of regulations needed to satisfy the international obligations of the United States as a party to the Convention, pursuant to the authority of the WCPFCIA. 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 above, the U.S. Initial Implementation Rule will establish the initial set of regulations needed to satisfy the international obligations of the United States as a party to the Convention. As such, the U.S. Initial Implementation 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. The implementation of Alternative D in addition to the other identified actions would not result in cumulative adverse effects that could have a substantial effect on target species or non-target species.

DETERMINATION

In view of the information presented in this document and the analysis contained in the supporting EA prepared for the rule "Initial Implementation of the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean," 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 EA. 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.

William L Robinson — DEC 1 8 2009

Regional Administrator
Pacific Islands Regional Office

Date